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LEEDS SCHOOL OF MEDICINE

LECTURES

ON THE

DISEASES

OF

INFANCY AND CHILDHOOD.

BY

CHARLES WEST, M.D.

FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS;
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LEEDS SCHOOL OF MEDICINE

TO

SAMUEL STEPHENS MARLING, Esq.

OF

EBLEY, NEAR STROUD,

GLOUCESTERSHIRE,

These Lectures are Dedicated,

IN ACKNOWLEDGMENT OF THE EVER ACTIVE FRIENDSHIP,

AND MORE THAN BROTHERLY KINDNESS,

WHICH HAVE MADE A LIFE-LONG DEBTOR

OF HIS

AFFECTIONATE KINSMAN,

THE AUTHOR.

LEEDS SCHOOL OF MEDICINE

PREFACE.

The substance of a considerable part of the following Lectures was addressed to the pupils of the Middlesex Hospital in the summer of 1847, and the form of lectures appeared to me to present advantages which led me to retain it, when I determined to publish the results of my observations on Children's Diseases.

These observations were made in the large field presented by the Children's Infirmary, which was first thrown open to me in the year 1839, by the kindness of my friend, Dr. Willis, then physician to that institution; to which office I succeeded on his resignation in 1842. Very nearly 14,000 children have thus been brought under my notice during the past nine years; and I have kept accurate notes of the diseases of 600, as well as of the results of 180 dissections of cases in which those diseases terminated fatally.

The time that has elapsed since the appearance of these Lectures in the Medical Gazette, has been too short to allow

me in preparing them for separate publication to do much toward supplying those deficiencies in them of which I am fully sensible. If life and health be spared me, it will be my constant endeavour to render those imperfections less numerous. I trust they may not be of a nature to detract seriously from the usefulness of the work; still less of a kind to lead into error those to whom it has been my earnest wish to prove myself a faithful guide.

96, Wimpole Street,
September 20, 1848.

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LECTURES

ON THE

DISEASES

OF

INFANCY AND CHILDHOOD.

INTRODUCTORY LECTURE.

Causes of peculiarities presented by diseases in childhood—These peculiarities are reasons for their special study—Difficulties of their study, and how to overcome them—Rules for the examination of sick children, and for taking notes of Cases.—General plan and objects of the Course.

GENTLEMEN,

IT is not without hesitation that I have determined on adding another to the already numerous courses of lectures that you are called on to attend while engaged in the study of medicine. My reasons—and I trust my justification—for so doing are furnished partly by the frequency of the diseases of infancy and childhood, partly by their fatality, but still more by their many peculiarities.

Children will form at least a third of all your patients, and so serious are their diseases, that one child in five dies within a year after birth, and one in three before the completion of the fifth year. These facts, indeed, afford conclusive arguments for enforcing on you the importance of closely watching every attack of illness that may invade the body while it is so frail; but they alone would scarcely be adequate reasons for my bringing these diseases under your notice as objects for special study.

The body, however, is not only more frail in infancy than it becomes in after life, but the sympathies between its different parts are more extensive and more delicate. One organ seldom suffers alone, but the effects even of local disease extend to the whole system, and so disorder its workings that it is often no easy matter to determine the seat of the original mischief.

Nor is this all; but many important consequences result from the period of childhood being one of unceasing development. In the adult the structure of the body is complete, and its functions are the same to-day as they were yesterday, but the child learns successively to breathe, to feel, to think; and its body is daily undergoing modifications to fit it for new duties, as well as daily growing in size and strength. Disease, therefore, not merely disturbs the present, but its influence reaches to the future; it not only interrupts the present function of the organ that is affected, but it puts a stop for a time to the completion of the general machinery of the body, or disarranges the due proportion of one part of that machinery to another. Moreover, there are periods, namely, those of the first and second dentition, when very great changes take place in the organism of the child, and when all these dangers are especially to be feared. Disease is then frequent and serious beyond what it is at other times, and every ailment then warrants a double measure of anxiety; while, on the other hand, if these epochs are safely passed, there succeeds a season of comparative immunity from many affections that before were both common and perilous.

But, if this be so, you will at once perceive that something more is essential to the successful treatment of children's diseases than to watch their advances carefully, and to adapt the strength and doses of your remedies to the tender years of your patients. It is not mere hyperbole to say that you have to study a new semeiology, to learn a new pathology, and new therapeutics. Matters of such importance cannot be properly examined at the end of a course of lectures on midwifery. I have therefore preferred making them the subjects of separate consideration during the summer, when the comparative leisure of the season will, I hope, enable some among you to study the diseases of children not only in the lecture-room, but also in the large field for their observation which you will find at the Children's Infirmary.

I must warn you, however, of one difficulty which you will encounter at the very outset,—a difficulty that disheartens many, and makes them abandon in despair the study of children's diseases. Your old means of investigating disease will here to a great degree fail you, and you will feel almost as if you had to learn your alphabet again, or as if, entering a country whose inhabitants you expected to find speaking the same language, and having the same manners as the people in the land you had lately left, you were to hear around you everywhere the sounds of a foreign tongue, and to observe manners and customs such as you had never seen before. You cannot question your patient; or if old enough to speak, still, through fear, or from comprehending you but imperfectly, he will probably give you an incorrect reply. You try to gather information from the expression of his countenance, but the child is fretful, and will not bear to be looked at; you endeavour to feel his pulse, he struggles in alarm: you try to auscultate his chest, and he breaks out into a violent fit of crying.

Some practitioners never surmount these difficulties, and the diseases of children are consequently a sealed book to them. After a time they grow satisfied with their ignorance, and will then with the greatest gravity assure you that the attempt to understand these affections is useless. They have fallen into this unfortunate error from not taking the pains to start aright: they have never learned how to interrogate their little patients, and hence they have never received satisfactory replies. I speak of interrogating them; for though the infant cannot talk, it has yet a language of its own, and this language it must be your first object to learn, if you mean ever to acquire the character of successful practitioners in the diseases of children. But, if you have not cultivated your faculties of observation, you cannot learn it, for it is a language of signs, and these signs are such as will escape the notice of the careless; if you are not fond of little children you cannot learn it, for they soon make up their minds as to who loves them, and when ill they will express their real feelings, whether by words or signs, to no one else.

There is, moreover, a certain tact necessary for successfully investigating the diseases of children. If, when summoned to a sick child, you enter the room abruptly, and, going at once to your patient, you begin to look closely at it, while at the same time you question the mother or nurse about its ailments in your ordinary pitch of voice, the child, to whom you are a perfect stranger, will be frightened, and will begin to cry; its pulse and respiration will be hurried, its face will grow flushed, and you will thus have lost the opportunity of acquainting yourself with its real condition in many respects. Besides this, the child's alarm, once excited, will not subside so long as you are present: if you want to see its tongue, or auscultate its chest, its terrors will be renewed, and it will scream violently; you will leave the room little wiser than you entered it, and, very likely, fully convinced that it is impossible to make out children's diseases.

Very different would be the result if you conducted this examination properly; and though I believe, where there is real love for children, the tact necessary for examining into their ailments will not be long in being acquired, still a few hints on this subject may not be out of place in an introductory lecture.

The quiet manner and the gentle voice which all who have been ill know how to value in their attendants, are especially needed when the patient is a child. Your first object must be, not to alarm it; if you succeed in avoiding this danger it will not be long before you acquire its confidence. Do not, therefore, on entering the room, go at once close up to the child, but sitting down sufficiently near to watch it, and yet so far off as not to attract its attention, put a few questions to its attendant. While doing this, you may, without seeming to notice it, acquire a great deal of important information; you may observe the expression of the face, the character of the respiration, whether slow or frequent, regular or unequal,

and if the child utter any sound you may attend to the character of its cry. All your observations must be made without staring the child in the face; little children, especially if ill, seem always disturbed by this, and would be almost sure to cry. If the child be asleep at the time of your visit, your observations may be more minute: the kind of sleep should be noticed, whether quiet or disturbed, whether the eyes be perfectly closed during it, or partly open as they are in many cases where the nervous system is disordered: you may too, if the sleep seem sound, venture to count the frequency of the respiration, and the beat of the pulse, but in doing this you should be careful not to arouse the child. It should be awakened gently by the nurse or mother, and a strange face should not be the first to meet its eye on awaking. If it were awake when you entered the room, it will probably in a few minutes have grown accustomed to your presence, and will allow you to touch its hand, and feel its pulse. This must always be done at as early a period in your visit as possible, in order that you may count it while the child is undisturbed, since the pulsations of the heart vary, in young children, as much as twenty in a minute under comparatively slight disturbing causes, and any inferences that you might draw from the pulse of the child, when frightened or excited, would almost certainly be erroneous. Besides the pulse, the frequency of the respiration should, if possible, be noticed, since the results obtained by a comparison of the two are always more valuable than those of either taken alone. But if this be your first visit to the child, do not, for the sake of ascertaining either of these points exactly, persevere in attempts which irritate or frighten it: probably you would, after all, be unsuccessful, and even though you were to succeed, the knowledge would not repay you for the loss of the child's confidence, which it must be your grand object to acquire and keep.

With management and gentleness, however, you will comparatively seldom fail, and while you are feeling the pulse, or with the hand on the abdomen are counting the frequency of the inspirations, you would also learn the temperature of the body and the condition of the skin. Supposing your examination has thus far been pretty well borne, you may now, probably, venture to talk to the child, or to shew it something to amuse it —as your watch or stethoscope, and while thus testing the state of its mental powers, you may pass your hand over the head, and note the state of the fontanelle, and the presence or absence of heat of the scalp.

The examination of the state of the abdomen, though too important to allow of its ever being omitted, will often lead to no satisfactory result, unless carefully managed. If you allow the nurse to change the child's posture and to lay it back in her lap, in order that you may pass your hand over its stomach, the child will often be alarmed and begin to cry. Its abdomen then becomes perfectly tense, and you cannot tell whether pressure on it causes pain, or whether the cries are not altogether the

consequence of fear. It is, therefore, the best plan to pass your hand beneath the child's clothes, and to examine the abdomen without altering its posture, while, at the same time, the nurse talks to it to distract its attention, or holds it opposite the window or a bright light, which seldom fails to amuse an infant. If there be no tenderness of the abdomen the child will not cry on pressure, or if, during your examination, the presence of flatus in the intestines should occasion pain, gentle friction, instead of increasing suffering, will give relief.

You must next examine the chest; and for this purpose immediate auscultation is always to be preferred, since the pressure of the stethoscope generally annoys the child. If the child be not in its bedgown, it will usually be your best course to have the back of its dress undone, and then, while it is seated on its mother's or nurse's lap, to kneel down behind it, and apply your ear to its chest. In all acute diseases of the lungs in infancy the condition of their posterior part is a sure index to the extent of the mischief from which they are suffering; for, owing to the infant passing so much of its time in the horizontal position, the blood naturally gravitates towards the back of the lungs, and the secretions are much more likely to accumulate in the bronchi in that situation than elsewhere: hence, if air be heard permeating the lungs throughout the whole posterior part of the chest, and unaccompanied with any considerable amount of crepitation, it may fairly be inferred that their front parts are free from serious disease, even though we should be unable to ascertain the fact by actual observation.

When you have listened thoroughly to the back of the chest, you may next percuss it. You must not percuss first and listen afterwards, as you often do in the adult; for even when practised with the greatest gentleness, percussion sometimes frets the child, and makes it cry, whereby any subsequent attempt to listen to the breathing would often be rendered unsuccessful. But you must not neglect percussion: it is of peculiar value in childhood, since auscultation is then unavoidably incomplete in many instances, sometimes quite impracticable. In practising it, however, there are some rules without attention to which you will very likely fail of acquiring any information whatever. You must never, in the child, attempt to percuss the walls of the chest immediately, but should strike on your finger, and even then very gently. The chest of the child is so resonant, that, if you percuss smartly, you will fail to perceive the finer variations in sonoriety which would be readily appreciable on gentle percussion. Always observe to compare the results obtained by percussing opposite sides of the chest, since otherwise you may overlook a very considerable degree of dulness. It often happens, too, that the lower lobes of both lungs are involved nearly equally; you must therefore notice the resonance of the lower as compared with that of the upper part of the chest. Sometimes you are compelled, by the fretfulness of the child, or by the tender-

ness of the walls of its chest, to percuss so gently as scarcely to elicit any sound. It is of importance, therefore, to attend to the sensation of solidity communicated to the finger, as well as to the sound of dulness that falls upon the ear, since, if your sense of touch be delicate, it will correct or confirm the evidence of hearing.

Having thus examined the back of the chest, you may, if the child be likely to tolerate it, try to listen at its sides, and then in front. You can, however, scarcely auscultate the front of the chest in infancy without a stethoscope, and this you will very seldom be able to use; for, if the child be not frightened, it will probably be so exceedingly amused at what it regards as specially intended for its own diversion, that it will join in the game, and disconcert you by playing with the instrument. You will encounter this difficulty in cases of phthisis in early childhood, and will often find it no easy matter to ascertain the character of the respiration in the front of the chest. In such cases you will learn all the value of percussion, which may be practised over the front of the chest as well as the back, while the state of the breathing in the upper and back part of the chest will generally be a correct index to its condition in front.

Your examination of the chest will not be complete until you have noticed the general character of the breathing, whether the whole of the chest is expanded by it, or whether the respiration is merely abdominal,—whether the child breathes as deeply as it should, or whether it makes frequent short inspirations which cannot fill the smaller bronchi. The time for ascertaining these points must vary in each case; but the earlier they are observed the better, since otherwise you run the risk of drawing your inferences not from the child's ordinary condition, but from its condition when excited and alarmed. Some of these points may be noticed though the child be so fretful that you cannot auscultate even the back of its chest satisfactorily. An imperfect auscultation, however, is better than none; for at the very worst, during the deep inspirations that are made at intervals in a fit of crying, you may ascertain how far the lungs are permeable to air, and whether the bronchi are much loaded with mucus. Independently of auscultation, too, much may be learned from the cry. If its two periods be clearly marked—the long loud cry of expiration, and the shorter, less loud, but perfectly distinct sound that attends inspiration—you may feel convinced that there exists no important ailment of the respiratory organs.

It would still remain for you to examine the tongue, and to ascertain the condition of the gums; and it is wise to defer this to the last, since it is usually the most grievous part of your visit to the child. If during any part of your previous examination it had cried, you might seize that opportunity to look at its tongue, and, if necessary, to pass your finger over the gums, thus sparing it any further distress about the matter. If you had not this opportunity, you will generally get a good view of the mouth

and throat in young infants by gently touching the lips with your finger: the child opens its mouth instinctively, and then you can run your finger quickly over its tongue, and down towards the pharynx, and thus secure a perfect view of the mouth and throat. With older children a good deal of coaxing is sometimes necessary to persuade them to open their mouth; but, if once you get your finger on the gum, you can usually keep them quiet by rubbing it, and by a little address will then seldom fail in opening the mouth wide enough to get a view of the tongue.

If little children be very ill, all this minute care in the order of your examination is not so much needed, because they will not notice so quickly; but gentleness of tone and manner will be even more necessary to soothe the pettishness and quiet the alarm of the little sufferer.

Many of the directions that I have just given you refer to the examination of infants, and become less applicable in proportion to the greater age of the patient. Minute rules for your examination of children from three years old and upwards are not needed; but patience the most untiring, and good temper the most unruffled, are indispensable.

The previous history of a patient, the circumstances under which his present illness came on, and the symptoms that at first attended it, often help to remove our doubts with reference to the nature of a disease, and sometimes greatly modify our diagnosis and influence our plan of treatment. Really trustworthy information on these points, however, is often difficult to be obtained, and the attempt to elicit it is almost sure to be unsuccessful, if the questions put to the patient are proposed at random, and without some previously well-digested plan on the part of the physician. One great object of clinical instruction is to teach the student so to conduct this as well as other parts of his examination of the sick, as to throw from every source the greatest possible amount of light upon the nature of the disease, and thus to fit himself to decide with some approach to certainty on the means most likely to effect its cure. Such instruction has been amply afforded you in the wards of this hospital; but you must allow me to detain you while I point out the subjects towards which your inquiries must be especially directed in the case of children, since they differ in many respects from the questions that you would propose if your patient were an adult.

We will suppose, if you please, that a child is brought to you of whose case you would wish to preserve a record. Its name, age, sex, and residence will form of course the first entry in your note-book; but your next inquiries should be as to the number of living children that the parents have had, whether any of those children have died, and, if so, at what age, and of what diseases, and as to the health of both parents, and of their immediate relatives. The object of these questions is to ascertain whether there exists any hereditary tendency to disease in the family, since that plays a most important part in many of the affections of childhood, and

symptoms that in the child of healthy parents would cause you but little uneasiness, would at once excite serious alarm if you knew that some members of the family had died of hydrocephalus or consumption, or had been the subjects of scrofula.

Many of the most serious affections of childhood occur within the period of a few years, and after a certain age are comparatively rare in their occurrence, and generally mild in their character. It is therefore very desirable, when any ailment is coming on, the nature of which is not yet quite apparent, to know which of the diseases incidental to childhood have already affected your patient. With this view you would ask whether the child has been vaccinated, or has had the small-pox, and whether it has passed through any other of those affections, such as chicken-pox, hooping-cough, measles, or scarlatina, which generally come on in early life. If the child had suffered from any other disease, you should learn its nature, the age at which it occurred, and any other point of importance connected with it.

In writing out your history of the case, these preliminary matters would naturally be mentioned at the beginning, and though you would not follow any very strict order in proposing your questions, yet it is always desirable to obtain information on these points at an early stage of your examination, since it may guide you in some of the questions that you afterwards propose, or may lead you to pay particular attention to symptoms which otherwise would not seem to be of much moment. Besides, if you postpone these inquiries till you have nearly completed your examination of the patient, the parents will probably apprehend that they are suggested by some doubt and apprehension in your mind as to the nature of the case, and will distress themselves by causeless fears, or perhaps disconcert you by questions to which you are not prepared to return a positive answer.

There are two other points which bear on the general condition of the child, to one or both of which your inquiries must in many instances be directed. If your patient be an infant at the breast, you must learn whether it lives entirely on its mother's milk, or has other food besides. If it has been weaned, you must ask its age at weaning—whether it was taken from the breast on account of any failure in its own health, or its mother's, and on what diet it has since been fed. The process of dentition is the other subject for inquiry, and in reference to it you must ascertain how many teeth the child has, and which they are—whether they were cut easily or with difficulty, the age at which teething commenced, and the time that has elapsed since any fresh teeth appeared.

You may now endeavour to obtain a clear and connected history of the present illness, and for this purpose it is well to begin with asking when did the child last seem quite well? since you thus get a fixed starting point from which you can make the mother or nurse set out in her detail of symptoms. The date thus assigned, indeed, will often be a wrong one,

the disease having begun before with some symptom that was not noticed, or its real origin having been considerably subsequent to its supposed commencement. But notwithstanding this possible error, you derive much advantage from thus making sure of the symptoms being told you in something like their chronological order, since otherwise it is very likely that those only would be mentioned which had chanced to strike the mind of the mother or nurse, while the others would be passed over in silence. Your object in the examination must not be to curtail the garrulity of the nurse, or to suppress the mother's expression of her sometimes imaginary fears, but to get as clear an account as possible of every thing that has been observed. You must be careful not to underrate the value of the information they communicate, or even of the opinions they express. Both are much more likely to be correct, when your patients are children, than when they are adults. A mother hanging over her sick infant, or a nurse watching the child she has helped to rear from babyhood, may sometimes see dangers that have no existence, but will generally be the first to perceive the approach of such as are real. You see the child but for a few minutes, and at distant intervals, and the excitement or alarm which your presence is so likely to occasion may greatly modify its condition during your visit. They tend the little one by day and night, notice each movement, and seize the most transient variations in its expression.

I need not say much concerning the necessity of inquiring about the appetite and thirst, the state of the bowels, and the appearance of the evacuations, for these are points which you would investigate in patients of every age. I will just mention, however, that the degree of appetite and thirst cannot be so readily determined in the infant as they may be in the adult, or even in the weaned child ; for an infant may suck, not because it is hungry, but in order to quench its thirst. That extreme craving for the breast, which is appeased only so long as the child is sucking, while the milk swallowed is speedily vomited, may be taken as a sign of thirst ; but it is always better to record the fact than the inference. It is likewise often desirable to let the infant be put to the breast in your presence, not only for the sake of observing the above-mentioned facts, but also in order to notice the vigour with which it sucks, the ease or difficulty with which it swallows, and other similar points from which very important conclusions may often be drawn.

Before you venture on drawing any inferences from the state of the child at the time of your visit, you should ascertain whether it has just before been taking food, or has been recently excited or fatigued by being washed or dressed, since comparatively trivial causes are sufficient to accelerate the pulse and respiration, and to give rise to changes which might, if unexplained, lead you to very erroneous conclusions. Any such circumstances ought of course to be mentioned in your notes, as should also

the fact of the child being asleep at the time of your visit, since that would explain even a very considerable diminution in the frequency of the pulse and respiration.

But if you are carefully to observe all the points which I have mentioned, and to make yourselves thoroughly masters of a case, you must be most lavish of your time; you must be content to turn aside from the direct course of investigation, which you would pursue uninterruptedly in the adult, in order to soothe the waywardness of the child, to quiet its fears, or even to cheat it into good humour by joining in its play; and you must be ready to do this, not the first time only, but every time that you visit the child, and must try to win its affections in order to cure its disease. If you fail in the former, you will often be foiled in your attempts at the latter. Nor is this all: you must visit your patient very often, if the disease be serious in its nature and rapid in its course. New symptoms succeed each other in infancy and childhood with great rapidity; complications occur that call for some change in your treatment, or the vital powers falter suddenly when you least expect it. The issues of life and death often hang on the immediate adoption of a certain plan of treatment, or its timely discontinuance. Do not wait, therefore, for symptoms of great urgency before you visit a child three or four times a day, but if the disease be one in which changes are likely to take place rapidly, be frequent in your visits as well as watchful in your observation.

You will perceive, gentlemen, by the subjects which I have endeavoured to bring before you this day, that I have assumed it to be your wish to acquire a practical knowledge of the diseases of children. But real acquaintance with disease is not to be gained in the lecture-room: it is to be obtained by painful and persevering observation, and for this purpose you are used to spend much of your time in the wards of the hospital, and the sick bed becomes to you a spot of peculiar attraction. Unfortunately I cannot open to you the wards of a children's hospital, for at present there is no such institution in the country; but I shall be most happy to meet those of you who can spare the time any Tuesday or Friday morning, at 10 o'clock, at the Children's Infirmary. You will then have the opportunity of seeing a large number of children who are brought as out-patients to the institution, and I will do all in my power towards rendering your visits there really profitable to you.

You will naturally think, that before I finish this lecture I should tell you something definite about the subjects that I mean to bring before your notice, and the manner in which I propose to treat them. The title of these lectures can, I should think, scarcely need any explanation, for by the diseases of infancy and childhood you will naturally understand all those affections which are either limited in the time of their occurrence to early life, or which, though incidental to all ages, yet in the child present many peculiarities in their symptoms, and require many important modifi-

cations in their treatment. Some of these diseases, indeed, are usually allotted to the care of the surgeon, and on their examination I will not enter, since I could tell you nothing more than has already been better said by others. They, however, are but few in number, and most of them are purely local affections, so that these omissions will not be many, and most of them not important.

In the description of the diseases of children, no practically useful end would be attained by following any elaborate nosological system. I shall therefore adopt the most simple classification possible, and shall treat in succession of the diseases of the nervous system, of the respiratory and circulatory, and of the digestive systems and their appendages. There will still remain one very important class of affections, namely, fevers; and these I propose to consider last of all, because much of their danger arises from their complications, and to treat them judiciously you must be familiar with the diseases of the brain, the lungs, and the bowels. In this plan it will be easy to detect a want, perhaps too great a want, of scientific arrangement, but the one object of my endeavours will be to communicate to you, as clearly as I can, such information as may be most useful to you in the discharge of your daily duties.

With this view, I have, while composing these lectures, tried to think over the doubts I felt, the difficulties I met with, and the errors I fell into, when, some years ago, I entered on the office of physician to a large institution for the cure of children's diseases. I have presumed that where I had encountered difficulties there you might meet them too,—that where I had made mistakes there you would need a guide,—and remembering the many anxious hours I passed when I hesitatingly adopted some course of treatment which I feared might after all be a mistaken one, it has been my endeavour to lay down, not only the rules for the diagnosis, but also the indications for the treatment of each disease as minutely as possible.

To the task before me I now apply myself, with a deep conviction of the narrow limits of my own knowledge, but still feeling that I have contracted an obligation to impart to others what I trust experience has taught me. My end will be answered, if you learn it at an easier rate than I did; and if I can be the means of saving you from some of those errors in diagnosis, and some of those mistakes in treatment, which, for want of some one to guide me aright, I committed.

LECTURE II.

Diseases of the brain and nervous system—their extreme frequency in early life favoured by the rapid development of the brain, and the wide variations in the cerebral circulation during childhood.—Peculiar difficulties of their study.—Symptoms of cerebral disease in the child.—Convulsions, their frequency in great measure due to the predominance of the spinal system in childhood—may be excited by many causes—hence attention should always be paid to the precursors of an attack. Description of a fit of convulsions.

It can scarcely be necessary to assign many reasons for beginning this course of lectures with the study of the *diseases of the nervous system*. The subject, although beset with many difficulties, has always engaged much attention; partly, no doubt, from the natural tendency of the human mind to inquire most curiously into those truths that seem most hidden; but still more from the alarming nature of many of the symptoms that betoken disturbance of the nervous system, and from the frequently fatal issue of its diseases. But besides the general interest and importance of these affections, at whatever age they may occur, *their extreme frequency in early life* gives them an additional claim on our notice.

It appears from the Fifth Report of the Registrar-General, that 7503 out of 45,000 persons who died in the metropolis during the year 1842, were destroyed by the various diseases of the nervous system. But 4847 of these 7503 deaths took place during the first five years of existence; or in other words, 64 per cent. of the fatal disorders of the nervous system occurred within that period. Even after making a very large allowance for the possible errors of statistical data, this predominance of the diseases of the nervous system in early life is far too remarkable to be overlooked; though some persons, not being able to account for the fact, have affected to doubt its reality.

The fact is one which cannot be gainsaid; and though we cannot pretend thoroughly to account for it, yet *two considerations may help in some degree to explain it.*

The *first* is derived from our knowledge of the circumstance, that in an organ whose development is rapidly advancing, many diseased processes also, if once set up, will go on with proportionate activity. Now there is no organ in the body, with the exception of the pregnant womb, which

undergoes such rapid development as the brain in early childhood. It doubles its weight during the first two years of life, and reaches nearly, if not quite, its maximum by the end of the seventh year. This same active state of the nutritive or vegetative processes in the brain of the child renders the organ liable to have disease set up in it by causes which would produce little or no injurious effect on the brain of the adult.

In the *second* place, the brain in infancy is much more exposed to disorder than that of the adult, owing to the far wider variations of which the cerebral circulation is susceptible in early life than subsequently. Nor is the cause of this difficult to discover. The cranium of the adult is a complete bony case, and the firm substance of the brain affords a comparatively unyielding support to the vessels by which it is nourished. It has been proved, indeed, by Dr. Burrows* that the quantity of blood which these vessels contain is not always the same, as some have erroneously supposed: still its variations must needs be circumscribed within far narrower limits than in the child, whose cranium, with its membranous fontanelles and unossified sutures, opposes no such obstacle to the admission of an increased quantity of blood, while the soft brain keeps up a much slighter counter-pressure on the vessels than is exerted by the comparatively firm parenchyma of the organ in the adult. If the circulation in the child be disturbed, whether from difficulty in the return of venous blood, as during a paroxysm of hooping-cough, or from increased arterial action, as at the onset of a fever, or during the acute inflammation of some important organ, the brain becomes congested, and convulsions often announce the severity of the consequent disturbance of its functions. The same causes, too, which expose the brain to be overfilled with blood, render it possible for it to be drained of its blood more completely than in the adult. This fact, which you should always bear in mind when treating the diseases of infants, is one reason why excessive depletion induces a far more serious train of symptoms in young children than succeed to it in the grown person.

It happens unfortunately that while there are special reasons for studying the diseases of the nervous system in childhood, *their study is beset with special difficulties* which we do not meet with in the adult. Disordered intellect, altered sensation, impaired motion, are the three great classes to which the symptoms of disease of the nervous system may be referred. If our patient be an adult, he tells us of his altered feelings; he perhaps experiences some disorder of his intellectual powers even before it has become observable to others, and, thus timely warned, we can often take measures to prevent the advance of disease, and to ward off that impairment of the motor powers which in his case we know usually indicates

* In his Lumleian Lectures, published in the Medical Gazette, April 28, and May 6, 1843, and subsequently in his work on Disorders of the Cerebral Circulation, &c., 8vo. Lond. 1846.

the occurrence of some grave organic lesion. In the child things follow a very different course. At first it cannot express its sensations at all, while, long after it has acquired the power of speech, it knows too little how to shape its ideas into words to give a correct account of what it feels; and we cannot expect to learn much from the disturbance of an intellect which as yet has scarcely asserted its claim to be any thing higher than the instinct of the animal. The value of the symptoms, too, is different; for disturbance of the motor power, which is comparatively rare in the adult, except as the consequence of some serious disease of the brain, takes place in the child in cases of the mildest as well as the most serious ailments; and we may even observe convulsions recurring several times a day for many days together, apparently without adequate cause, and not leading to any serious impairment of the child's health.

How, then, are we to attain in the child to anything beyond the merest guess-work in our diagnosis of diseases of the nervous system, when we are deprived to so great an extent of that information which the state of his intellect and the description of his sensations afford us in the adult? What meaning are we to attach to that symptom—the impairment of the motor power, which in the adult we look on as of such grave import, but which we meet with in the child under such varying conditions and in by far the greater number of cases? The task, indeed, is attended with difficulty, and the solution of these inquiries will need that you should devote to it some time and some careful observation; but if you do this you need not despair of learning much about an infant's sensations, and the state of its mind, and will at length become able rightly to interpret the meaning even of a fit of convulsions.

It may be well to pause here for a moment, and briefly to pass in review *the symptoms* by which disease of the nervous centres, and especially of the brain, manifests itself in infancy and early childhood.

The painful sensations which the infant experiences soon show themselves in the haggard, anxious, or oppressed look, which takes the place of the naturally tranquil expression of its countenance. It often puts its hand to its head, or beats or rubs it, or while lying in its cot, bores with its occiput in its pillow, owing to which, in children who have suffered for any time from uneasy sensations in the head, you will often find the hair worn quite off the occiput. It turns its head away from the light, and lies much with its eyes half closed, in a state of apparent drowsiness, from which it often arouses with a start, and cries. The cry, especially in inflammatory disease, is peculiar; it is generally a low, almost constant moan, very sad to hear,—interrupted occasionally by a sharp, piercing, lamentable cry, almost a shriek. If the child be young it will often seem relieved by being carried about in its nurse's arms, and while she is moving will cease its wail for a time, but begin again the moment she stands still. You will sometimes observe, too, that if moved from one person's arms to

those of another, or even if its position be but slightly altered, a sudden expression of alarm will pass across its features; the child is dizzy, and afraid of falling.

You see, then, that even in the infant there is a language of signs by which we learn with certainty the existence of pain in the head, and the connexion of this pain with dizziness and intolerance of light. You must beware, however, of concluding from any one set of symptoms that the head is the seat of real disease. The child, as well as the adult, may have sick headache, and the degree of febrile disturbance, of heat of surface, and of heat of head, together with the state of the digestive organs, are all to be taken into account in forming your diagnosis.

Something may be learned of the state of the mental powers and of the feelings even in early infancy Have you never watched an infant on its mother's lap, and noticed the look of happy recognition with which its eye meets that of its mother? An early result of cerebral disease is to interrupt this intercourse: the child now never seems to catch its mother's eye, but lies sad and listless, as if all persons were alike indifferent to it; or at other times even familiar faces cause alarm, the child apparently not recognising those who yet have always tended it. This disturbance, however, is but momentary, and the child subsides into its former condition, and allows itself to be taken by those at whom a minute before it seemed frightened.

But these symptoms are to be interpreted by the light thrown on them from other sources, and by the information, both positive and negative, thus obtained. You fear that disease is going on in the brain; but is the skin hot?—is there heat of head?—are there frequent flushings of the face, and does the accession of each flush seem connected with an increase of agitation and distress, or followed by a deepening of the drowsiness? Is the fontanelle prominent and tense, or are the pulsations of the brain to be felt with unusual force through it?—are the veins of the scalp full, or do the carotids beat with unusual force? What is the character of the pulse?—is it not merely increased in rapidity, but even when examined under exactly similiar condition, does it afford a different result each time? Do you find it irregular in frequency, or unequal in the force of its beats, or even distinctly intermittent. Again, what is the state of the pupil?—is it generally contracted, as if to exclude light as much as possible from the over-sensitive retina? or is it usually dilated, and does it act slowly, as though disease had deadened the sensibility of the nervous system, or do the pupils of the two eyes not act simultaneously, but one more readily than the other? Do the pupils oscillate under the light; at first contracting, then dilating, and either remaining dilated or continuing to oscillate, though within narrower limits, and with a tendency to remain more dilated than at first? Or, lastly, do you find, when the child is roused, this oscillation of the pupil going on under the ordinary amount of light that

enters the chamber? Now all of these are indications of disordered function of the brain, and many of them point to disorder of a very serious kind.

But there are yet other sources from which we must not neglect to seek for information. Much may be learned from the state of the digestive functions. The bowels are almost always disturbed, usually, though not invariably, constipated, while nausea and vomiting are seldom absent. I am not acquainted with any one symptom which should so immediately direct your attention to the brain, as the occurrence of causeless vomiting, and especially its continuance. At first, perhaps, the child vomits only when it has taken food; but before long the stomach will reject even the blandest fluid, and then the efforts at vomiting will come on when the stomach is empty, a little greenish mucus being rejected, with no relief, the retching and vomiting soon returning. I shall have occasion to dwell again upon the importance of this symptom, which I have known continue for several days before any other indication of cerebral disease could be discovered. In children of three or four years old this occurrence would scarcely be overlooked; but the case is different with infants, who so often vomit the milk when ill, that the mother or nurse might fail to mention it to you if you did not make special inquiries with reference to that point.

The manner in which the functions of the respiratory organs is performed is also not to be overlooked. That peculiar, unequal, irregular breathing to which the name of cerebral respiration has been applied, though of considerable value when present, is sometimes not observed, or not until the disease of the brain is already so far advanced that all questions of diagnosis have long been set at rest. There is, moreover, a short, hard, hacking cough, which you may sometimes hear, and the import of which you ought to be acquainted with, since it betokens disease of the brain, not of the lungs. There are peculiar sounds, too, which sometimes attend respiration, and are known as indicating disturbance of the nervous system. To these, however, I shall have to return hereafter, since they betoken a disease of a serious nature, known by the name of spasmodic croup, and which I must, in the course of these lectures, describe in full.

I have purposely delayed till now speaking of the indications of cerebral disease afforded by the occurrence of *convulsions*. The symptom is one undoubtedly of great importance, since it is observed in almost every case of serious disease of the brain, at some stage or other of its progress. The very frequency of the phenomenon, however, and the great variety of the circumstances under which it occurs, render it difficult for us rightly to interpret its meaning. Perhaps it will help us to understand it if we bear it in mind that in a large proportion of cases convulsions in the infant answer to delirium in the adult. In early life the superintendence of the motor power is the chief function of the brain, which has not yet attained to its highest office as the organ of the intellect. Hence the convulsions which you may observe to come on in infancy in the course of some acute

diseases, such as inflammation of the lungs, do not import that any new malady has invaded the brain, but simply that the disease is so serious as to disturb the due performance of all the functions of the organism, and of those of the brain in common with the rest. Convulsions at other times take place in infancy not as the result of any abiding disease of the brain, but simply in consequence of those anatomical peculiarities which allow of a much more sudden and more considerable congestion of the cerebral vessels than can occur in the adult. Of this kind are frequently the convulsions that come on during a paroxysm of hooping-cough, which are induced by the impediment to the return of blood from the head, and which cease so soon as that impediment is removed by the child taking a deep inspiration. But these two considerations are, it must be owned, by no means adequate to explain the very great frequency of convulsions in children, though they account for much that otherwise would be inexplicable.

The grand reason of their frequency is no doubt to be found in the *predominance of the spinal over the cerebral system in early life.* In the adult, the controlling power of the brain checks the display of those reflex movements which become at once evident if disease heighten the excitability of the spinal cord, or cut off the influence of the brain from the paralysed limb, or even if sleep suspend that influence for a season. When the child is born the brain is but imperfectly developed, its functions are most humble, and convulsions are then so frequent that they are computed to occasion 74 per cent. of all deaths which take place during the first year of existence, from diseases of the nervous system. In the next two years the brain more than doubles its weight, and deaths from convulsions sink to nearly a third of their former frequency. In proportion as the brain increases in size, and its structure acquires perfection, and its higher functions become displayed, convulsions grow less and less frequent, until from the 10th to the 15th year they cause less than 3 per cent., and above 15 less than 1 per cent., of the deaths from diseases of the nervous system.*

But a little observation will show you, that though convulsions are often the immediate cause of death, yet this fatal event is rare during childhood in

* The first line in this table shows the proportion per cent. of deaths from diseases of the nervous system at different ages, to the deaths from all causes in the metropolis; and the second line the proportion borne by deaths from convulsions to deaths from diseases of the nervous system in general.

Under 1 year.	From 1 to 3 years.	From 3 to 5 years.	Total under 5 years.	From 5 to 10 years.	From 10 to 15 years.	Total above 15 years.
33	20.9	20	26.4	15.9	9.3	9.3
74.2	27.1	18.1	56	10.8	2.7	.9

Deduced from the 5th Report of Registrar-General.

comparison with those instances in which they pass off without any serious result, and that in proportion to their frequency they less often betoken serious disease of the brain in the child than in the adult, while any cause which greatly excites the spinal system may be attended by them. The disturbance of the spinal system, which ushers in fever in the adult, shows itself by shivering. In the child, the same disturbance often shows itself not by shivering but by convulsions, or convulsions may be induced by a constipated state of the bowels, by the presence of worms in the intestinal canal, or of a calculus in the kidney, or by the pressure of a tooth upon the swollen gum. Hence your first duty is, in every case, to ascertain where is the seat of the irritation which excited the nervous system to this tumultuous reaction. If the fits come on in an advanced stage of some serious disease, they are probably only the indications that death is busy at the centres of vitality; if they attack a child labouring under hooping-cough, they point to a congested state of the brain, the consequence of the impeded circulation through the lungs; if they occur in a child apparently in perfect health, they probably indicate that the stomach has been overloaded, or that some indigestible article of food has been taken; or, if that be certainly not the case, one of the eruptive fevers is perhaps about to come on; most likely either small-pox or scarlatina.

To determine the *cause of the convulsions* you must acquaint yourself with the history of the child's health for some time before any threatening of them had appeared; you must learn whether the child has ever suffered from worms, whether its digestive functions have long been out of order, or whether the process of dentition, which is now perhaps going on, has been attended with much constitutional disturbance. But, besides all these points, your inquiries must be still more carefully directed to ascertain whether any cerebral symptoms preceded the attack, and if so, what was their nature, since it is seldom that acute disease of the brain sets in with convulsions. You will sometimes, indeed, be told that the child was well until a convulsive seizure suddenly came on; but on inquiring minutely it will usually be found that some indications of cerebral disease had been present for days, though not sufficiently severe to attract much attention. In cases of apoplexy, of intense cerebral congestion, and of phrenitis, convulsions occur at a very early period; but even here, extreme drowsiness, great pain in the head, and vomiting, usually precede for a few hours the convulsive seizure. When the brain is thus seriously involved, the recovery from the convulsions is very imperfect, coma perhaps succeeding to them, or the evidence of cerebral disease being so marked as to leave no doubt of the brain being affected. Tubercle sometimes remains for a long time after its deposition in the brain, without giving rise to any well-marked symptoms, its presence being at length announced by a fit of convulsions. These convulsions are seldom at first very severe, but you will learn to dread them more than those which assume a more formidable appearance, from noticing either that one side of the body is exclusively affected, or, at

least, that there is a marked preponderance of the affection on one side. It is well to bear in mind, too, that convulsions may occur from a want of blood in the brain as well as from its excess, and that the convulsions which come on in some ill-nourished infants may indicate a state of atrophy of the brain.

I must, however, have said enough already, to impress upon you the importance of narrowly scrutinising the meaning of every attack of convulsions. But, though so important, there are few tasks more difficult. You have to maintain your own self-composure at a time when all around you have lost theirs; to extract truth as you best may from the imperfect, often exaggerated, accounts of anxious relatives; to observe not only minutely but quickly, and to come to a speedy decision; since while in those cases which require active treatment delay is almost synonymous with death, there is at least as great danger of destroying your patient by that "*nimia diligentia*" to which the prejudices of the nurse and the fears of the friends will often conspire to urge you.

It is well to watch closely the *first indications* of that disturbance of the nervous system which will be likely to issue in *convulsions*. And here let me recommend you not to listen with too incredulous an ear to old nurses, who may tell you that a child has been much convulsed, while you find upon inquiry that it has not had any fit. When they say that a child has been much convulsed, they mean usually that it has shown many of the symptoms which forebode an attack of general convulsions. These forebodings are often induced by dyspepsia, or disorder of the bowels in young infants, and have been described by writers under the name of "inward fits." A child thus affected lies as though asleep, winks its imperfectly closed eyes, and twitches the muscles of the face—a movement especially observable about the lips, which are drawn as though into a smile. Sometimes, too, this movement of the mouth is seen during sleep, and poets have told us that it is the "angel's whisper" which makes the babe to smile,—a pretty conceit of which we can scarce forgive science for robbing us. If this condition increase, the child breathes with difficulty, its respiration sometimes seems for a moment almost stopped, and a livid ring surrounds the mouth. At every little noise the child wakes up, it makes a gentle moaning, brings up the milk while sleeping, or often passes a great quantity of wind, especially if the abdomen be gently rubbed. When the intestinal disorder is relieved, these symptoms speedily pass away, nor have we much reason to fear general convulsions so long as no more serious forebodings show themselves. There is more cause for apprehension, however, when we see the thumbs drawn into the palm either habitually or during sleep; when the eyes are never more than half closed during sleep; when the twitching of the muscles is no longer confined to the angles of the mouth, but affects the face and extremities; when the child awakes with a sudden start, its face growing flushed or livid, its eyes turning up under the upper eyelid, or the pupils suddenly dilating while the counte-

nance wears an expression of great anxiety or alarm, and the child either utters a shriek or sometimes begins to cry.

When a *fit* comes on, the muscles of the face twitch, the body is stiff, immoveable, and then in a short time, in a state of twitching motion, the head and neck are drawn backwards, and the limbs violently flexed and extended. Sometimes these movements are confined to certain muscles, or are limited to one side. At the same time neither consciousness nor sensation is present. The eye is fixed and does not see, the finger may be passed over it without winking, the pupil is immoveably contracted or dilated, the ear is insensible even to loud sounds, the pulse is small, very frequent, often too small and too frequent to be counted; the breathing hurried, laboured, and irregular; the skin bathed in abundant perspiration.

After this condition has lasted for a minute, or ten minutes, or an hour or more, the convulsions cease; and the child either falls asleep, or lies for a short time as if it were bewildered, or bursts into crying, and then returns to its senses, or sinks into a state of coma in which it may either be perfectly motionless, or twitching of some muscles may still continue; or, lastly, it may die in the fit. This, however, is not usual except when the convulsions have come on in subjects exhausted by previous disease, or when they are the result of apoplexy or intense cerebral congestion, such as takes place occasionally in hooping-cough, or when they are associated with that closed state of the larynx which occurs sometimes in spasmodic croup.

This preliminary examination of the symptoms of disturbance of the nervous system has placed us in a position to commence our investigation of the different forms of cerebral disease, on which we will enter at the next lecture.

LECTURE III.

Congestion of the Brain.—Active congestion comes on at the onset of eruptive fevers, or is induced by exposure to the sun, or attends dentition, or is excited by various other causes—Symptoms in each of its three stages—Treatment—Special rules for depletion and the application of cold—Active measures not always appropriate. Passive congestion supervenes on hooping-cough, or is connected with disorder of the digestive organs in weakly children, or is induced by unfavourable hygienic causes—Its symptoms and treatment.

In the last lecture I endeavoured to explain some of the reasons for the greater frequency of affections of the nervous system in infancy than at any other period of life. You will remember that I then called your attention to certain structural peculiarities of the brain which expose its vessels to be overloaded with blood under the influence of causes that would be wholly inadequate to produce such an effect in the adult. A distinguished German physician, Dr. Mauthner, of Vienna,* on examining the bodies of 229 children who had died of various diseases, found a congested state of the vessels of the brain in 186; and I shall have occasion to warn you over and over again to be on the watch against *congestion of the brain*, as a condition which is very likely to come on in the course of affections even of distant organs. But it is not merely as a serious complication of many other diseases that this cerebral congestion deserves your notice: its importance depends still more on its constituting the first and curable stage of many diseases of the brain, which, unless arrested at the outset, soon pass beyond the resources of our art.

Any cause which greatly increases the flow of blood to the head, or which greatly impedes its reflux, may give rise to a congested state of the brain; and, according as this state is induced by the one or the other cause, it is said to be *active* or *passive*. The head symptoms which often usher in the eruptive fevers depend upon the former cause; the convulsions which sometimes occur during a fit of hooping-cough result from the latter. The brain may become actively congested at the time of teething, or from exposure to the sun, or from a blow on the head; or a state of passive

* Die Krankheiten des Gehirns und Rückenmarks bei Kindern. 8vo. Wien. 1844, p. 12.

congestion may be induced by some mechanical impediment to the return of blood from the organ —such as the pressure of a hypertrophied thymus, or of enlarged and tuberculated bronchial glands upon the jugular veins, or it may be merely the result of a languid circulation from the want of pure air, or of nourishing and sufficient food.

Active cerebral congestion is not a very unusual consequence of the disturbance of the circulation *at the outset of the eruptive fevers.* Convulsions and apoplectic symptoms sometimes come on suddenly in a child previously, to all appearance, in perfect health, and may even terminate in death in less than twenty-four hours. The brain is found loaded with blood, but all the other organs of the body are quite healthy. A year or two ago I was requested to be present at the examination of the body of a boy not quite two years old, who had been in perfect health until the day before his death, which took place under such circumstances as I have just mentioned. The congested state of the cerebral vessels gave but little satisfactory information; but the same evening, the brother of the child was taken ill with vomiting, intense fever, and sore throat. In a few hours a red rash appeared: the case was one of scarlet fever, and ran its course with considerable severity, though, happily, to a favourable termination. It is probable that the poison of the fever had affected the blood of both children, and that the consequent disturbance of the cerebral circulation was so violent as at once to destroy the life of the younger, while the elder brother survived the shock, and in him the disease soon presented its usual features. The history of most epidemics of scarlatina would afford you many instances of a similar nature.*

But, alarming though these symptoms are, it is comparatively seldom that they end in death; for when they occur at the onset of the exanthemata, they generally disappear almost as if by magic on the appearance of the eruption.

I was called one day to see a little girl two years old, who, until the day before, had never had an hour's illness. She had eaten a hearty dinner; and, though she vomited soon afterwards, did not seem otherwise indisposed, and slept well in the night. Immediately on waking in the morning, however, she had a fit, during which she was insensible, squinted, threw her limbs about, and occasionally screamed aloud. She continued very ill during the whole day; was hot and feverish through the night, having occasional attacks of convulsions, in which she stretched out her legs, threw back her head, now and then uttered a word or two,

* See Armstrong's notice of this suddenly fatal form of the disease, at p. 30 of his work on Scarlet Fever, &c. 2d edit. London, 1817; and Von Ammon's mention of it in his description of the epidemic of malignant scarlatina at Dresden in 1831-2, in Analekten ueber Kinderkrankheiten, 11tes Heft, p. 42. Stuttgart, 1836.

and then relapsed into a state of insensibility. This was her state at half-past 10 A.M.—about twenty-four hours after the occurrence of the first fit. I bled her, put eight leeches on her head, employed cold affusion, and gave active cathartics during the day, but without much benefit; and at midnight she was still insensible, rolling uneasily from side to side, boring with her head in the pillow, squinting, and making automatic movements with her mouth and tongue. I now put eight more leeches on the head, which bled profusely, and the bleeding was followed by great diminution in the convulsive movements. About 4 A. M. of the next day, the child fell asleep, and dozed for a few hours. She awoke sensible, and continued so. On my visit in the morning, I found her quiet and sensible, without any sign of convulsion; her face was very pale; her head, before so hot, was now quite cool; her pulse had sunk in frequency, and lost its fulness. An eruption of a papular character had appeared on the hands, arms, inside of the thighs, and slightly on the face. This eruption was the small-pox, and the disease ran its course with no unfavourable symptom.

It might not be right, indeed, to attribute the symptoms of disturbance of the nervous system that sometimes occur at the commencement of the eruptive fevers entirely to derangement of the cerebral circulation; but we see similar results produced by *other causes*, the immediate effect of which is to disturb the circulation and to favour congestion of the brain. Thus, exposure to the heat of the sun, even though the head had not been unprotected from its rays, may be followed by convulsions or other indications of an overloaded state of the brain, and these symptoms may all subside so soon as the excited circulation has recovered its wonted balance. Of this I recently saw a striking instance in the case of a delicate boy, who, when a year old, was taken out by his nurse during one of the hottest days in June. He was quite well and cheerful when he left the house, but, after being out for some time, began to breathe hurriedly and irregularly, and his nurse, in consequence, brought him home. I saw him about two hours afterwards. He was then restless, fretful, and alarmed; his surface generally hot, and his head especially so, the brain pulsating forcibly through the anterior fontanelle; the pulse too rapid to be counted; the respiration hurried, laboured, and irregular, and there were constant startings of the tendons of the extremities. The child was on the eve of an attack of convulsions, but the tepid bath relieved the heat of skin, and the pulse fell, and the subsultus diminished. Light and sound were excluded from the room; he fell asleep, and awoke in a few hours refreshed and tranquillized, and on the next morning a little languor was all that remained of an illness which had seemed likely to prove so formidable.

Disorders of the nervous system are very frequent during the period of teething. Many of the symptoms which then occur are the direct result of irritation of the trifacial nerve, but others are the immediate consequence

of congestion of the brain. Febrile disturbance almost always attends upon the process of dentition, and you can easily understand that when the circulation is in a state of permanent excitement, a very slight cause may suffice to overturn its equilibrium, and occasion a greater flow of blood to the brain than the organ is able to bear.

But I need not occupy more time in pointing out to you the various circumstances which may give rise to active congestion of the brain. Let us now pass to a more minute examination of its *symptoms*.

Cerebral congestion may, as you have seen, come on very suddenly, its symptoms from the first being alarming, and such as to call for immediate interference; or general uneasiness, a disordered state of the bowels, which are generally, though not invariably constipated, and feverishness, may have for a few days preceded the more serious attack. The head by degrees becomes hot, the child grows restless and fretful, and seems distressed by light, or noise, or sudden motion, and children who are old enough sometimes complain of their head. One little boy, nearly three years old, who died of congestion of the brain, had seemed to suffer for some days before any alarming symptom came on, from severe pain in the head. He sometimes awoke crying from his sleep, or when awake would suddenly put his hands to his ears, exclaiming, "Oh, hurt! hurt!" Usually, too, vomiting occurs repeatedly, a symptom on the importance of which I have already insisted, since it is not only confirmatory of others, but also may exist before there is any well-marked indication of the head being affected, and when, though the child seems ailing, there is nothing definite about its illness. The degree of fever which attends this condition varies much, and its accessions are irregular; but the pulse is usually much and permanently quickened; and if the skull be unossified, the anterior fontanelle is either tense and prominent, or the brain is felt and seen to pulsate forcibly through it. The sleep is disturbed, the child often waking with a start, while there is occasional twitching of the muscles of its face, or the tendons of its wrist.

The child may continue in this condition for many days, and then recover its health without any medical interference; but a slight cause will generally suffice to bring back the former indisposition. You will sometimes see striking instances of this in children while teething; the fever subsiding, the head growing cool, and the little patient appearing quite well so soon as the tooth has cut through the gum, but the approach of each tooth to the surface being attended by the recurrence of the same symptoms.

But though the disturbance of the brain may pass away of its own accord, yet we cannot reckon on such a favourable result occurring, for symptoms such as I have mentioned are often the indications of the organism generally having begun to suffer from mischief which has been

going on for months unnoticed, and which is now about to break out with all the formidable characters of acute hydrocephalus. Or should they have no such serious import, yet congestion of the brain is itself a serious, sometimes a fatal malady. Even though no treatment be adopted, indeed, the heat of head may diminish, and the flush of the face grow slighter and less constant, but the countenance becomes very heavy and anxious, the indifference to surrounding objects increases, and the child lies in a state of torpor or drowsiness ; from which, however, it can at first be roused to complete consciousness. The manner, on being roused, is always fretful ; but if old enough to talk, the child's answers are rational, though generally very short ; and, murmuring " I am so sleepy, so sleepy," it subsides into its former drowsiness. The bowels generally continue constipated, and the vomiting seldom ceases, though it is sometimes less frequent than before. The pulse is usually smaller than in the other stage, and there is often irregularity in its frequency, though no actual intermission. An attack of convulsions sometimes marks the transition from the first to the second stage ; or the child passes, without any apparent cause, from its previous torpor into a state of convulsion, which subsiding, leaves the torpor deeper than before. The fits return, and death may take place in one of them, or the torpor growing more profound after each convulsive seizure, the child at length dies comatose.

This second stage, if so it may be called, is usually of short duration, and if relief be not afforded by appropriate treatment, death is seldom delayed beyond forty-eight hours from the first fit, though no graver lesion may be discovered afterwards than a gorged state of the vessels of the brain and its membranes, and perhaps a little clear fluid in the ventricles and below the arachnoid.

Occasionally, indeed, death does not so speedily follow these symptoms ; but they continue slightly modified for days, or even weeks, and, contrary to all expectation, recovery now and then takes place. This protracted course of the affection is, I believe, met with only in the case of very young children, in whom, the congestion having relieved itself by a copious effusion of serum into the ventricles, the yielding skull accommodates itself to its increased contents. The symptoms, though to a great extent the same as before, are now due to the presence of water in the brain—a disease which, though dangerous and often fatal, is yet chronic in its course, and may even admit of cure.

If active congestion of the brain may come on under so great a variety of circumstances, it is evident that there can be no invariable rule for its *treatment,* adapted alike to every case, but that the peculiarities of each must be taken into your most careful consideration. The little girl I have mentioned in whom convulsions preceded the attack of small-pox, would most likely have died from apoplexy if she had not been bled ; and it is probable that in her case the depletion might have been carried still further

with advantage. On the other hand, the boy who had been exposed to the heat recovered under the tranquillizing influence of a tepid bath, and there can be no doubt but that to him depletion would have been injurious. You must, then, always endeavour to make out what has been the antecedent of the attack. If violent convulsions have come on suddenly, and without apparent cause, in a child until a short time before in perfect health, inquire whether your patient has had the eruptive fevers, especially scarlatina and small-pox, or whether he has been recently exposed to their contagion, and examine the arm to see whether there is a good cicatrix as evidence of successful vaccination. When head symptoms usher in the exanthemata, the danger for a time may be imminent, but you know that if you can relieve the gorged vessels of the brain, and thus ward off the immediate peril, nature herself will come to your assistance, and the outbreak of the eruption will probably be followed by the cessation of the cerebral disturbance. Or it may be that the child has greatly overloaded its stomach, or partaken of some indigestible substance, in which case you would give an emetic, though under any other circumstances the attempt to induce vomiting would be not only useless but dangerous. If the symptoms had succeeded to a blow, you would not lose sight of the danger of inflammation of the brain supervening: while if the head affection had been preceded by long continued gastric or intestinal disturbance, or if it had come on during teething, you would bear in mind that a more cautious treatment must be pursued, lest you cause as serious mischief by doing too much, as might in other cases result from your doing too little.

There are, however, but few exceptions to the rule which prescribes the *abstraction of blood*, either locally or generally, as one of the most important remedies in cases of active cerebral congestion. If the symptoms set in violently, as they did in the case of the little girl whose history I mentioned to you, you must deplete freely, and will find that relief will follow more speedily on the abstraction of blood from the jugular vein than on venesection or the application of leeches. It is not easy to define exactly the quantity of blood which may be drawn, but from two to three ounces would probably be as much as you would ever be warranted in taking from a child a year old; and the appearance of manifest relief to the symptoms should be a signal to you for stopping its flow, even before that quantity had been obtained. The removal of too large a quantity of blood would be at least as mischievous as the abstraction of too little, while you would run some hazard of confounding the effects of loss of blood with those of its excess, and might thus be led further into error. It is, therefore, better (although children bear repeated bloodletting ill) to take but a moderate quantity of blood at first; to watch its effects, and to repeat the bleeding in a few hours, if it be necessary, rather than to subject the system to the shock of an excessive loss of blood.

In children under eighteen months old, bleeding from the arm is seldom

practicable, and, without the case be very urgent, it is inexpedient to open the jugular vein. At this early age, however, almost all the good effects of general bleeding can be obtained by the application of leeches. You will, probably, not be far wrong if you estimate the quantity of blood drawn by a healthy leech at about ʒiij., and, if the subsequent bleeding be encouraged, about as much will flow afterwards. In cases such as these, however, where too little and too much are alike attended by most serious danger, you must not content yourselves with ordering a certain number of leeches, and leaving their application to a nurse, and the regulation of the subsequent bleeding to accident, but must attend and watch the effects they produce.

If, on your second visit, you find that the child, though manifestly relieved for a time by the depletion, is relapsing into a state of coma, or that convulsions, checked for a season, are returning, or that the head is nearly as hot, and the pulse nearly as accelerated as before, and quite as hard, you may be warranted in bleeding again. Such depletion should be local, and if you can obtain the services of an expert cupper, it will be better, in the case of children above three or four years old, to draw blood by cupping from the back of the neck rather than by leeches. You must not, however, resort to a second bleeding without the most evident necessity, nor without having fully tried all those subsidiary means by the diligent employment of which you will often be able to render further depletion unnecessary. Many of these means, indeed, are so simple that their value is frequently underrated; and it is so often said, almost as a matter of course, "*keep the child quiet and the room cool, and apply cold to the head,*" that it does not strike the parents how much depends upon those directions on which the doctor seems to lay so little weight. You must learn, however, that in the treatment of children's diseases none of these things are trivial, but that on their due performance often hangs the life of your patient. Do not content yourselves, then, with merely giving directions, but stay to see them attended to; and do not leave the house till the chamber has been darkened, the cool air is freely admitted, the cold application to the head has been properly adjusted, and all persons who are not actually waiting on the child have left the apartment.

At the outset of the affection the bowels are usually constipated, so that an active *purgative* is in most cases called for. You may give a dose of calomel and jalap, or the calomel may be administered alone and followed by the infusion of senna, which may be repeated every three or four hours till the bowels act. Should the stomach be very irritable, a larger dose of calomel may be given, and after the lapse of a couple of hours, an attempt may be made to quicken its action by administering a purgative enema, or by dissolving some sulphate of magnesia in the child's drink, and giving it at short intervals. In many cases the disorder will be speedily removed

by this treatment, and the child, whose life had seemed to be hanging by a thread, will, in the course of twenty-four hours, be almost well.

But it may happen that though the symptoms are increasing in severity, though the convulsions are unchecked, or coma is evidently coming on, yet the state of the pulse forbids a repetition of depletion ; or it may even be that you dare not bleed at all, for fear of altogether putting out the life which is in such urgent peril. Fortunately we have another and very powerful remedy in store, which we may try in cases where, otherwise, we should be without resource,—this remedy is the *cold affusion*. There is something, however, apparently so formidable in taking a child from its bed and pouring a stream of cold water on its head for several minutes together, that you will be wise to explain what you are about to do to the child's friends, and to obtain their consent to the experiment, lest you be compelled by their alarm to desist before you have done any real good. When you have determined to resort to it, the child must be taken out of bed, wrapped in a blanket, and laid upon the nurse's lap with its face downwards, while you pour a stream of water, from a little height, upon its head. The most effectual way of doing this, though one not always practicable, is to place the child under the cock of a water cistern, or the spout of a pump, since you can then continue the stream, uninterruptedly, for five or six minutes. I have seen some remarkable instances of convulsions arrested, and of children roused from coma, by these means ; but you must bear in mind that the agent is one of great power, and you must feel the pulse from time to time, during its employment, lest you should, by its long continuance, produce too great a depression of the vital energies.

But besides those cases in which you want to produce a sudden effect by the application of cold with a shock, you often need the sedative influence of cold constantly applied. A very intense degree of cold may be kept up by allowing cold water to drip constantly upon the patient's head, which may be managed, as suggested by Dr. Watson, by means of a sponge and funnel placed a little above the head. This plan is, however, objectionable on account of its being almost impossible, when it is adopted, to prevent the patient's person from becoming extremely wet ; and, moreover, it is but seldom that so powerful an agent is needed in the case of children. Few methods of applying cold to the head are better than that which consists in half filling two bladders with pounded ice or cold water, and placing them, each wrapped in a napkin, the one under, and the other upon the child's head. By pinning the corners of the napkins to the pillow you can secure them from being displaced, and can also prevent the weight of the upper bladder from resting too heavily on the child's head, while all danger of the bed or of the dress becoming wet is avoided.

Supposing, now, that by the employment of these means you have

removed the imminent danger, and that your patient is going on favourably, still it will be generally desirable to continue treatment for a few days. Free action of the bowels must be secured; for which purpose small doses of calomel may be given two or three times a day, and it may be desirable to accompany each powder with a dose of a mixture containing nitre and sulphate of magnesia. You must, however, bear in mind that you will do less harm by allowing a child to go without medicine, than by forcing on it remedies which it dislikes, and resists taking. Calomel, indeed, can almost always be given; and even sulphate of magnesia will very often be taken if mixed with the drink or dissolved in a little veal broth. But how muchsoever a child may resist medicine, the abstraction of blood, a spare diet, a cool and dark and quiet chamber, are remedies always at command, the value of which you must not underrate.

I need not tell you that all cases do not admit of this active treatment. When the disease creeps on with febrile symptoms, occasional vomiting, constipation, loss of appetite, and restless nights, with complaints, if the child be old enough to speak, of pain in the head or limbs, or vertigo, and with a quick and variable pulse, you must treat it gently. If you deplete, it must be only by leeches, and then not in large number, while you trust much to quiet and the careful regulation of the diet. In such cases you will often find a tepid bath night and morning soothe the child and tranquillize the circulation far more than you might have expected from so simple a remedy. Drastic purgatives must be avoided, but small doses of mercury and chalk, or of calomel, either alone or combined with rhubarb, may be given with advantage once or twice a day. Half a grain of calomel, or two grains of the Hydr. c. Cretâ, with four of rhubarb, would be a proper dose for a child a year old. If there be much feverishness and restlessness during the day, you may give a mixture of bicarbonate of potash not quite saturated with citric acid, and containing small doses of ipecacuanha wine, if the stomach be not extremely irritable, and of the tincture of hyoscyamus; the value of which last medicine as a sedative in the diseases of children can scarcely be too highly estimated. The addition of a little syrup of mulberries will render the above mixture extremely palatable.

You will sometimes meet with cases of cerebral congestion that appear to have been brought on by exposure to the heat of summer. In such cases it often happens that the bowels are not constipated, but somewhat relaxed. You must not, however, aim at checking the diarrhœa by direct astringents, but should rather pursue an alterative plan. In most instances, there is irregularity of the bowels rather than diarrhœa; the child having five or six unhealthy motions, for the most part destitute of bile, in the course of one day, and passing the succeeding twenty-four hours without any evacuation at all. In such cases you will find the treatment I have just in-

dicated very useful. If the bowels be much disturbed, half-grain or grain doses of Dover's powder may be combined with the mercurial with advantage.

I have not time to enter into more minute details with reference to the management of every variety of active cerebral congestion, but must briefly notice those cases in which the condition exists in what may, perhaps not improperly, be called the *passive state*. In the paroxysms of hooping-cough the brain becomes congested by the impediment to the return of the blood from the head; and cerebral congestion is induced in a similar manner when the larynx becomes spasmodically closed in the disease known by the name of Laryngismus Stridulus. But we likewise meet with cases where the passive succeeds to the active form of cerebral congestion, or becomes more or less gradually developed out of some disorder of the abdominal viscera: or, lastly, where it supervenes towards the close of life in weakly children, whose vital powers have at length become too feeble to propel the blood.

In children who have suffered long and severely from hooping-cough, you often notice a general lividity of the face and lips, a puffed and anxious countenance, and the child makes grievous complaints about its head, while the skin is moist and cool, and the pulse soft, though frequent. Many of these symptoms indicate an overloaded state of the cerebral veins; and if a paroxysm of coughing occur, and the circulation be thus further disturbed, the child may die in a fit, or may sink after some convulsive seizure into a state of coma, which sooner or later proves fatal. In such a case you will find the vessels of the brain and its membranes universally gorged with black blood, the choroid plexuses of a deep purple colour, and more bloody points than natural will present themselves on a section of the brain being made. Both the symptoms during life, and the appearances after death, are only a rather exaggerated illustration of what occurs in all cases of passive congestion of the brain. It is not, however, always easy to explain why this condition comes on. Among the poor you often find it connected with general disorder of the digestive organs, and occurring as one of a long train of ills induced by destitution and neglect. It was so in the case of a little boy four months old, whom I saw a few years ago. His parents were young and healthy people, but they had already lost three children, apparently in consequence of their inhabiting one of those narrow courts so numerous in London, into which the sun never shines, and where young children pine and fade like tender plants shut up in a cellar. When ten weeks old, this little boy was taken with pain in his bowels and diarrhœa, and at three months old he began to suffer from fits, which came on daily, sometimes several times a day. No efficient treatment had been adopted when he was brought to me. He was then as large as most children of his age, and by no means emaciated;

but his flesh was flabby, his face unintelligent, puffed and livid, his head hot, the veins of the scalp and eyelids turgid, the eyes prominent, lustreless, covered by mucus, and the pupils not acting under light. He lay in his mother's lap, uttering a constant hoarse moan; his head thrown rather back, and in incessant rotatory motion; his mouth was open, his tongue red and parched, and the papillæ on its surface were very prominent: his abdomen was rather full, and his legs were constantly drawn up towards it. He vomited much; his bowels were open three or four times a day, the motions being green and offensive; his pulse was frequent, but without power. In this, as in many instances of passive congestion of the brain, local depletion was resorted to at first, and benefit resulting from it, was repeated more than once. It is not, however, every case that will admit even of local depletion, which, whenever employed, must be practised only with the view of affording relief to the gorged cerebral vessels, not with the idea of curing the patient by bleeding. The greatest attention must in every case be paid to diet and to the state of the bowels, and you will find no means of inducing their healthy action better than the employment of small doses of mercury and chalk two or three times a day. If the child be not weaned, you may find it desirable, if there be constant sickness, to take it almost, or entirely, from the breast for a day or two, and to substitute barley water, sugar and water, or a weak solution of isinglass, with the addition of one-third of milk, which should be given in quantities of one or two teaspoonfuls at a time till the stomach becomes more settled. A stimulating bath, as a hot salt-water bath, or a bath into which a handful of mustard has been put, and in which the child is to be kept for four or five minutes, night and morning, will often be found a valuable auxiliary to the general treatment, as well as very useful, if combined with the application of cold to the head, in cutting short the convulsive seizures.

If the case be associated with much diarrhœa and general impairment of nutrition, the extract of bark, with a few drops of salvolatile, or of the compound tincture of bark, should be given two or three times a day, and you should not let the head symptoms lead you to keep the child on a low diet. Remember, too, that when nutrition is much impaired, farinaceous food is not usually well digested; you must, therefore, be sparing of arrow-root, and give milk and water, or milk and water with isinglass, or veal-tea. If the broth should purge, as it sometimes does, the white decoction of Sydenham* will form a cheap substitute for isinglass. As

* This, the Decoction Blanche of the French Pharmacopœia, is made by boiling half an ounce of hartshorn shavings, and the inside of one French roll, in three pints of water, till reduced to two; when it may be sweetened, and given either alone or with the addition of one part of milk.

the child improves, the ferrocitrate of quinine will be one of the best tonics you can give, and throughout the whole progress of the case you will remember the tonic influence of pure air; and may even find the removal to a healthier spot and a purer atmosphere absolutely necessary to the recovery of your patient.

Lastly, I will just allude to the head symptoms that sometimes for a few days precede death in children who have been long ill. You may in such cases find the vessels of the brain turgid, and be disposed to reproach yourselves for not having adopted active treatment. Such self-reproach would be unmerited; the streams have stagnated, because the vital powers were all too feeble to keep them in motion.

LECTURE IV.

CEREBRAL HÆMORRHAGE.—The rupture of any large vessel in childhood very rare, but effusion of blood into arachnoid frequent—reasons for its especial frequency in new-born infants—its symptoms and treatment.—Blood sometimes effused external to the skull in new-born infants.—Cephalhæmatoma, its characters, changes in the effused blood, and process of cure—its treatment.—Hæmorrhage into arachnoid in childhood—changes in the effused blood—obscurity of the symptoms—occurs sometimes in very feeble children, or in connexion with changes in the blood—illustrative cases.—Hæmorrhage into cerebral substance in childhood extremely rare—cases in illustration of its causes and symptoms—capillary hæmorrhage in connexion with tubercle in the brain.

WHEN we last met, I called your attention to the very important consequences that may result from the vessels of the brain becoming overloaded with blood. I pointed out to you a train of symptoms, rising in severity, from mere pain or heaviness of the head, to convulsions or coma, according to the degree of the cerebral congestion; and told you that death itself might take place, without any mischief being discoverable, afterwards, more serious than a general turgescence of the vessels of the brain and its membranes. *Simple apoplexy*, indeed, is by no means rare in childhood, and the knowledge of this fact may furnish encouragement to us in in cases where the symptoms of present danger are most alarming. We may hope, that if the instant peril can be averted, the blood, which has not burst its vessels, will flow again tranquilly through them, and the functions of life once more go on in their wonted course. In the adult we could scarcely indulge such an expectation, for the import of apoplectic symptoms is generally far more serious. If the patient die, we look for, and seldom fail to find, blood poured out into the brain, compressing its substance, and lacerating the delicate fibres along which the nervous influence travels. Or, even should he survive, it often is to pass through a tedious convalescence, with palsy, and weakened senses, and impaired mental powers,—the sad and standing evidence of the grievous injury which the brain has sustained.

You may naturally inquire how it happens that in the child, the very structure of whose skull favours the occurrence of cerebral congestion, hæmorrhage into the brain is comparatively so rare; while in the adult,

whose unyielding cranium and firmer brain tend to check congestion, the extravasation of blood into its substance takes place so often? The changes which advancing age induces in the structure of the cerebral vessels are probably the chief cause of this difference. In early life, the arteries are yielding, and admit of being greatly distended without giving way; but in the course of years they lose their elasticity, their calibre becomes diminished and unequal, and their coats grow brittle by the deposit of a cartilaginous or earthy matter in their tissue.

But though the larger arterial trunks withstand the constantly recurring variations in the cerebral circulation during infancy and childhood, the smaller and more delicate vessels of the brain are very liable to give way, and *capillary hæmorrhage*, or hæmorrhage by exhalation, as it has been often, though incorrectly, termed, takes place with greater frequency than in adult age.

All periods of childhood are not equally exposed to this accident, but it is oftenest met with immediately after birth; and no circumstances can be imagined more favourable to its occurrence than those which then concur to produce it. The head of the infant has been subjected to severe and long-continued pressure during its passage through the mother's pelvis; immediately on its birth, the course of the circulation is altogether changed, and should any difficulty occur in the establishment of the new function of respiration, a long time will elapse before the blood flows freely through its unaccustomed channels. No one will wonder that death should frequently take place during this transition to a new kind of existence. The tumid scalp and livid face of many a still-born child point to one of its most important causes, since they are but the measure of that extreme congestion of the vessels within the skull that has at length ended in a fatal effusion of blood upon the surface of the brain.

There would be reason to fear that this occurrence had taken place, if an infant, when born, were to present great lividity of the surface, and especially of the face; and if the heart were to beat feebly, and at long intervals, although the pulsations of the cord were slow and faint, or had altogether ceased. Under these circumstances, death sometimes takes place without any effort at respiration being made, the beatings of the heart growing feebler and fewer till they entirely cease; but at other times the child breathes irregularly, imperfectly, and at long intervals. The hands are generally clenched, and spasmodic twitchings are of frequent occurrence about the face, or these twitchings are more general, and more severe, and amount almost to an attack of convulsions. The symptoms, however, are by no means uniform, and probably are in some degree modified by variations in the seat as well as in the quantity of the effusion; for it sometimes happens, even in cases where a very large quantity of blood has been poured out into the arachnoid cavity, that the breathing is little or not at all disturbed, and that after living for a few hours in a state of weakness

and torpor, with chilliness of the whole surface, the child dies without any sign of convulsion.

Instances of this form of asphyxia will be sure to come under the notice of those of you who engage in midwifery practice. I need hardly remind you that the first indication to fulfil in their treatment is to relieve the overloaded vessels of the brain, by allowing of the escape of half an ounce or an ounce of blood from the divided umbilical cord. When the diminished lividity of the surface shows that this end has been attained, the cord should be tied, and the child may now be plunged for a minute or two in a hot bath at 100° or 102° ; but prolonged immersion in a warm bath at a less elevated temperature is likely to depress the nervous energy. While the body is in the bath, cold water may be dashed rather smartly on the face or chest, by which means the inspiratory muscles are often excited to action. If, however, the child do not soon begin to breathe, you must not continue too long the use of these or of other subsidiary measures, such as the application of ammonia to the nostrils, tickling the throat or nares with a feather, &c., for you would thus fruitlessly consume that time which would be much more usefully spent in making a persevering trial of artificial respiration.

If no occurrence have taken place more serious than a very great degree of congestion of the cerebral vessels, you will generally succeed, by the use of these means, in restoring the child. Often, however, it will happen that your attempts at resuscitation will fail completely, or that after breathing imperfectly for a few hours without having ever seemed thoroughly restored, the child will die, and you will then find blood poured out into the cavity of the arachnoid. The extravasation is sometimes limited to the neighbourhood of the cerebellum, but at other times it covers a considerable part of the convex surface of the brain, and even occupies the spinal canal ; as you see in this by no means exaggerated representation of a case of infantile apoplexy in Cruveilhier's great work on Morbid Anatomy.*

It fortunately happens that the overcharged vessels of the head in the new-born infant do not always relieve themselves by pouring out blood within the skull, but sometimes the capillaries of the scalp give way, and blood is extravasated into its tissue ; or, at other times, the effusion of blood takes place between the bone and the pericranium. When this last accident occurs, it often gives rise to the formation of a tumor upon the head, that presents peculiarities sufficient to call for some notice.

This tumor (*cephalhæmatoma*, as it has been called, from κεφαλη head, and αἱματῶμα, from αἱμα blood) makes its appearance within forty-eight hours after birth—often much sooner—on one or other parietal bone, most frequently on the right, as a circumscribed, soft, elastic, slightly fluctuating,

* Anatomie Pathologique, liv. xv. pl. 1.

painless swelling, beneath the unchanged integument. On a careful examination, it is generally felt to be bounded by a firm, apparently osseous ridge, which usually encircles it completely, though more distinct at one part than another. On passing the finger over the summit of this ridge, and down towards the base of the tumor, the impression is at once conveyed of the parietes of the skull being deficient at this point, and of the ridge being the edge of a hole in the bone. When first discovered, the tumor is usually small, but increases, in the course of two or three days, from the size of half a marble to that of a chesnut, or of half a hen's egg. As it grows larger, it generally becomes tenser, but still seems to cause no pain, and the child's health continues good. After it has attained its full size, it often remains stationary for a few days, and during this time a gradual increase in the distinctness of the ring which surrounds it is the only change that it undergoes. A slight diminution in the size of the tumor at length becomes perceptible, and then it slowly disappears, though its removal occupies a month, six weeks, or more, and a slight elevation of the skull at the point where it was situated sometimes remains even longer. The centre of the tumor generally retains its soft and fluctuating character nearly to the last, but occasionally it loses this, and communicates to the finger a sensation of crackling such as we should experience if we pressed on a piece of tinsel.

Although once the subject of much difference of opinion, the mode of formation of these tumors, and the nature of the changes they undergo, are now tolerably well understood. The edges of the os uteri, compressing the fœtal skull during labour, just as, in this engraving,* the hands are represented compressing it, often produce an effect similar to that which you see depicted here, and occasion an oozing of blood from its surface. The quantity of blood thus poured out is usually small, and is then speedily absorbed, without having at any time produced a perceptible swelling. If, however, it be more considerable, a tumor is formed on the exterior of the skull, and this tumor may continue to enlarge for some time after birth, owing, possibly, to the influence of causes calculated to keep up a congested state of the brain, and to favour the effusion of blood.†

The blood thus effused speedily coagulates, and the edge of the coagulum sometimes conveys to the finger an indistinct sensation of a raised border surrounding the tumor. The elevated ring that is afterwards plainly felt circumscribing it, is, however, mainly the result of a reparative process, in

* In Valleix's Clinique des Maladies des Enfants Nouveau-nés, 8vo. Paris, 1839, planche i. fig. 2.

† The various questions relating to the mode of formation of these tumors are fully discussed by Feist, Ueber die Kopfblutgeschwulst der Neugebornen, 4to. Mainz, 1839; and by Burchard, De Tumore Cranii recens natorum sanguineo, 4to. Vratislaviæ, 1837; where are likewise mentioned various exceptional cases in which the swelling formed on the parietal bone that had been directed towards the sacrum, and not, as is usual, on the bone which had presented during labour.

the course of which a fibrinous exudation is poured out over that part of the skull whence the pericranium has been detached, and is heaped up in great abundance just where the bone and its investing membrane come into apposition. This is proved to be its real source, by the circumstance that the ring becomes much more evident after the absorption of the blood has commenced, than it is at first; while in those cases where the effusion of blood has been very considerable, no ring is perceptible during life, and it is found after death that scarcely any attempt at reparation has been made, and that the fibrinous exudation is very scanty, or altogether absent.

This exudation is generally absorbed in course of time, but sometimes a process of ossification is set up in it: the fibrinous ring becomes converted into an osseous ridge, and that part of the cranium over which the blood had been poured out is roughened by the formation of new bone upon its surface. The meaning of the appearances thus produced was long misunderstood, and they were thought to be owing to a process of destruction, not to one of cure. The roughened surface of the skull was looked on as the result of ulceration by which its outer table had at one part been destroyed, and the bony ridge around it was supposed to be the edge of that part of the outer table to which the disease had not yet extended. The real nature of these changes was extremely well exemplified in a very remarkable case that came under my notice, in which blood was effused between the skull and dura mater, as well as between it and the pericranium.* This drawing shews the processes of cure in progress. First, however, you may notice the perfect smoothness of the inner surface of the bone, which the edge of the clot is raised in order to display. Its outer as well as its inner investment had been detached from this portion of the skull by the effusion of blood beneath them, and the bone continues unroughened, because an attempt at reparation was impossible here. At the edge of the clot, the dura mater and the bone come again into contact, and nature has here begun the cure. New bone has been deposited, and an osseous ridge has been formed precisely similar to that which in so many instances surrounds the external effusion. Nor is this all; but bony plates are beginning to be deposited between the layers of the dura mater; exemplifying the manner in which, when blood has been poured out beneath the pericranium, that membrane sometimes becomes ossified, and accounting for the crackling sensation that in these cases is felt on pressing the tumor.

The characteristics of these tumors are so well marked, that they are not likely to be confounded with swellings of the scalp produced by any other cause. A hernia of the brain, indeed, may present some resemblance to them, since it forms a soft painless tumor, unattended by discolouration of the integuments; and the edges of the aperture in the bone through

* A description of this case will be found at p. 397 of vol. xxviii. of the Medico-Chirurgical Transactions.

which the brain protrudes may easily be taken for the ring which surrounds an effusion of blood beneath the pericranium. Independently, however, of the pulsating character of the swelling formed by hernia of the brain, its situation at one of the fontanelles, probably the posterior, or in the course of one of the sutures, will generally distinguish it sufficiently from these sanguineous tumors, which are almost always seated on the parietal bone, and near to its protuberance.

While the nature of this affection was ill understood, many practitioners regarded it as of very serious import, and thought that *its cure* could be effected only by making a free incision into the tumor, and emptying it of the effused blood, or else by applying caustic to its surface, with the view of exciting suppuration within it. There is, however, no real necessity for these severe measures, which appear in not a few instances to have caused the death of the child; for the blood will almost always be absorbed, and the tumor diminish and disappear of its own accord. At first, therefore, you may content yourselves with the employment of some simple evaporating lotion; and you would use this rather by way of appearing to do something, than with the expectation that it would really be of much service. So long as the tumor continues enlarging, it would not be desirable to apply pressure to it, since, if much tendency existed to congestion of the brain, the blood thus prevented from escaping between the skull and pericranium might be poured out in a much more dangerous situation within the cranium. After the swelling has ceased to enlarge, a strip or two of plaster might be applied round the head, so as to keep up gentle compression. If, after this had been continued for four or five days, no diminution took place in the size of the tumor, a small puncture might be made in it, so as to let out the blood, and a bread-and-water poultice might then be applied for a day or two. While, however, the affection generally requires but little treatment, and is very rarely attended with danger, it is yet right to bear in mind the possibility of internal as well as external effusion having taken place; in which case, as happened in an instance that came under my own notice, the sudden increase of the former may be followed by apoplectic symptoms, and death.

Perhaps I may be pardoned if I digress for a moment to notice the occasional *pouring out of blood beneath the occipito-frontalis* or temporal muscle in children as the result of a blow on the head. Unlike a bruise, this effusion does not always take place at the precise spot where the injury was inflicted, but the greater size of the vessels that traverse the skull at the side seems to be the reason why a shock, such as a fall on the occiput, is sometimes succeeded by the formation of a tumor of this kind at the side of the head, and not at the part which received the blow. It has twice come under my notice under these circumstances. The tumor thus formed is soft, painless, and fluctuating, and its size at first increases very rapidly, but the integuments covering it are neither hot nor discoloured.

It is not surrounded by so well defined a ring as circumscribes the swelling formed by the effusion of blood beneath the pericranium, the ridge is imperfect, its edge is much less sharp, and it is often to be felt nowhere except near to the insertion of the temporal muscle.

In this as in the other case nature herself is usually fully equal to the removal of the blood, and the consequent dispersion of the swelling.

Cerebral hæmorrhage, though at no other time so frequent as immediately after birth, may occur at any period of subsequent childhood, under the influence of causes that favour congestion of the brain, or even independently of any cause that we can discover. The *hæmorrhage* still takes place almost invariably *into the arachnoid cavity*, and blood is sometimes poured out there in very large quantity, but the accident is neither so invariably nor so speedily fatal as in the new-born infant.

If death should follow very soon after the occurrence of the effusion, the blood is found unchanged, forming a more or less extensive layer upon the convex surface of the brain, and extending downwards and backwards towards the base of the organ, but seldom situated at its anterior part unless the hæmorrhage have been unusually profuse. If life be prolonged, the clot speedily separates into serum and crassamentum, and a series of changes commences in the latter, the effect of which is to deprive it of its colouring matter, and to convert it, in course of time, into a delicate false membrane, which lies in close apposition with the parietal arachnoid. This transformation may sometimes be observed while in course of progress, and a central clot may then be seen gradually losing itself in a membrane that grows more and more delicate towards its periphery. If, as occasionally happens, successive effusions of blood take place at somewhat distant intervals, this membrane may become thick and firm, and may even present a pearly lustre; which circumstance has led some observers into the error of attributing the appearance to alteration and thickening of the dura mater. The amount of the original effusion has much to do with the rapidity of the changes in the clot. If the effusion were but inconsiderable, the serum of the blood soon becomes absorbed, and no other trace of the occurrence remains than the false membrane lining a portion of the arachnoid. If the hæmorrhage were at all abundant, the reddish serum will, even after the lapse of a considerable time, be very evident on opening the sac of the arachnoid, and some of it will probably be found entangled in the substance of the clot. By degrees the serum loses its colour, but its quantity may still continue for a long time undiminished, or the efforts of nature may even entirely fail to accomplish its absorption. The fluid in such cases is either simply contained within the arachnoid cavity, or, having remained inclosed within the clot during the changes which it underwent, appears at length to be situated within a delicate cyst or shut sac. If the hæmorrhage, in the first instance, were very considerable, or if it were to recur two or three times, the yielding cranium of

the child will enlarge, the head will alter in form, and the case will assume many of the characters of chronic hydrocephalus.*

All writers, even those who, like MM. Rilliet and Barthez, have thrown the most light on the anatomy and pathology of cerebral hæmorrhage in the child, concur in representing its *symptoms* as extremely obscure. Paralysis, which, in the grown person, is one of the most frequent results of the escape of blood from the cerebral vessels, is so rare in the child that it was observed by M. Legendre† only in one out of nine cases, and by MM. Rilliet and Barthez‡ in one out of seventeen cases. This peculiarity is doubtless in great measure accounted for by the circumstance of the blood being almost always poured out into the cavity of the arachnoid, so that the pressure which it exerts on the brain is generally diffused over the surface of the organ, and is nowhere very considerable.

The absence of paralytic symptoms, however, is not the sole cause of the obscurity of these cases, but the indications of cerebral disturbance by which they are attended vary greatly in kind as well as in degree. The sudden occurrence of violent convulsions, and their frequent return, alternating with spasmodic contraction of the fingers and toes in the intervals, appear to be the most frequent indications of the effusion of blood upon the surface of the brain. I need not say, however, that such symptoms taken alone would by no means justify you in inferring that effusion of blood had taken place. Many circumstances having reference to the previous history of the child, as well as to its present condition, must be taken into account in forming a diagnosis. Hæmorrhage into the arachnoid cavity is most frequent in early childhood,—symptoms such as have been enumerated then would acquire additional diagnostic importance in proportion to the tender age of the child in whom they occurred. The probability of their betokening this accident would be still further strengthened if the child who experienced them had previously suffered from frequent attacks of cerebral congestion, or had been recently exposed to the sun without proper covering to the head; or had been placed in other circumstances calculated to favour determination of blood to the head.

The popular notion that associates the idea of rude health and general plethora with the occurrence of apoplexy in the adult, is in many instances altogether fallacious. In the case of the child it has still less foundation, since the effusion of blood upon the brain occurs much more frequently in weakly children than in such as are robust. There seems to be reason, indeed, for supposing that the hæmorrhage is sometimes of a purely

* Not having had the opportunity of observing the whole series of changes said to take place in blood effused into the sac of the arachnoid, I have chiefly followed the account given by MM. Rilliet and Barthez, in their Traité des Maladies des Enfans, vol. ii. pp. 32 to 42.

† Recherches Anatomo-Pathologiques sur quelques Maladies de l'Enfance, 8vo. Paris, 1846, p. 130.

‡ Lib. cit., p. 43.

passive character, and dependent on an altered state of the blood. I will relate to you a case or two as illustrations of this *cachectic form of cerebral hæmorrhage*.

Some years ago, I saw a little boy, five weeks old, the child of healthy parents, and who had been perfectly well for the first fortnight after his birth; he then, without any evident cause, grew drowsy, and vomited often, and his skin became quite jaundiced. His abdomen at this time was large and hard, and he cried when pressure was made on the right hypochondrium: these symptoms still continued when he was brought to me. A leech now applied on the right side drew a good deal of blood, and the hæmorrhage was stopped with difficulty; the bowels, previously constipated, were acted on by small doses of calomel and castor oil, and in three days the child lost the yellow tinge of his skin, became cheerful, and seemed much better. He was now, however, on the 18th of July, suddenly seized with hurried respiration and great depression, soon followed by violent convulsions, during which he screamed aloud. At the same time it was observed that his left hand had begun to swell, and to put on a livid hue, and on the 20th, the right hand also became œdematous. His whole surface grew quite sallow, and, on the day before he died, the œdema of the left hand had much increased; the livor had become considerably deeper, and there were small spots of extravasated blood over each knuckle. The right elbow was slightly livid; the right hand much swollen, but of its natural colour; and a small black spot had appeared under the chin, corresponding to the knot of the cap-string. The fits recurred very frequently, the child in the intervals lying quite still; the pupils were contracted, and the condition seemed to be one of extreme exhaustion rather than of coma. On the 20th, the power of deglutition was lost, and after several returns of less violent convulsions, the child died at 9 A.M. on July 21st; about sixty hours after the occurrence of the first fit.

The sinuses of the brain were full of fluid blood; a black coagulum, three or four lines thick, covered the whole posterior part of both hemispheres, extending from the posterior third of the parietal bones, occupying the whole concha of the occipital bone, and reaching along the base of the skull to the foramen magnum. A little blood was likewise effused about the anterior part of the base of the brain, though the quantity was very small in comparison with what was found at its posterior part. The substance of the brain was very pale, and all the organs of the body were anæmic, except the liver, which was gorged with fluid blood, while the heart was quite empty. The ductus arteriosus was closed, the foramen ovale admitted a probe with ease, the ductus venosus admitted one with difficulty.

Another instance has since then come under my notice, in which passive hæmorrhage took place into the arachnoid in a child exhausted by long

continued illness, all the effects of which were aggravated by poverty and want. From the age of two to that of five months the child had been under my care in consequence of frequent attacks of hæmatemesis and purging of blood, and though his health afterwards improved, yet he never became strong, and his evacuations were almost always white, and deficient in bile. After he was weaned, the coarse food which his indigent parents gave him did not nourish him; he lost flesh and strength, and when almost three years old was puny and emaciated. Three days before his death an attack of diarrhœa came on, which induced great exhaustion; and while suffering from this affection, he suddenly became comatose, cold, and almost pulseless, and his breathing became so low that he inspired only four or five times in a minute. In this state he lay for twenty-four hours, and then died quietly. Nearly six ounces of dark coagulated blood were found in the sac of the arachnoid, over the right hemisphere of the brain; a little blood was likewise effused beneath the arachnoid, and there was a very small clot in the lower and front part of the right middle lobe of the brain, but no ruptured vessels could be perceived. Great anæmia of every organ, and a state of extreme attenuation of the walls of the heart, were the only other remarkable appearances.

Hæmorrhage into the substance of the brain, though extremely rare in infancy and childhood, does sometimes occur, and then gives rise to appearances similar to those with which we are familiar in the adult. Death, however, usually takes place too speedily in these cases for any of those changes to occur in the apoplectic effusions which are often observed in the adult, and which betoken the advance that nature has made in her efforts to repair the injury of the brain.

I have only twice met with distinct extravasation of blood into the substance of the brain in children. In the first case, that of a little girl 11 months old, the occurrence was evidently due to the impediment to the circulation through the brain produced by an attack of inflammation of the sinuses of the dura mater. In addition to other appearances which I shall describe in a future lecture, there was great venous congestion of the membranes covering the middle lobe of the left hemisphere of the brain, and the cerebral veins were distended with coagula, and their coats were thickened. At the anterior part of the lower surface of the left middle lobe of the brain there were four apoplectic effusions, in all of which the blood still retained its natural colour, and each effusion was situated close to an obliterated and distended vein. The largest clot extended for an inch into the substance of the brain, the others were of smaller dimensions. Head symptoms, as might be expected, had existed in this little child for a long time before her death. The occurrence of the effusion was probably synchronous with a sudden attack of extreme faintness that came on forty-eight hours before she died, and from which she never completely rallied.

The other instance of hæmorrhage into the substance of the brain occurred in a girl 11 years old, the child of healthy parents, and whose own health had been quite good until she was six years of age. At that time the extraction of a molar tooth was followed by necrosis of a large portion of the lower jaw, and by the formation of abscesses on the face and head, from which bone escaped. An abscess, attended with similar exfoliation of bone, formed likewise on the right foot, and it was three years before the child had recovered completely. Though much disfigured by the disease, her health ever after continued good until April 12th, 1846. She was then suddenly and causelessly attacked with vomiting and pain in the head, for which no other treatment was adopted during ten days than the occasional administration of an aperient. During this time, however, a condition of stupor gradually stole over the child, for which, on April 21st, a blister was applied to the back of her neck with slight relief. On April 23d she had two attacks of convulsions, with an interval of four hours between each. She struggled much during their continuance, especially with the right side; when they subsided, partial palsy of the left side remained: the child complained much of her head, and sank from time to time into a state of stupor, from which, however, she could always be roused. Very free purgation on the 24th of April, and the application of another blister to the back of the neck, were followed by some amendment. On the evening of the 25th another fit occurred, with symptoms similar to those that had been observed on the previous occasions; but it was not followed by any increase in the palsy of the left side, nor was the degree of stupor so considerable as on the former occasion. Mercurials, which had been employed from the commencement of the attack, had now produced a decided influence on the mouth, and the abundant action of the bowels was again succeeded by much improvement in the child's condition. The pulse, which had varied from 60 to 70, now continued about 70, and was natural in character, and the child improved daily, though taking no other medicines than occasional aperients. The headache returned occasionally, though each time it was less severe than the time before; but on the evening of May 15th, this amendment was suddenly interrupted by an attack of violent pain in the abdomen, which was soon followed by convulsions and coma, and the child died convulsed in 16 hours; on the 36th day from the first attack of pain in the head.

On making an examination of the head, permission for which was obtained with difficulty, blood was found to be effused into the sub-arachnoid tissue over a great part of the right hemisphere of the brain. The quantity of blood, however, was no where very considerable, but merely occupied the sulci between the convolutions. The brain presented no remarkable appearance, except that on a level with, and just exterior to the right lateral ventricle, there was a large clot of blood, rather larger than a hen's egg, but of more irregular shape, around which the brain was

softened. This effusion was perfectly black throughout, the colouring particles of the blood being equally diffused through it, and no appearance betokened that hæmorrhage had previously taken place in this situation. The anterior cerebral artery ran for a considerable distance just outside the clot, but it could not be ascertained that it had given way at any point.

Cerebral hæmorrhage is one of the few affections of early life concerning the *treatment* of which but little can be said; for where the symptoms of a disease are so obscure, it would be idle to attempt laying down elaborate rules for its cure. The general principles, according to which you would manage a case of congestion of the brain, would still guide you if hæmorrhage had actually taken place. It cannot, however, be necessary for me to repeat to-day the observations on that point to which I yesterday directed our attention.

Before concluding, I must for a moment refer to a form of cerebral hæmorrrhage, which, though of no great importance, yet forms an exception to what has been stated as to the rarity of the accident in early life. In children who have been affected with tubercular disease of the brain, it is by no means unusual to observe very small effusions of blood in the midst of the softened cerebral matter that surrounds the deposit. This *capillary apoplexy*, produced by some of the minute vessels of the brain giving way, is, however, seldom extensive, and probably has but little share even in accelerating the fatal event.

When next we meet, we shall pass from this subject, which, it must be owned, has more of a pathological than of a practical interest, and shall enter on the study of the inflammatory affections of the brain in childhood.

LECTURE V.

Inflammatory Affections of the Brain—frequent in childhood, but overlooked by early writers—first noticed about a century ago—described under the name of acute hydrocephalus, by Dr. Whytt.

Progress of knowledge with reference to acute hydrocephalus.—The name restricted in these lectures to scrofulous inflammation of the brain, which is much more frequent than its simple inflammation in childhood.

Morbid appearances in acute hydrocephalus—due either to inflammation or to tubercular deposit—alterations more apparent in the membranes at the base of the brain than in those of its convexity.—Reasons for considering granulations of the membranes as tubercular.—Increase of fluid in the ventricles almost invariable.—Central softening of the brain not a post-mortem alteration—frequently connected with changes in the lining of the ventricles.

Symptoms of the three stages of the disease.

Few of the diseases of childhood are more serious than those *inflammatory affections of the brain* on the examination of which we are now about to enter. They occasion more than 10 per cent. of all deaths under five years of age in this metropolis, while they are so especially the diseases of early life, that 81·3 per cent. of all cases of fatal inflammation of the brain occur in children under five years of age, 90·5 per cent. before the age of 10, and 92·6 per cent. before the age of 15.*

But, though the frequency of these affections in the young is a matter of such popular notoriety that most of you were familiar with the fact long before you engaged in your present profession, yet if you turn to the writings of any of the old physicians, you will find in them no mention of inflammation of the brain in childhood. At first this may surprise you, but a few moments' consideration will explain the seeming oversight. Convulsions, which form a prominent symptom in most cases of inflammation of the brain, occur, as I need not remind you, in the course of many other affections of the nervous system. An accident so alarming as a fit of convulsions is sure to attract attention, but much careful observation is often needed to distinguish those minor differences between the symptoms that precede or accompany it, that alone would indicate the cause to which it

* Deduced from 5th Report of Registrar-General, p. 296-303.

is due. It cannot, then, be surprising, that in the absence of this minute care, many diseases, though differing in most important particulars, should have long been classed together under the head of convulsions, and that inflammation of the brain should not have been recognised as a distinct affection. The importance of some of those less obvious structural changes which we know to be most significant of the nature of previous diseases was not then understood, so that an alteration in the consistence of the brain, or a diminution in the transparency of its membranes, often passed unnoticed: and anatomical research was not exact enough to make up for the deficiencies in clinical observation.

But just as the physician's attention was fixed on the convulsive seizures which in so many cases affected his patients, so the eye of the anatomist was often arrested by the discovery of a large quantity of fluid in the interior ofthe brain. Sometimes this fluid had been secreted in such quantity as not only to distend the ventricles of the brain, but to occasion a manifest enlargement of the skull. In such cases the disease was essentially chronic in its course, and was called, from its most striking characters, dropsy of the brain, or chronic hydrocephalus.

Speculation, however, was set afloat by the occasional notice of cases in which, though fluid was found in large quantity within the brain, yet the previous disease had been of short duration, its symptoms had been acute, and the fever, drowsiness, and cerebral disturbance which attended it, had run a very rapid course to their fatal termination. Dr. Whytt was the first* who, in the year 1768, clearly pointed out the connexion between these symptoms and the accumulation of fluid in the ventricles. His attention, like that of previous observers, was mainly fixed on this point, to the exclusion of other morbid appearances, and he was thus led to regard the disease as an acute dropsy of the brain. Little can even now be added to his description of the malady, but further observation has shown that the presence of an increased quantity of fluid in the brain, on which he laid so much stress, is not of invariable occurrence; that there is no certain relation between the amount of the fluid and the intensity of the symptoms, or the rapidity of their course; and that it is almost always associated with other very important lesions, some of which are the evident results of inflammation. Many years were occupied in the investigations which led to this conclusion, so that long before Whytt's theory had been ascertained to be erroneous, people had grown familiar with the name which he proposed for the disease, and in this country it is still called hydrocephalus, or acute hydrocephalus.

A most important step towards a knowledge of the true pathology of this disease was the discovery, that the fluid poured out into the ventricles is not a mere dropsical effusion, but that it is the result of previous inflam-

* In his Observations on the Dropsy in the Brain, 8vo. Edin. 1768.

matory action. A difficulty, however, appeared when it was ascertained that in those cases in which the signs of inflammation of the brain were most evident during life, and its effects most marked after death, both the symptoms and the morbid appearance differed in some respects from those usually observed in Whytt's disease. The almost invariable existence of a very obvious tendency to scrofula in well-marked instances of Whytt's disease, and its frequent absence in other cases of inflammation of the brain, did much towards solving this difficulty. It was next discovered that in nearly every instance in which Whytt's disease terminates fatally, tubercle is present in greater or less abundance in various organs of the body; and to the acuteness of French anatomists we owe the last step in this investigation, by which it has been shewn that in the majority of cases the membranes of the brain themselves are the seat of tubercular deposit.

We are thus led to the conclusion that inflammation of the brain occurs in early life under two different conditions. It now and then comes on in previously healthy children, but occurs much oftener in connexion with the tuberculous cachexia, or as the result of tubercular deposit in the brain or its membranes. The term encephalitis may be properly used to denote the cases of simple inflammation of the brain, while we may with advantage restrict the term *acute hydrocephalus* to cases of cerebral inflammation in scrofulous subjects. Owing to the extreme rarity of the former affection, it will, I think, be our better plan first to study minutely all the characters of acute hydrocephalus, and then to examine the points of difference between simple and scrofulous inflammation of the brain.

We will commence this investigation with an inquiry into the nature of *the appearances found after death* in cases where acute hydrocephalus has had a fatal termination. These may be divided into two classes, according as they are the result of inflammation or of the deposit of tubercle; and changes due to both of these causes are often found in the membranes of the brain as well as in its substance.

The appearances which present themselves on the skull being opened are seldom very striking, for the dura matter is usually healthy, and the changes in the arachnoid are not in general of a kind at once to attract attention. Sometimes, indeed, the eye is struck by an excessive vascularity of the membranes, but this appearance often depends on the overfilling of the large vessels as the result of position. Attentive examination will usually enable us to distinguish between this, and that increase of vascularity which is produced by a uniform injection of the minuter vessels; and moderate pressure, while it causes the disappearance of the apparent vascularity in the former case, will produce no effect on the true congestion in the latter.

The secretion that naturally moistens the sac of the arachnoid is altered, increased, or suppressed, but the last of these changes is the most frequent, while the first is seldom observed in cases of hydrocephalus. The pre-

ternatural dryness of the membrane is usually connected with some diminution of its natural transparency; it looks dull and lustreless, and feels sticky,—a state to which the French have applied the term "*poisseux*." The dulness of the arachnoid is sometimes more considerable, and it then presents an opaline appearance, which is very evident at those parts where the membrane passes from one convolution to another. This opalescence is not often general, but is usually most marked about the upper part of the hemispheres, and in the neighbourhood of the longitudinal fissure.

When any considerable degree of vascularity of the membranes is evident, this is, of course, chiefly due to the injection of the minute vessels of the pia mater. Such intense injection of the pia mater is, however, far less frequent than the effusion of fluid between it and the arachnoid, and it is still less common to find the two appearances in the same subject. The effused fluid is for the most part colourless and transparent, and if present in any considerable quantity, the surface of the convolutions then appears as if covered by a layer of transparent jelly, though on puncturing the membrane a drop of clear serum will exude. The effusion of lymph or pus into the pia mater covering any considerable extent of the convexity of the brain, is very seldom met with, but deposits of a yellow puriform lymph are not unfrequently seen occupying the depressions between the convolutions, or following the course of the vessels along the sides, or at the upper surface of the hemispheres.

But though the alterations presented by the membranes at the convexity of the brain are often comparatively trivial, the membranes at the base of the organ almost always show unequivocal traces of inflammatory action. The predominance of the affection of the membranes at the base of the brain has indeed been regarded by some writers as pathognomonic of scrofulous inflammation of the organ;* and though this rule is not without exception, still it holds good in the vast majority of cases. In 25 out of 29 fatal cases of acute hydrocephalus, in which I carefully recorded the condition of the membranes, those at the base of the brain were found to be the seat of disease more or less extensive, and always more considerable than that which existed at the vertex. In one of the cases in which the membranes at the base were healthy, there was a good deal of serous effusion beneath the arachnoid at the convexity; and in another instance there was some fluid in the sac of the arachnoid, and the pia mater covering the upper surface of the brain was greatly injected; but in the two remaining cases the membranes at the upper, as well as those at the lower part of the brain, were perfectly healthy.

The least considerable of the morbid changes in the membranes at the base of the brain consists in a milky or opaline condition of the arachnoid

* On which subject the valuable essay of M. Rilliet, De l'inflammation franche des méninges chez les enfants, in the Archives de Médecine, for Dec. Jan. and Feb. 1846-7, may be consulted with advantage.

and pia mater, but chiefly of the former, sometimes extending over the whole lower surface of the cerebrum, but seldom being equally apparent in that part of the membrane which invests the cerebellum. But, besides this opacity, we usually observe much more distinct evidence of inflammatory action in the effusion of yellow lymph beneath the arachnoid. This is generally found about the olfactory nerves, which are often completely imbedded in it, while a similar effusion extending across the longitudinal fissure unites the two hemispheres of the brain together. A deposit of the same kind likewise reaches up the fissure of Sylvius in many cases, and connects the anterior and middle lobes of the brain with each other; or if poured out in less abundance, it may be seen running up in narrow yellow lines by the side of the vessels as they pass from the base of the brain towards its convexity. It is in the neighbourhood of the pons Varolii, however, and about the optic nerves, that the most remarkable alterations are met with. The opacity of the arachnoid is here particularly evident, while the subjacent pia matter is opaque, much thickened, and often infiltrated with a peculiar semi-transparent gelatinous matter, sometimes of a dirty yellowish-green colour. This matter is sometimes so abundant as perfectly to conceal the third and fourth nerves, and at the same time to invest the optic nerves with a coating two or three lines in thickness; though on being dissected off, the substance of the nerves beneath appears quite healthy. When this morbid condition exists in any very considerable degree it extends beyond the pons, and involves the membranes covering the medulla oblongata, especially at its anterior surface.

It is only within the past sixteen or seventeen years that attention has been drawn to the importance of *another element, besides mere inflammation*, in the production of acute hydrocephalus. The peculiar granular appearance which various parts of the membranes of the brain often present in this disease, though noticed many years before, began then to engage the special attention of several French physicians.* The conclusion to which we are led by their careful investigation of the subject, is, that this appearance is not due to inflammation, as was once supposed, but that it is occasioned by the presence of tubercular deposits. These deposits often assume the form of minute, flattened, spherical bodies of the size of a small pin's head, or smaller, and either of a yellowish colour, and rather friable under pressure, or greyish, semi-transparent, and resistant, almost exactly resembling the grey granulations which are sometimes seen in the lungs or pleuræ of phthisical subjects. They are likewise sometimes met with in what would seem to be an earlier stage, when they appear like small opaque spots of a dead white colour, much smaller than a pin's head, and communicating no perceptible roughness to the membrane. This appear-

* M. Papavoine appears to have been the first who, in the Journal Hebdomadaire for 1830, vol. vi. p. 113, clearly established the tubercular nature of these granulations of the membranes of the brain.

ance is often observed in the arachnoid covering the cerebellum and those parts of the base of the brain where the arachnoid is stretched across from one part of the organ to another. The flattened yellowish bodies are most frequently seen at the convexity of the brain, and on either side of the hemispheres. They generally follow the course of the vessels that ramify in the pia mater, and accordingly occupy the sulci between the convolutions much oftener than their summit. The firm grey bodies are mostly seen about the pons, or imbedded in the pia mater in the neighbourhood of the optic nerves, or projecting from the surface of the membranes that cover the medulla oblongata. They are also often deposited in the arachnoid lining the occipital bone, and are then sometimes collected in considerable numbers around the foramen magnum. These bodies, sometimes of a grey, at other times of a yellow colour, are likewise met with, though less frequently, in the substance of the velum interpositum, or imbedded in the choroid plexuses, and in both of these situations they are sometimes very abundant.

These bodies, however, do not always retain the appearance of distinct granules, but sometimes on separating two folds of the arachnoid which had seemed to be glued together by an effusion of yellow lymph or concrete pus, we find that the matter which formed these adhesions is not homogeneous, but that it consists of an aggregation of minute granular bodies connected together by the lymph or pus in which they are imbedded. This appearance is often met with at the convexity of the brain, and close to the longitudinal fissure, and rather more towards its posterior than its anterior part; a strip of this yellow matter, half an inch long by two or three lines broad, connecting together the two hemispheres of the brain or the two surfaces of the arachnoid. Sometimes two or three deposits of this kind are observed at the convex surface of the brain, but they are generally more extensive at the base of the organ, where they occupy the longitudinal fissure and the fissure of Sylvius, and frequently connect opposite surfaces of the brain so closely together as to render their separation impossible without injury to its substance.

But you may ask me for the *proof of these granular bodies being,* as I have represented them to be, *real tubercular deposits.* It would occupy nearly the whole of this lecture to detail all the arguments that have been adduced on both sides of this question, for it is a question which has been much disputed; some persons being disposed to regard them merely as products of inflammation.

The reasons, which appear to me to be conclusive, in favour of the tubercular nature of these bodies, are—

1st. That they are always associated with tubercle elsewhere.

2d. That their abundance is not in proportion to the amount of inflammatory mischief.

3d. That they are sometimes met with in cases where no head symp-

toms were observed during life, and unconnected with any sign of inflammation discovered after death; and,

4th. That their chemical composition and their microscopic structure are identical with those of tubercle in other organs of the body.*

Notwithstanding the important nature of the changes presented by the membranes of the brain in cases of acute hydrocephalus, it was long before they attracted as much attention as the *alterations in the substance of the brain* itself, and especially as that *distension of its cavities with fluid* from which the malady has derived its name. The surface of the brain, indeed, generally presents but few traces of disease, though sometimes the convolutions are greatly flattened, and the sulci between them almost obliterated by the pressure of the fluid from within. The cerebral substance is often healthy as low down as the centre of Vieussens, or presents no change more important than the presence of an unusual number of bloody points, the divided cerebral vessels. But, though unaltered to the eye, a diminution of consistence is often perceptible as the ventricles are approached. Sometimes the whole brain feels softer than natural, while at other times, though not actually softened, it is infiltrated with fluid, as though it had soaked up the serum from the ventricles.

The presence of a larger quantity of fluid than natural in the lateral ventricles is of almost constant occurrence. In 28 out of 30 cases in which death had taken place under the symptoms of acute hydrocephalus, I found an appreciable quantity of fluid in the ventricles; and in 26 of these cases the quantity was considerable, amounting to several ounces. The fluid is in general a perfectly transparent serum, resembling passive effusions poured out from other serous membranes, and such it doubtless is in many cases in which it is found distending the lateral ventricles. But, in a large proportion of instances of hydrocephalus, the increased secretion in the ventricles is associated with a very notable change in the surrounding cerebral substance. This change consists in a loss of the natural firmness of the central parts of the brain, which varies in degree from a slight diminution of consistence to a state of perfect diffluence, in which their texture becomes completely disorganised, and they form a pulpy mass that is easily washed away by a stream of water; or the softening may be even more considerable, and the cerebral matter may become semifluid, and may closely resemble thick cream. The parts thus affected are perfectly pale and bloodless, and the cerebral substance in the neighbourhood is usually rather anæmic. The fornix, septum lucidum, corpus callosum, and posterior horn of the lateral ventricles, are the parts most frequently affected; the optic thalami, corpora striata, and lower parts of the middle and posterior lobes of the brain, rank next in this respect, while the

* With reference to these two points, see Becquerel, Recherches Cliniques sur la Méningite des Enfans. 8vo. Paris, 1838, p. 20; and Lebert, Physiologie Pathologique, &c. 8vo. Paris, 1845, vol. i. p. 440-449.

anterior lobes are but seldom softened. In a few instances the cerebellum is involved in the softening, and now and then the whole brain is found to have lost much of its natural firmness,—a change, however, which is usually much more marked on one side than the other. Closely allied to this softening is the state to which I have already referred, wherein the whole brain appears perfectly infiltrated with serum, as though it had been long soaked in it, and had imbibed it like a sponge.

A mechanical explanation has been frequently suggested to account both for this appearance and for the central softening of the brain, which you will observe is most marked in those very parts to which the fluid in the ventricles would naturally gravitate after death. Many facts, however, are opposed to this view of the cause of softening of the brain. If it were a change induced by the imbibition of fluid after death, we should expect to find it as constant as is hypostatic congestion of the lungs; but instead of this being the case, fluid is found in many instances in the ventricles without the consistence of the brain being in the least diminished. In a recent work on Acute Hydrocephalus, which embodies the results of a very large number of dissections, it is stated that central softening of the brain existed only in 47 out of 71 instances, in which the ventricles contained a quantity of serum varying from 3 to 11 ounces.* In my record of the examination of the brain in 28 cases of fatal hydrocephalus, I have preserved an accurate account of the condition of the cerebral substance, and find that in 12 instances there was not the least central softening, although the ventricles contained fluid in every case but one, and the quantity amounted on seven occasions to several ounces. M. Louis, too, mentions in his work on Phthisis,† that in 75 out of 101 tubercular subjects, each ventricle contained a quantity of fluid, varying from half an ounce to two or three ounces, but yet in only 6 of these 101 cases were the central parts of the brain at all softened. And, not to dwell on any other arguments which might be adduced, it may be added that M. Rokitansky has subjected the supposed hygroscopic property of the brain to the test of experiment, and found that no change whatever was produced in slices of cerebral matter by soaking them for hours in serum.

But if we reject the theory of this change in the brain being a mere post-mortem occurrence, the question still remains, to what is it due? M. Rokitansky regards it as a condition of acute œdema of the brain, often, though not invariably, associated with inflammation, since its products, pus and exudation corpuscles, are usually found in the broken-down or infiltrated nervous matter.

One very strong proof of the close *connection* that subsists *between softening of the brain and an inflammatory process* going on in the organ, is furnished by the changes which in many of these cases may be observed

* Beobachtungen und Bemerkungen über den rasch verlaufenden Wasserkopf. Von K. Herrich. 8vo. Regensburg, 1847, p. 161, § 126.

† Recherches sur la Phthisie. 2de éd. 8vo. Paris, 1843, p. 160, § 161.

in the *lining membrane of the ventricles*. In 14 cases of acute hydrocephalus, in which central softening of the brain co-existed with the presence of fluid in the ventricles, accurate notes were taken of the condition of their lining, and in three instances only was it found to be healthy. In one of these three cases the central softening was very inconsiderable, and in the other two cases the softening of the central parts was associated with very marked softening of other parts of the brain, which were altered in colour as well as in consistence. The lining of the ventricles in the remaining 11 cases was notably altered, although the degree of its change was very variable. The first alteration that takes place in it is the loss of its transparency, which is often, though not always, associated with a turgid state of its vessels. It next acquires an unnatural toughness, so that it can be raised by the point of the scalpel; and sometimes it is not merely opaque and tough, but greatly thickened, forming a dense firm membrane; and once or twice I have noticed its inner surface present a slightly granular appearance. These changes in the membrane do not bear any certain relation either to the quantity of fluid or to the degree of central softening, though it is rare to find an extreme degree of change in the lining of the ventricles without a considerable quantity of fluid in their cavity, and great softening of the brain around them.*

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* The subjoined note contains an analysis of my dissections of 30 cases of acute hydrocephalus, as far as respects the presence of fluid in the ventricles, the state of their lining membrane, and the condition of the cerebral substance; particulars the mutual relation of which to each other have not yet been fully investigated.

In 12 of these 30 cases there is no express mention of the condition of the lining of the ventricles.

In 2 the state of the cerebral substance is only imperfectly described.

In 28 the condition of the cerebral substance was carefully noted, and in 12 of these cases the brain was not softened at its centre.

In 1 of these 12 cases the ventricles contained				no fluid.
1	"	"	"	very little.
1	"	"	"	not above 1 oz.
2	"	"	"	1½ oz.
1	"	"	"	3 oz.
1	"	"	"	4 oz.
1	"	"	"	6 oz.
4	"	"	"	a considerable quantity.

In 4 of these 12 cases the state of the lining of the ventricles is likewise expressly described.

In 1, in which there was no fluid in the ventricles, and in 1 in which there was very little fluid, their lining was not altered.

In 1, in which there was no fluid, the choroid plexuses were beset with tubercular granulations.

In 1, in which there were 4 oz. of fluid, their lining was slightly opaque.

In 10 of these 12 cases the consistence of the cerebral substance was everywhere natural.

In 1 the brain was generally firmer than usual.

In 1 the anterior parts of both posterior cerebral lobes, and the whole of the cerebellum, were softened,—changes which were most evident on the left side. [In

It happens sometimes that we find large patches of *tubercular matter* deposited beneath the membranes on the convex surface of the brain, and extending to the depth of about a line into its tissue, in children who have died of acute hydrocephalus. Now and then, also, masses of tubercle, of a spheroidal shape, and of various sizes, are found imbedded in the cerebral substance. This latter appearance, however, is not frequent; it existed

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In 16 cases the central parts of the brain were softened.

In 5 of these 16 cases the softening was but slight at the centre.

In 1 of these 5 cases the substance of the brain elsewhere was healthy: six ounces of fluid in the ventricles, their lining healthy.

In 1 of these 5 cases the substance of the brain elsewhere was healthy: four ounces of fluid in the ventricles, their lining granular.

In 1 of these 5 cases the substance of the brain elsewhere was healthy: much fluid in the ventricles, their vessels large, choroid plexuses turgid.

In 1 of these 5 cases the substance of the brain elsewhere was healthy: much fluid in the ventricles, their lining opaque, and vessels turgid.

In 1 there was much yellow softening of the anterior and lower half of the middle lobes, greater in degree and extent on the left side; not above half an ounce of fluid in the ventricles.

In 11 instances the central softening was considerable.

In 3 of these 11 cases the cerebral substance elsewhere was softened also.

In 1 of these 3 cases, both posterior lobes were softened, especially the right, and the brain there had an uniform yellowish white colour.

In 1 of these 3 cases, the brain was very vascular down to the centre of Vieussens; the lower and posterior third of left posterior lobe was of a yellowish white colour, and quite fluid. Six ounces of fluid in the ventricles. Cerebellum soft.

In 1 of these cases, there was great congestion of the brain, and general softening, increased towards the centre. Much turbid reddish fluid in the ventricles.

In 3 other cases, the lining of the ventricles was altered, viz.:—

In 1 it had lost its polish, and was slightly thickened. Six ounces of fluid in the ventricles.

In 1 it was thickened and dull. Much fluid in the ventricles.

In 1 it was opaque and thickened. Much fluid in the ventricles.

In 5 instances the lining of the ventricles was altered, and the cerebral substance elsewhere softened, viz.:—

In 1 the whole brain was softened; the thalami optici were of a gelatinous consistence for a quarter of an inch deep: there was much fluid in the ventricles, and their lining was opaque.

In 1 there was increased vascularity and general softening of the cerebrum and cerebellum; much fluid in the ventricles, and their lining very thick and firm.

In 1 softening began about half an inch below the surface of the brain, and increased towards the centre; much fluid in the ventricles, and their lining remarkably thick.

In 1 there was great softening of both posterior lobes, especially of the right; two ounces of fluid in the ventricles, and their lining but slightly opaque.

In 1 there was great vascularity, especially of the grey matter of the convolutions; extreme softening of the anterior and middle lobes, proceeding from the longitudinal fissure outwards; most marked on the right side, but the posterior lobe was not at all affected. There was capillary apoplexy of the left corpus striatum. The ventricles contained four ounces of turbid rose-coloured serum; their lining membrane was very vascular, thick, and firm in some parts,—thick, soft, and actually desintegrated in others.

only in three out of the thirty cases on which I have founded my remarks on the morbid anatomy of acute hydrocephalus, and even in these cases peculiar symptoms existed which during the lifetime of the patient led to the suspicion of the disease being something else than an ordinary attack of water in the brain.

The *complications* of hydrocephalus consist almost entirely in the deposit of tubercle in many organs of the body, and in the various results to which that tubercular deposit may have given rise. The lungs and the bronchial glands are the parts most frequently and most seriously invaded by the tubercular deposit; the spleen, liver, mesenteric glands, and intestines, rank next in frequency as the seat of tubercle. The complication of hydrocephalus with tuberculous ulceration of the intestines is one which, though not very frequent, must not be lost sight of, since its existence may give rise to diarrhœa, and thus lead to an error of diagnosis on your part, if you look for constipation of the bowels as an invariable symptom of water in the brain.

But let us now pass to the examination of the *symptoms* of acute hydrocephalus. We cannot, however, do more to-day than familiarize ourselves with the main features of the disease, and must leave all attempts at filling up the outline to our next meeting.

The *first* or *premonitory stage* of the affection is attended with many indications of cerebral congestion, coupled with general febrile disturbance, and presenting exacerbations and remissions at irregular periods. The child becomes gloomy, pettish, and slow in its movements, and is little pleased by its usual amusements. Or, at other times, its spirits are very variable; it will sometimes cease suddenly in the midst of its play, and run to hide its head in its mother's lap, putting its hand to its head, and complaining of headache, or saying merely that it is tired and sleepy, and wants to go to bed. Sometimes, too, it turns giddy, as you will know, not so much from its complaint of dizziness, as from its suddenly standing still, gazing around for a moment as if lost, and then, either beginning to cry at the strange sensation, or seeming to awake from a reverie, and at once returning to its play. The infant in its nurse's arms betrays the same sensation by a sudden look of alarm, a momentary cry, and a hasty clinging to its nurse. If the child can walk, it may be observed to drag one leg, halting in its gait, though but slightly, and seldom so much at one time as at another, so that both the parents and the medical attendant may be disposed to attribute it to an ungainly habit which the child has contracted. The appetite is usually bad, though sometimes very variable, and the child when apparently busy at play may all at once throw down its toys and beg for food; then refuse what is offered, or, taking a hasty bite, may seem to nauseate the half-tasted morsel, may open its mouth, stretch out its tongue, and heave as if about to vomit. The thirst is seldom considerable, and sometimes there is an actual aversion from drink as well

as from food, apparently from its exciting or increasing the sickness. The stomach, however, seldom rejects everything, but the same food as occasions sickness at one time is retained at another. Sometimes the child vomits only after taking food; at other times, even when the stomach is empty, it brings up some greenish phlegm without much effort and with no relief. These attacks of vomiting seldom occur oftener than two or three times a day, but they may return for several days together, the child's head probably growing heavier, and its headache more severe. The bowels during this time are disordered, generally constipated from the very first, though their condition in this respect sometimes varies at the commencement of the disease. The evacuations are usually scanty, sometimes pale, often of different colours, almost always deficient in bile, frequently mud-coloured, and very offensive. The abdomen is seldom full; the child sometimes complains of pain in it, and it is tender on pressure. The tongue is not dry, generally rather red at the tip and edges, coated with white fur in the centre, which becomes yellowish towards the root. Occasionally I have seen it very moist, and uniformly coated with a thin white fur. The skin is harsh, but there is no great heat of surface; the nares are dry, the eyes lustreless, the pulse accelerated, but seldom exceeding 120 in children of four years old and upwards, not full nor strong, but often unequal in the force and duration of its beats. The child is drowsy, and will sometimes want to be put to bed two or three times in the day; but it is restless, sleeps ill, grinds its teeth in sleep, lies with its eyes partially open, awakes with the slightest noise, or even starts up in alarm without any apparent cause. At night, too, the existence of intolerance of light is often first noticed in consequence of the child's complaints about the presence of the candle in the room.

I need scarcely say that you must not expect to find all these symptoms in every case, neither, indeed, when present are they persistent, but the child's condition varies greatly in the course of a few minutes; cheerfulness alternating with depression, and sound sleep being now and then enjoyed in the midst of the unrefreshing dozes of the night. It will not be by a hurried visit of a few minutes that you will learn these things; you must not grudge your time, if you hope ever to attain to excellence in the management of children's diseases.

This precursory stage is of very variable duration, but on the average does not exceed four or five days. If the disease be not recognised, or if the treatment adopted be unsuccessful, it will pass into *the second stage*, in which the nature of the affection is very apparent, though unhappily the prospect of its cure is almost lost. The child no longer has intervals of cheerfulness, nor attempts to sit up, but wishes to be left quiet in bed, and the face assumes a permanent expression of anxiety and suffering. The eyes are often kept closed, and the eyebrows are knit, the child endeavouring to shut out the light from its morbidly sensitive retina. The

skin continues dry, the face is sometimes flushed, and the head often hot; and though these two symptoms vary much in their duration, coming and going without any evident cause, yet there is a permanently increased pulsation of the carotids, and if the skull be not ossified the brain may be felt and seen forcibly beating through the anterior fontanelle. The child is now very averse to being disturbed, and often lies in a drowsy condition, unless spoken to, when, if old enough to answer, it usually complains of its head, or of weariness or sleepiness. Its replies are generally rational, but very short; and if it need anything, it asks in as few words as possible, in a quick, pettish manner, and shows much irritability if not at once attended to. At other times it lies with its face turned from the light, either quite quiet, or moaning in a low tone of voice, and now and then uttering a short, sharp, lamentable cry, which M. Coindet, of Geneva, regarded as characteristic of the disease, and hence termed it *cri hydrencephalique*, but making no other complaint than the low moan and the occasional plaintive cry. To this, however, there are exceptions, and children sometimes scream with the intensity of the pain, or cry out, "My head! my head!" most piteously. As night comes on, there is almost always a distinct exacerbation of the symptoms, and the quiet of the day is frequently succeeded by a noisy and excited state, in which vociferous cries about the head alternate with delirium. This, however, is not by any means a constant occurrence; an increase of restlessness being often the only difference from the state of stupor in which the child lay during the day. At the commencement of this stage the pulse is quickened, sometimes very much so, and is in many cases unequal in the force and quickness of the beats. Irregularity of its rhythm, or distinct intermission in its beat, is the next change, and is usually perceived at the same time with a great diminution in its frequency, which often falls in a few hours from 120 to 90 or 80. At the same time that these changes take place in the general characters of the pulse, its power becomes manifestly diminished, while the slightest exertion, such as attends any alteration in the child's position in the bed, will often suffice to increase its frequency twenty beats or more in the minute. The child sometimes keeps its eyes so firmly closed that we can scarcely see the state of its pupils. Usually they are not much affected, but sometimes one is more dilated and acts more sluggishly than the other, or, in other cases, strabismus exists, though perhaps in a very slight degree, or confined to one eye. It is seldom that vomiting continues beyond the commencement of this stage, but its cessation is not followed by any desire either for food or drink. The bowels usually become even more constipated than they were before, and the evacuations continue quite as unnatural, while all flatus disappears from the intestines, and the abdomen thus acquires that shrunken form on which much stress has been laid by some writers as characteristic of hydrocephalus.

The transition from this to the *third* stage of the disease is sometimes

effected very gradually by the deepening of the state of drowsiness, till it amounts to a stupor from which it is impossible to rouse the child. At other times, however, this stupor comes on very suddenly, succeeding immediately to an attack of convulsions. These convulsions usually affect one side much more than the other, and after the fit has passed off one side is generally found partially or completely paralysed, while the child makes constant automatic movements with the other, carrying the hand to the head, and alternately flexing and extending the leg. The side which is the most affected during the fit is generally, though not invariably, the most palsied afterwards. When the third stage is fully established, the child lies upon its back in a state of complete insensibility, with one leg stretched out, the other drawn up towards the abdomen. The tremulous hands are either employed in picking the lips or nose till the blood comes, or one hand is kept on the genitals while the other is rubbing the face or head. The head is at one moment hot, and the face flushed, and then the heat disappears and the flush fades, though usually there is a permanent increase in temperature about the occiput. Sometimes the skin is dry, and then, though the extremities are cold, a profuse sweat breaks out on some part of the body or on the head. The pulse often loses its irregularity, but at the same time it grows smaller and more rapid, till at length it can be counted only at the heart. The eyelids now close only very partially, and in most cases there is some degree of strabismus. Light is no longer unpleasant, for the dilated pupils are either altogether motionless, or they act very sluggishly, frequently oscillate under the stimulus of a bright light, alternately contracting and dilating, till at length they subside into their former dilated condition. The child now often makes automatic movements with its mouth, as though chewing; or as though endeavouring to swallow something. It generally happens that, although sensibility is quite extinguished, the child will still swallow anything that is put into its mouth, and the power of deglutition is in most cases one of the very last to be abolished.

An attack of convulsions now sometimes puts an end to the painful scene; but often the child lives on for days, though wasted to a skeleton, and its features so changed by suffering that those persons who had seen it but a short time before would now scarcely recognise it. The head often becomes somewhat retracted, and the child bores with the occiput in the pillow; the eyelids are wide open, and the eyes turned upwards so as to conceal three-fourths of the iris beneath the upper lid, while the countenance is still further disfigured by a horrible squint, or by a constant rolling of the eyes. The pupils are now fixed and glassy, the white of the eyes is extremely bloodshot, and their surface is besmeared with a copious secretion from the Meibomian glands which collects in their corners. One leg and arm are stiff and motionless, the other in constant spasmodic movement, while the hands are often clenched, and the wrists bent upon the

forearm. At the same time there is frequently so much subsultus as to render it impossible to count the pulse, and the muscles of the face are thrown from time to time into a state of spasmodic twitching. Cold clammy sweats break out abundantly about the head, the breathing is laboured, deglutition becomes difficult, and the child almost chokes with the effort to swallow, or lets the fluid run out at the corners of its mouth. It is uncertain how long this condition may endure; the recurrence of convulsions usually hastens the end, but sometimes many days will pass, during which death is hourly expected, and earnestly prayed for, to put an end to the patient's sufferings.

LECTURE VI.

Hydrocephalus, continued. Diversities in its course and in its modes of attack—insidious approach in phthisical subjects—resemblance of its symptoms to those of remittent fever—of simple gastric disorder—serious import of continued sickness in cases of gastric disorder.

Prognosis. Disease almost always fatal—appearances of improvement often delusive—cautions against being misled by them.

Duration of the disease—real nature of cases of waterstroke.

Treatment.—Prophylaxis—Treatment of the disease—rules for depletion, for use of purgatives, mercurials, application of cold.—Diet of patients—circumstances under which opiates may be useful—when blisters are to be applied. Conclusion.

It can scarcely be necessary to observe that acute hydrocephalus does not always run precisely that course which I described to you at our last meeting. Almost every case, indeed, presents some slight peculiarity either in the comparative severity of the different symptoms, in the date of their occurrence, or in the order in which they succeed each other. Convulsions, for instance, though hardly ever absent, occur earlier in one case than in another,—affect in one the whole body, in another are limited to one side,—are succeeded in one instance by paralysis, in another by a stiff and contracted state of the limbs. Again, coma sometimes comes on gradually, at other times takes place suddenly; in one instance it continues long, in another is speedily followed by death. The pupils sometimes become early insensible to light, at other times they continue to act, though slowly, almost to the time of death; and in like manner strabismus may exist in various forms, or there may be constant rotation of the eyeball, or neither of these symptoms may be present; and yet we cannot couple these diversities in the signs of the disease with any certain differences in the morbid appearances. But, how much soever one case of hydrocephalus may differ from another in these respects, such differences are of comparatively but little moment, since whether these symptoms occur early or late,—whether they are slight or severe,—short in their duration, or of long continuance,—the appearance of any one of them stamps the character of the disease too plainly for it to be mistaken; and indicates not the incipient but the fully developed evil. The *deviations from the ordinary*

mode of its attack are far more important, since they may lead you to mistake the nature of the disease during the only time when treatment is likely to be of much avail.

The healthy and robust are comparatively seldom attacked by hydrocephalus, and in many instances the indications of declining health precede for weeks or months the real premonitory symptoms of the disease. You may, however, be so much taken up with watching the former as to overlook the latter, or to misinterpret their meaning. Your solicitude is excited by the gradual decay of a child's strength and the wasting of its flesh. You observe that it becomes subject to irregular febrile attacks,—that it coughs a little,—that it loses its appetite,—that its bowels are almost always disordered, and generally constipated,—and that it makes frequent vague complaints of pains in its limbs, or of weariness or headache. These symptoms, which depend upon that general deposit of tubercle in the different organs of the body which almost every dissection of fatal cases of hydrocephalus reveals, make you apprehensive lest phthisis be about to come on, and you often auscultate the chest in the expectation of discovering some signs of disease in the lungs. At length, the child seems worse,—he coughs more, and is more feverish,—grows heavier and more dull, but does not complain more about his head,—or, at most, says that the cough makes his head ache. The parents think the child must have caught cold, and you do not see the indication of any new disorder; for, though listless and moody, he still moves about in the house, and sometimes plays, though in a spiritless manner. Simple treatment seems to do a little good, and you not unnaturally hope that the aggravation of the symptoms will prove only temporary; but, after an usually restless night, a fit of convulsions comes on, or the listlessness deepens in the course of a few hours, and without any evident cause, into profound coma, and a very few days terminate the patient's life.

In such a case as this you would, it is true, most likely be able to do little or nothing, even if you recognized the approach of hydrocephalus from the earliest indication of its coming. But you would save your patient's friends some sorrow, and yourself some reproach, if you discovered the danger at a distance. Now, whenever any child, especially if it be of a consumptive family, has been failing in health for some weeks or months, without evident cause, I advise you to look with much suspicion on the supervention of unusual drowsiness or listlessness, or on any aggravation of the cough, for which you cannot find adequate reason in the information afforded by auscultation. A frequent, short, dry cough is not infrequent at the commencement of hydrocephalus; but in cases where cough has existed for some time, you are very likely to refer its aggravation to mischief in the chest, and to lose sight of its possible connection with affection of the brain. Inquire, therefore, in every doubtful case, whether there has been any vomiting,—for sometimes it is but slight, and occurs only after

food has been taken, and then only occasionally, so that it may seem to the parents to be a symptom of little importance. Ascertain the condition of the bowels, watch the pulse most carefully ; it may not be irregular or intermittent, but you will probably find a little inequality in the force and duration of its beats : if so, you may be sure that the head is suffering, and if the head suffer in such a patient, it is in ninety-nine cases out of a hundred from the approach of hydrocephalus. Do not content yourself with seeing your patient once a day, visit him at least morning and evening,—stay some time with him, watch him closely, and see how far he is capable of being amused : but if you be still strangers to that freemasonry which assures a little child that you love it, you will very likely fail of arriving at the truth.

But it may happen that a child, though not robust, had yet been tolerably well till a week or two before you visited it, and that it was then attacked with febrile symptoms, with a little headache, and perhaps with vomiting and constipation. You learn that these two symptoms were but of short duration, but that the fever has continued ever since, and that the child has been very taciturn, rather drowsy, and averse to being disturbed, though giving rational answers when spoken to. You regard the case as one of remittent fever, and treat it without either improvement or deterioration, till the appearance of convulsions or coma corrects your diagnosis, though unfortunately too late.

It must be confessed that it is sometimes a matter of great difficulty to distinguish between these two affections. It may help you, indeed, to bear in mind that remittent fever is very rare before five years of age, and is hardly ever met with in children under three ; while at least half of all cases of hydrocephalus occur in children who have not completed their fifth year. But still this is not the kind of evidence on which you can place much reliance in a doubtful case. There are differences in the symptoms, however, which will generally enable you to discriminate between them, if you have acquired the habit of minute and careful observation. The vomiting, on which I have laid so much stress as a symptom of approaching hydrocephalus, is often absent even at the onset of remittent fever ; it soon ceases, and is not followed by that abiding nausea which is frequent in hydrocephalus. In remittent fever the bowels are often relaxed from the very outset, or speedily become so, and the evacuations present no resemblance to the scanty, dark, or mud-coloured motions which are voided in hydrocephalus, but are usually watery, fæcal, and of a lightish colour. Tenderness of the abdomen is nearly constant in remittent fever, and is greater in the iliac regions than elsewhere, and wind can always be felt in the intestines. The tongue is not moist as in hydrocephalus, and is seldom much loaded, but has only a thin coating of yellow fur at the centre and towards the root, while it is very red at the tip and edges, and becomes dry at an early stage of the disease. In hydro-

cephalus there is frequently a great distaste for drink as well as for food, while, although the appetite is lost in cases of remittent fever, yet the patients have great desire for drink, especially for cold drink, to quench the urgent thirst. The heat of the skin in remittent fever is extremely pungent, and much greater than in hydrocephalus, in which, although there is great dryness of the surface, yet the temperature is seldom much increased. The pulse in remittent fever is much quicker than in hydrocephalus; it continues quick throughout, and never becomes unequal or irregular, while its frequency is in direct proportion to the elevation of the temperature of the surface. In remittent fever the child makes few complaints about its head, but delirium is of early occurrence, especially at night; in hydrocephalus, on the contrary, true delirium hardly ever occurs till an advanced period of the disease, and is sometimes absent altogether. In remittent fever, as its name implies, there are distinct remissions and exacerbations of the symptoms, the patient getting better towards morning, and worse again as night approaches; while though there are many fluctuations in the course of hydrocephalus, yet we observe no *definite* periods at which the symptoms invariably remit or are increased in severity.

With due caution you will scarcely take a case of incipient hydrocephalus for one of simple gastric disorder, though there are many points of resemblance between the two. Vomiting and constipation occur in both, and there is usually some degree of headache in the latter affection, though seldom severe or lasting. Mere gastric disorder is not attended with much febrile disturbance; the face, though heavy, is not distressed or anxious, while the tongue is usually much more coated than at the onset of an attack of hydrocephalus. The relief that follows the use of remedies in the less dangerous affection is complete as well as speedy; the sickness will cease after the operation of an emetic, the bowels will act copiously after the administration of a brisk purgative, and in a day or two your patient will be quite well. The persistence of vomiting, however, in any case which you had thought to be one merely of gastric disorder, must be looked upon by you with great suspicion, and this even though the bowels have acted freely from medicine, and though there be no obvious indication of mischief in the head. I once saw a case in which the continuance of intractable vomiting for more than six weeks after the cessation of a short but severe attack of diarrhœa, was the only symptom of illness in a boy five years of age. At length he became a little drowsy, and once or twice, when closely questioned, said that his head ached. Not quite two days after the first complaint of headache, the child had a violent fit of convulsions, and in the course of the succeeding week he died, having suffered during that time from all the symptoms of acute hydrocephalus, and his body presenting after death its characteristic lesions.

An inquiry of little less importance than that concerning the means of distinguishing between one disease and another, respects the *prognosis* that

we are to form, the inferences that we may draw, from the course of the malady, either to encourage hope or to excite anxiety. Unfortunately the prognosis in hydrocephalus is so unfavourable that we can scarcely speak of the circumstances which regulate it; for under almost every variety of condition, of symptoms, and of treatment, the patients die. I have never yet seen an instance of recovery from advanced hydrocephalus; I have seen but one in which the child got well after the disease was well marked and the second stage had commenced, and have observed only very few cases have a favourable issue even though they came under treatment immediately on the appearance of the premonitory symptoms of water in the brain. This result is, I know, more discouraging than that which other practitioners have arrived at; but M. Guersant, of Paris, who probably had a larger experience than any man now living in the management of children's diseases, does not seem to have been more fortunate.

"Tubercular meningitis," says he (by which name French writers have designated the disease that we are now studying), "may sometimes terminate by recovery in the first stage, though the nature of such cases is always more or less doubtful; in the second stage I have not seen one child recover out of a hundred, and even those who seemed to have recovered have either sunk afterwards under a return of the same disease in its acute form, or have died of phthisis. As to patients in whom the disease has reached the third stage, I have never seen them improve even for a moment."*

Since the fatality of the disease is so invariable, it may seem to you superfluous for me to say anything more with reference to the prognosis; but I am desirous of guarding you against being deceived by certain *delusive appearances of improvement* which are by no means unusual even in cases where the real nature of the disease has for some two or three days been clearly manifest. A few years ago, a little girl, three years old, was brought to me in a state of profound coma, and presenting the symptoms of the third stage of acute hydrocephalus, of which she died forty-eight hours afterwards, without having had any return of consciousness. I learned from the mother that, fourteen days previously, the child had been attacked with vomiting, attended with fever and great drowsiness, but that these symptoms abated in three days, and that the child improved and was regaining her cheerfulness until the morning of the day before she was brought to me, when her mother found her comatose, and in just the condition in which she was when I saw her. A more acute observer than this child's mother would probably have seen something to make her mistrust the apparent improvement; but it is evident that the change was great from fever and drowsiness, and frequent vomiting, to a cessation of the sickness, a diminution of the fever, and a return of cheerfulness; and yet during all

* Dict. Méd. t. xix. p. 403, quoted by MM. Rilliet and Barthez, op. cit. t. iii. p. 531.

this time disease was going on, and producing the very extensive softening of the central and posterior parts of the brain which was discovered after death. The cases in which you are likely to fall into error are for the most part such as have come on insidiously, unattended with very violent symptoms, and about which you perhaps hesitated some little time before you became convinced that so grave a malady as hydrocephalus could wear so mild a form. Treatment for some days produces no effect, the disease remaining stationary; but at length your hopes are raised by finding that the vomiting has ceased, and that the constipated condition of the bowels has been overcome. The heat of head has disappeared, the pulse presents much less irregularity than before, or may even have lost it altogether, and the child's restlessness has subsided, and its manner is almost natural. Perhaps the child seems rather drowsy, or it may be sleeping at the time of your visit, but the account you hear of it seems satisfactory: its repose is quiet, and the mother rejoices: her little one has had no sound sleep for many days, and will, she thinks—and you may think so too—be much better when it wakes. It does not wake up, but it swallows well when some drink is given in a spoon, and the mother is still content. Presently slight twitches of the face and hands are seen, but the child does not wake,—you cannot rouse it: the sleep has passed into coma, and the coma will end in death. Always suspect the sleep which follows continued restlessness in a case of hydrocephalus.

In other cases, although the disease did not come on so insidiously, and although it has reached a stage at which all its characters are well marked, you may yet be led for a few hours to entertain, and perhaps to express, ill founded hopes, in consequence of the symptoms having somewhat abated, of the child having had some hours of quiet sleep, or having ceased to vomit, or no longer complaining of its head, or being visited by a short gleam of cheerfulness. You must not forget, however, that it is characteristic of hydrocephalus to present *irregular* remissions, that they last but for a few hours, and that at your next visit you may find every bad symptom returned, and, possibly, some fresh one superadded. Usually, too, you may be guarded from error by observing the suddenness of the change, and that the condition which has now come on is the very opposite of that which before existed, preternatural excitement having been succeeded by an equally unnatural apathy, or great talkativeness having taken the place of obstinate silence, or the pulse, which before was above 120, having sunk all at once to 90 in the minute. At other times, though there is a general abatement in all the previous symptoms, yet some new one may have appeared, not more formidable, perhaps, than the occurrence of a slight degree of strabismus which had not existed before, but still enough to indicate that the mischief is still going on, and that you must not dare to hope.

A still more remarkable temporary improvement is sometimes observed,

that "lightening before death" which seems, contrary to all expectation, to warrant a hope of recovery even when dissolution is impending. The only instance of it which has come under my notice occurred in a girl, aged seven years, who died on the fifteenth day of an attack of acute hydrocephalus. She had been in a state of stupor for six days, and profoundly comatose for two days, when she became conscious, swallowed some drink, spoke sensibly, and said she knew her father. She became worse again, however, in the course of an hour and a half, though she did not sink into the same deep coma as before, and in another hour she died.

A few points still remain on which I must touch before passing to the consideration of the treatment of hydrocephalus. One of these is the question of its *duration*. The exact determination of this is not always easy, owing to the insidious manner in which the disease comes on; but, on the whole, there is less discrepancy than might have been expected between the statements of different writers. Of 117 cases observed or collected by Dr. Hennis Green, 80 terminated within 14 days, and 111 within 20 days. Of 28 cases recorded by Gölis,* 18 terminated within fourteen days, and only 2 exceeded 20 days. MM. Rilliet and Barthez† state the average duration of 28 cases that came under their observation to have been 22 days; and the average duration of 30 fatal cases of which I have a complete record, was 20½ days. Of these 30 cases, that which ran the most rapid course terminated fatally in five days; death took place in 10 more before the fourteenth day; in 11 others during the third week, and in 3 during the fourth week. In the remaining five cases, indications of cerebral disturbance had existed for four, six, or eight weeks; but death took place in every instance in less than 21 days after the appearance of well-marked symptoms of hydrocephalus. We are, then, warranted in stating that the disease usually runs its course in from two to three weeks.

The late celebrated Dr. Gölis, of Vienna, proposed the name of *water-stroke* for some cases in which the head symptoms were of such short duration as not to exceed 24 or 48 hours. Such a rapid course, however, is not observed in true tuberculous hydrocephalus; but the name of water-stroke has been applied to a great variety of cases which have presented little in common, except the presence of head symptoms, and their rapidly fatal termination.‡ The appellation has been sometimes bestowed on cases of intense cerebral congestion; at other times on cases of simple meningitis. In a few instances the name may have been given to cases of true hydrocephalus in which the rapid course of the disease has been apparent, rather than real, owing to its having succeeded to chicken-pox, or come on in the course of that febrile disturbance which vaccination

* Praktische Abhandlungen, etc. 8vo. Wien. 1820, vol. i.

† Op. cit. vol. iii. p. 497.

‡ In proof of this statement, see Gölis, lib. cit. Cases 1 to 9.

sometimes excites, or which attends upon dentition. Under such circumstances, it often happens that the manifestations of cerebral disease are mistakenly attributed entirely to the previous cause of irritation in the system, so that, when the signs of serious mischief force themselves upon the notice, the hydrocephalus has well nigh run its course.

In describing this disease, I divided it into three stages, but did so simply for convenience. Many physicians, however, have attached much greater importance to this division, regarding the first as the stage of turgesence; the second as that of inflammation; the third, that of effusion. Again, the first has been characterised as the stage of increased sensibility; the second, of diminished sensibility; the third, of palsy. Lastly, Dr. Whytt proposed a division that has been much followed, based on the variations of the pulse, which is usually quick and regular in the first stage, slow and irregular in the second, and quick in the third. There are too many exceptions, however, to the order of these changes for it to be right to make them the foundation of any division of the disease into different stages; and the same remark may be made with reference to any arrangement founded on the variations in the sensibility of the patient.

I have said that the phenomena of the pulse are not constant: I need scarcely add, that the slow irregular pulse is no proof of the occurrence of effusion; neither is the dilated pupil a proof of it: it is a proof of great mischief having been inflicted on the brain; so are the strabismus and the rolling of the eyes which frequently accompany it; but you cannot connect these symptoms with injuries of a special kind, or involving particular parts of the brain.

Although a disease of childhood, acute hydrocephalus is by no means most frequent in early infancy. In only 5 of 31 fatal cases in which the diagnosis was confirmed by a post-mortem examination, were my patients under a year old; 7 were under 3 years of age; 16 between 3 and 6; and the remaining 3 between 6 and 9 years old.*

From all that I have told you about hydrocephalus, you have, I doubt not, already deduced the practical inference, that the only *treatment* likely to avail much is the prophylactic; and that, if you would hope ever to save a patient, you must treat the mere threatenings of his disease, and not remain inactive until you see the malady fully developed before you.

The *prophylactic treatment* of hydrocephalus must be in the main the prophylactic treatment of consumption, since not only is tubercle invariably present in the various organs of children who have died of hydrocephalus,

* This statement as to the time of life at which hydrocephalus is most frequent, is fully borne out by the Third Report of the Registrar-General, from which it appears that while only 7·5 per cent. of the total deaths under one year old in this metropolis resulted from cephalitis and hydrocephalus, these diseases caused 12·8 per. cent. of the deaths between 1 and 3; 13 per cent. of those between 3 and 5; 11·5 per cent. of those between 5 and 10; and 6·4 per cent. of those between 10 and 15.

but the disease itself often supervenes on more or less definite phthisical symptoms. The influence of hereditary predisposition to phthisis, in favouring the development of hydrocephalus, is shewn by the fact that not only was the previous health of the children indifferent in two-thirds of the cases that came under my notice, but that, in sixteen out of twenty instances, in which the health of the relatives was made the subject of special inquiry, it was ascertained that either the father, mother, aunt, or uncle, had died of phthisis.

In any case where several children of the same family have already died of hydrocephalus, or have shewn a marked tendency to the disease, the mother should for the future abstain from suckling her infants, and they should be brought up by a healthy wet-nurse. Under such circumstances, too, it would be desirable that a child should always live in the country; its clothing should be warm, and flannel should be worn next the skin; its diet should be simple, and any change in it should be made with the greatest caution, while milk should for a long time form one of its chief aliments; and it would be desirable not to wean it until after it had cut four molar teeth, as well as all the incisors. As it grows up, over exertion, either of mind or body, must be most carefully avoided; and on this account, though free exercise in the air is highly beneficial, gymnastic exercises are by no means to be recommended. The child must be watched carefully during the whole period of dentition, and every precaution must be taken to shield it from the contagion of measles, hooping-cough, or scarlatina; since these diseases, which tend to excite the tuberculous cachexy, would be likely greatly to aggravate the disposition to hydrocephalus, or even to bring on an attack of the disease. The condition of the bowels must be most carefully watched, constipation must not be allowed to exist even for a day, and the least indication of gastric disorder must be regarded as a serious matter. It is not desirable that calomel should be used as a domestic remedy; but if the simplest aperients (such as castor-oil, or the infusion of senna, or of rhubarb, the taste of which may be concealed by caraway-water,) do not act, the child should be immediately placed under proper medical care. If at any time there should be heat of head, and the child appear squeamish, you must be at hand with your remedies, and those well chosen. Any bulky remedy would probably be rejected, but the stomach is almost sure to bear a grain or two of calomel with sugar, and you may follow this up with a small quantity of sulphate of magnesia, dissolved in water, flavoured with syrup of orange peel, which may be repeated every hour. A small dose of mercury with chalk, or of calomel, may be continued every night for two or three times, and if any feverishness remain, or the bowels be disposed to be constipated, the sulphate of magnesia may still be given twice or thrice a day. Leeches should not be applied to the head without very obvious necessity, nor then in large numbers, for strumous children

do not bear the loss of blood well; and your endeavour should therefore always be, not simply to cure, but to cure at the smallest possible expense to the constitution. After attacks of this kind, children sometimes recover their health very slowly, and much good may then be effected by a judicious use of tonics. The infusion of calumba, with a small dose of tincture of rhubarb, is a very suitable medicine, and one which children generally take tolerably well. Or you may give the ferro-citrate of quinine in orange-flower water, and sweetened with the syrup of orange peel, while you secure the healthy action of the bowels by a grain or two of Hydr. c. Cretâ, combined with five or six of rhubarb, administered every night, or every other night.

If threatenings of head affection have frequently occurred, an issue should be inserted in the back of the neck; for the keeping up a constant discharge from the neighbourhood of the head is certainly very serviceable in many instances as a means of warding off hydrocephalus. A most remarkable instance of this is recorded by Dr. Cheyne, who mentions that all the children in a numerous family were carried off by water in the brain, with the exception of one, in whose case the precaution was adopted of putting a seton in the back of his neck.

But the opportunity may not be afforded you of adopting this prophylactic treatment; and when you first see your patient, the existence of headache, vomiting, constipation, and a quickened pulse, with perhaps a very slight inequality in its beat, may leave you but little doubt as to the formidable nature of the disease with which you have to contend. In doing this, there are three remedies on which your main reliance must be placed,—depletion, purging, and the administration of mercury.

With reference to *depletion*, you must not forget that the disease in which you are about to employ it, although of inflammatory nature, is inflammation in a scrofulous subject, and is in many cases grafted on previous organic disease; such as those tubercular deposits in the membranes of the brain, which I have already described to you. You cannot, therefore, hope to cut short the affection by a large bleeding, but your object must be to take blood enough to relieve the congested brain, and no more than is necessary for that purpose. Avoid precipitancy in what you do, and do not let your apprehensions betray you into that over-activity which is sometimes more fatal to a patient than his disease. If you feel any doubt as to the necessity for depletion, visit your patient again before determining on it, but do not delay that visit long. Order a dose of calomel, to be followed by some sulphate of magnesia, if, as is most probable, the bowels be confined, and return again in three or four hours. You may then find that the bowels have acted, and the sickness has ceased; that the head is cooler, and aches less, and that depletion is, for the present at any rate, unnecessary. Or the child's state may be the same, and

you may still feel uncertain as to the right course. In that case, at once obtain the assistance of some other practitioner. This is the season when advice may be really useful, for it is only at the outset of the disease that its cure is possible; when convulsions have occurred, or coma is coming on, your treatment matters comparatively little, for the season of hope and the opportunity for action have then fled.

Though you may have determined on the propriety of depletion, it will be seldom found, even at the outset of the disease, that the character of the pulse is such as to warrant venesection. Local bleeding will generally answer every purpose, and the age and docility of the patient will determine whether it shall be performed by cupping or by the application of leeches. The former is more effective, and, from its shorter duration, often occasions less excitement and annoyance than the latter. In children who are very unmanageable, however, or in very young children or infants, the employment of leeches is always preferable. They should be applied to the vertex, because, if put on the temples, they hang down over the eyes and terrify the child; if behind the ears, they are very likely to be rubbed off as it rolls its head from side to side. I will not say that this depletion is never to be repeated, but I believe that in by far the greater number of cases you will do no good whatever by its repetition, and the exceptional cases will generally be those in which, very marked relief having followed the first bleeding, the same symptoms of congestion of the brain appear to be returning twenty-four or thirty-six hours afterwards. If you do not see the child until the second stage of the disease is far advanced,—till general convulsions have occurred, or twitchings of the limbs, or of the muscles of the face, an appearance of extreme alarm, or a state of alternate contraction and dilatation of the pupils, show them to be impending,—you must be exceedingly careful in abstracting blood. Under such circumstances, I have seen convulsions, to all appearance, induced, and the fatal course of the disease accelerated, by a rather free, though by no means immoderate loss of blood.

The value of *purgatives* in the treatment of hydrocephalus can scarcely be overrated; but they must be given so as not merely to obtain free action of the bowels, but to maintain it for some days. After having once overcome the constipation, you will secure this end best by giving small doses of a purgative every four or six hours. The administration of a strong cathartic every morning will not answer this end nearly so well; for, independently of the chance of its being rejected by the stomach, you will find that the dose which sufficed the first time will not be large enough the second, and that there will be a constantly increasing difficulty in obtaining an evacuation. The nausea and vomiting which at first stood in the way of your administering any medicine, are often so much relieved by depletion, that the stomach will almost immediately afterwards bear a

dose of calomel and jalap, or calomel and scammony, which may be repeated every three hours, until it acts, while you, at the same time, endeavour to quicken its operation by the administration of a purgative enema. There is no use, however, in persevering with these medicines if they excite sickness, and it is then better to give a single large dose of calomel in some loaf sugar, and to follow it up by a solution of sulphate of magnesia, which should be repeated at short int ervals. When a free evacuation has been obtained, the same salt, in combination withthe nitrate of potash, will often keep up a free action of the bowels, as well as stimulate the kidneys to increased activity. These remedies may either be mixed with the child's drink, or be dissolved in water flavoured with syrup of lemon or of orange peel.

Hand in hand with purgatives I would have you continue the administration of *calomel;* but I do not put faith in calomel alone, nor in the production of salivation, as a means of curing hydrocephalus. I have seen children die whose mouths had been made sore by mercury, without any influence appearing to have been thereby exerted on the disease; and I recollect two who, at the time of their death, were in a state of most profuse salivation. Whatever good I have seen in these cases from calomel has been when it was given in combination with purgatives, or when it produced a purgative effect.

Let me, however, again remind you that you may have hydrocephalus combined with tubercular ulceration of the intestines, and that in such a case diarrhœa may exist from the outset, or may come on after a mild dose of some aperient. Now and then, too, without such a cause, constipation is absent, while diarrhœa comes on occasionally in the far advanced disease. You must not, therefore, draw inferences as to the state of the patient too exclusively from the condition of the bowels.

I insisted much on the *local employment of cold* when speaking about the management of cases of cerebral congestion. It is likewise a very valuable agent in the treatment of hydrocephalus, but its application requires to be judiciously regulated. You will generally find it of service after depletion, for you have abstracted blood on account of the febrile disturbance and heat of head, and other indications of congestion of the brain, all of which cold will be a powerful auxiliary in subduing. So long as the signs of active congestion of the brain are present, cold will be of service; but it should not be employed independently of those symptoms which betoken the existence of that condition; nor can you hope to see any benefit result from cold applications to the head in the advanced stages of the disease. I need scarcely say that the application of cold with a shock, or the pouring cold water from a height upon the head, though a very valuable means of rousing a child from the state of coma into which it sinks in some cases of intense cerebral congestion, is wholly inapplicable in the coma of hydrocephalus. The functions of the brain are here not

merely interrupted by the excess of blood in the organ, but they are abolished by the disorganization of its tissue, or the compression of its substance by the effusion of fluid.

In the management of children attacked by hydrocephalus, you must not forget that for the most part they are of feeble constitution, and that they will not bear too rigorous a *diet*. Just at first, indeed, while the febrile symptoms run high, and the bowels are unrelieved, or the sickness is urgent, the less the patient takes the better. Afterwards, however, it is desirable that he should be supplied with as much light and unstimulating nutriment as he will take; such, for instance, as arrow-root, or veal or beef-tea, either of which will often remain on the stomach when most other articles of food or drink would be rejected.

In the treatment of many diseases you see physicians destroy the sense of pain by *narcotics*, and the question naturally suggests itself to you whether you may not sometimes venture, in the management of hydrocephalus, to mitigate by their means your patient's sufferings. The inquiry is one not very easy to reply to satisfactorily. I think, however, that there are two conditions under which you would be justified in trying the experiment of giving them. Sometimes the disease sets in with great excitement, and a condition closely resembling mania in the adult, symptoms which may have been ushered in by convulsions. In such a case, although the heat of head and the flush of the face may have disappeared after free depletion and the copious action of purgative medicine, and though the pulse is feeble as well as frequent, yet the excitement may be scarcely if at all diminished. Here an opiate will sometimes give the relief which nothing else will procure; your patient will fall asleep, and wake tranquillized in the course of two or three hours. In other cases, which did not set in thus violently, restlessness, talkativeness, and a kind of half delirious consciousness of pain in the head, become very distressing as the disease advances, being always aggravated at night, so that your patient's condition seems one of constant suffering. But he is not able to bear any more active treatment, and, indeed, you have already emptied your quiver of such weapons. Under these circumstances I have sometimes given a full dose of morphia, and have continued it every night for several nights together with manifest relief.

Another inquiry that you may put is, when are you to employ *blisters?* Certainly not at the beginning of the disease, when they would increase the general irritation, and do more harm than good. At a later period they may be of service, when the excitement is about to yield to that stupor which usually precedes the state of complete coma. They should then be applied to the nape of the neck or to the vertex; and I am disposed to think the latter the better place, since, when applied to the nape of the neck, they often become displaced by that boring movement of the head which the child in many instances keeps up unconsciously. It is

well, too, to remember that the skin in hydrocephalus is very inapt to vesicate, so that a blister will require to be kept on for ten or twelve hours; contrary to what ought to be your usual practice with children. Cases enough are on record proving the utility of blisters thus applied, to render it your duty not to neglect this means.

Need I say, that you must not think of treating a case of hydrocephalus throughout just in the same way as you did at its commencement. There is, if the disease do not run a very rapid course, a stage of weakness and exhaustion, often associated with a half comatose condition, though sometimes attended with a considerable degree of suffering, which frequently precedes the signs of approaching death. The bowels are now sometimes relaxed, though oftener they continue constipated, because the nervous energy which kept up the peristaltic movements of the intestines is worn out. The powers of organic as well as those of animal life are palsied. This is the time for the administration of quinine, for the employment of nutritious broths and jellies, and even of wine.

You may perhaps be disposed to ask me what I think of this remedy or the other, which has at different times been boasted of, as having done good when other means had failed. Now you must not infer from my silence that I do not believe that other medicines besides those which I have spoken of have been of service; but to attempt to canvass the respective merits of each would, I fear, be a tedious task, and one from which you would derive but little profit.

Besides, may I remind you of what Sydenham says, "* * * In eo præcipuè stat Medicina Practica, ut genuinas Indicationes expiscari valeamus, non ut remedia excogitemus quibus illis satisfieri possit; quod qui minùs observabant, Empericos armis instruxere, quibus Medicorum opera imitari queant."

LECTURE VII.

Simple inflammation of the brain—its differences from hydrocephalus—occasional extreme rapidity of its course—cases in illustration—morbid appearances—frequent connection with meningitis of the cord—extreme rarity as an idiopathic affection—treatment.

Inflammation of the brain, succeeding to disease of the ear—digression concerning otitis—its symptoms—distinctions between it and inflammation of the brain—treatment—chronic otorrhœa, with disease of the temporal bone—case.

Phlebitis of the sinuses of the dura matter—circumstances under which it occurs—it sometimes succeeds to large collections of pus in distant organs—case in illustration.

We have been engaged at our last two meetings with the study of one form of inflammation of the brain in the young subject. We found hydrocephalus to be an affection almost exclusively confined to children whose previous health had been indifferent, who had shown some indications of phthisis, or in whose family phthisical disease existed. We observed its development to be gradual, its progress often tardy, and attended with irregular remissions: but its issue almost always fatal. The alterations of structure discovered after death were seen to be slight at the convexity of the brain, but very obvious at its base, where, in addition to the effects of inflammation, the membranes often present a peculiar granular appearance. The fluid contained in the ventricles of the brain is almost always transparent, and tubercle is discovered in some, often in many, of the viscera.

But we sometimes meet with cases in which *inflammation of the brain* has given rise to changes that contrast remarkably with those which true hydrocephalus produces. We find the cerebral membranes intensely injected, the effusion of lymph or pus abundant, especially about the convex surface of the brain, where it sometimes forms a layer concealing the convolutions from view. Moreover, the fluid that occupies the cavity of the arachnoid, as well as that within the ventricles, is turbid and mixed with lymph, while the membranes present no trace of that granular appearance so remarkable in true hydrocephalus, and the various organs of the body are free from tubercle.

If we inquire as to the symptoms by which this disease was attended during the life-time of the patient, we shall most likely find that they pre-

sent fresh reasons for distinguishing between it and hydrocephalus. We shall learn that the attack came on in a previously healthy child, that it was either ushered in by convulsions, or that they soon occurred, that they returned often, and probably that they continued with but little intermission until death took place. We shall be told, moreover, that the disease set in with violent vomiting and intense febrile excitement, and that having commenced thus severely, it advanced rapidly and without remission, to its fatal termination, which may have arrived in the course of a few hours, and is seldom delayed beyond the first week.

Some cases of this *simple encephalitis* are recorded by Gölis, under the name of Water-stroke; I will select one of them as affording a good specimen of the most acute form of the disease.*

"A little girl, 14 months old, who was healthy and strong and fat, was suddenly seized at 5 o'clock in the morning, after a restless night, with violent fever and frightful general convulsions. Medical assistance was at once obtained, and in less than thirty minutes from the commencement of the attack, four leeches were applied behind the ears, which drew three ounces of blood: calomel and other remedies were administered internally, and mustard poultices were put to the soles of the feet. These measures soon alleviated the symptoms, but the relief lasted for but a very short time; the fever returned as intensely as before, convulsions came on again, attended with opisthotonos, and the child became comatose. Hemiplegia succeeded; the pupils became extremely contracted; complete loss of vision, and spasmodic twitching of the muscles of the face, soon followed, and thirteen hours after the first convulsive seizure, in spite of most appropriate and energetic treatment, the little child died.

"The vessels of the scalp were loaded with blood, and the skull was so intensely congested as to appear of a deep blue colour; the sinuses were full of coagulated blood mixed with lymph, and all the vessels of the brain and its membranes were enlarged and turgid with blood.

"A large quantity of coagulated lymph covered the convolutions of the brain and the corpus callosum like a false membrane, and furnished a delicate lining to the lateral ventricles, whose walls were softened and in part broken down. The ventricles contained about ʒiij. of turbid serum, and there was a considerable quantity of lymph at the base of the brain."

As I have never seen an instance of this most rapid form of meningitis, I will draw for another illustration of it upon that valuable storehouse of facts, Dr. Abercrombie's work on Diseases of the Brain.†

"A child, aged 2 years, 21st May, 1826, was suddenly seized in the morning with severe and long-continued convulsion. It left her in a dull and torpid state, in which she did not seem to recognise the persons about her. She had lain in this state for several hours, when the convulsion re-

* Praktische Abhandlungen, etc. vol. i. Case 2.

† Case 10, p. 52.

turned, and during the following night it recurred a third time, and was very severe and of long continuance. I saw her on the morning of the 23d, and while I was sitting by her, she was again attacked with severe and long-continued convulsion, which affected every part of the body, the face and the eyes in particular being frightfully distorted. The countenance was pale, and expressive of exhaustion; the pulse frequent: her bowels had been freely opened by medicine previously prescribed by Dr. Beilby, and the motions were dark and unhealthy. Farther purging was employed, with topical bleeding, cold applications to the head, and blistering. After this attack she continued free from convulsion till the afternoon of the 23d; in the interval she had remained in a partially comatose state, with frequent starting; pulse frequent, but feeble; pupils rather dilated: she took some food. In the afternoon of the 23d the convulsion returned with greater severity; and on the 24th there was a constant succession of paroxysms during the whole day, with sinking of the vital powers; and she died early in the evening.

"On removing the dura mater, the surface of the brain appeared in many places covered by a deposition of adventitious membrane betwixt the arachnoid and pia mater. It was chiefly found above the openings between the convolutions, and in some places appeared to dip a little way between them. The arachnoid membrane when detached appeared to be healthy, but the pia mater was throughout in the highest state of vascularity, especially between the convolutions; and when the brain was cut vertically, the spaces between the convolutions were most strikingly marked by a bright line of vivid redness, produced by the inflamed membrane. There was no effusion in the ventricles, and no other morbid appearance."

It would not answer any useful purpose to multiply the recital of cases, since though there are great varieties in the duration of the disease, yet its general features are the same in almost every instance, and will, I think, usually be recognised by you as betokening an affection very different from ordinary hydrocephalus.

The morbid appearances are sometimes found to vary both in their degree and in their extent, without any corresponding difference being observed in the symptoms. With the exception of its course being more rapid, Gölis's case differed but little from that recorded by Dr. Abercrombie. I believe that in the majority of instances the lining of the ventricles is affected, and it is certainly more common for the membranes at the base of the brain to be involved in the disease, than for it to be entirely limited to those at the convexity. It may also be doubted whether the membranes of the spinal cord are not also affected in the greater number of cases; but unfortunately the histories of but few post-mortem examinations contain complete details with reference to their condition. I have had the opportunity of examining five fatal cases of acute meningitis in infants or children, and in three of these there was not only abundant deposit of lymph

on the surface of the convolutions, but it was effused copiously at the base of the brain ; the ventricles contained turbid serum intermixed with flakes of lymph ; and the membranes of the spinal cord were inflamed, and coated in many parts with lymph and pus. In all of these three cases the children were under a year old, and the disease came on without any assignable cause, as it did also in the case of another little boy, aged 13 months. In that instance, however, no lymph was effused anywhere ; the ventricles contained only a small quantity of transparent fluid, and the most remarkable appearance consisted in an intense injection of the pia mater of the convexity and of the surface of the convolutions for about two lines in depth, the cerebral substance in that situation being softened, so that portions of it were removed when the pia mater was stripped off. In another instance, where all the symptoms of encephalitis succeeded to an injury of the neck and head, the membranes at the convexity of the brain, and also the choroid plexuses and the velum interpositum, were intensely red ; there was much effusion in the sub-arachnoid tissue ; not much in the lateral ventricles, though their lining was considerably thickened. The substance of the brain was injected and much softer than natural, especially towards the centre of the organ and at its left side. In both of these cases the membranes at the base of the brain were perfectly healthy, but the spinal cord was not examined.

I have seen two other cases in which I believe that inflammation existed of the meninges both of the brain and spinal cord, but in which I had no opportunity of making an examination after death. These seven cases constitute the whole of my experience in this formidable disease.

Acute inflammation of the brain or its membranes is fortunately of very rare occurrence in childhood, except as the result of fracture of the skull, or of injury to the head or neck. Exposure to the heat of the sun has been known to induce it ; sometimes it occurs in children who are apparently recovering from scarlatina ; and at other times it occurs without our being able to trace it to any definite cause.

In the *treatment* of this affection, our remedies must be, in the main, the same as we should employ to combat the acute inflammation of any other vital organ. Bleeding, purgatives, mercurials, and the application of cold, are the grand means on which we must rely ; and these must be used with an unsparing hand if we would have any chance of saving our patient. Our prospect of success, however, depends almost entirely upon our seeing the patient at the very outset. The case which I quoted from Gölis shewed you what extensive mischief may occur in thirteen hours, and instances are on record in which a greater amount of injury has been discovered after a still shorter train of symptoms. Even in those cases which do not run this extremely rapid course, and in which the mischief found after death is not so considerable, there is little less need for speedy as well as active interference, for if life be prolonged for a day or two

without the disease being overcome, the patient often sinks into an exhausted, or, as the French call it, an ataxic condition, in which active treatment can no longer be ventured on.

Formidable though these cases are, yet if seen early, and treated actively, they may be regarded more hopefully than those in which the brain and its membranes become inflamed in consequence of the extension to them of *disease beginning without the skull.* You will occasionally see instances of this occurrence in children who have suffered from scrofulous disease of the cervical vertebræ, when a life of suffering is terminated by a most painful death; or inflammation of the brain, proving very quickly fatal, may come on in a child who has long had discharge from the ear, with occasional attacks of ear-ache. Vague threatenings of mischief in the head may perhaps have existed for some time, just sufficient to excite your apprehension, but not so serious or definite as to call for decided interference; and yet, when death takes place, you will find it almost impossible to reconcile the existence of lesions so extensive and of such long standing as a post-mortem examination discovers, with the long-continued absence of definite cerebral symptoms.

In Dr. Abercrombie's work on Diseases of the Brain,* an account is given of a boy, aged 14 years, who had been affected for two months with headache and discharge of matter from the right ear. A week before his death the pain increased, and was accompanied by great debility, giddiness, and some vomiting. He continued in this state, without stupor or any other remarkable symptom, until the day of his death, when he was suddenly seized with convulsions, and died. An abscess was found in the middle lobe of the right hemisphere of the brain, and another in the cerebellum, and there was extensive caries of the pars petrosa, with effusion of three ounces of fluid in the ventricles.

I have quoted this case in order to impress upon your minds that every even the slightest, indication of cerebral disturbance is to be looked on with the greatest anxiety in children who have suffered from chronic otorrhœa. Your solicitude must be redoubled if the discharge from the meatus had ever been attended with the formation of abscesses at the back of the ear, or burrowing between the cartilage and the bone, since they would render it extremely probable that caries of the bone had existed, and that the membranes of the brain had been reached by the advance of the disease.

Inflammation of the brain occasionally supervenes on disease of the internal ear, even though there have been no actual exposure of the dura mater by destruction of the bone, and though attacks of otitis have not been of frequent occurrence. Attacks of otitis, indeed, are of importance, not merely on account of the occasional supervention upon them of in-

* Page 37; quoted from Mr. Parkinson, in London Med. Repository, March 1817.

flammation of the brain, but also on account of the severe suffering by which they are always attended. In many instances, too, needless alarm may be excited by the symptoms of inflammation of the ear being supposed to betoken that the brain itself is the seat of the mischief; and hence it is very desirable to become familiar with the diagnostic marks that distinguish the less from the more dangerous affection.

Inflammation of the internal ear is most frequent before the completion of the first dentition, and is by no means rare in young children who are perfectly unable to point out the seat of their sufferings. The attack sometimes comes on quite suddenly, but usually the child is fretful and languid for a period varying from a few hours to one or two days before acute pain is experienced. In this premonitory stage, however, it will often cry, if tossed or moved briskly, noise seems unpleasant to it, and it does not care to be played with; while children who are still at the breast shew a disinclination to suck, though they will take food from a spoon. The infant seeks to rest its head on its mother's shoulder, or if lying in its cot, moves its head uneasily from side to side, and then buries its face in the pillow. If you watch closely, you will see that it is always the same side of the head which it seeks to bury in the pillow, or to rest on its nurse's arm, and that no other position seems to give any ease except this one, which, after much restlessness, the child will take up, and to which, if disturbed, it will always return. The gentle support to the ear seems to soothe the little patient; it cries itself to sleep, but after a short doze some fresh twinge of pain arouses it, or some accidental movement disturbs it, and it awakes crying aloud, and refusing to be pacified, and may continue so for hours together. Sometimes the external ear is red, and the hand is often applied to the affected side of the head; but neither of these symptoms is constant. The intensity of the pain seldom lasts for more than a few hours, when a copious discharge of offensive pus takes place from the ear, and the child is well. Sometimes, indeed, this complete cure does not take place, but the ear-ache abates, or altogether ceases, for a day or two, and then returns, no discharge, or but a very scanty discharge, taking place, while for weeks together the child has but few intervals of perfect ease. In infants ear-ache seldom follows this chronic course, though I have occasionally seen it do so in older children.

In children who are too young to express their sufferings by words, the violence of their cries, coupled with the absence of all indications of disease in the chest or abdomen, naturally lead to the suspicion of something being wrong in the head. There are three circumstances, however, which may satisfy you that the case is not one of ordinary hydrocephalus; the child does not vomit, the bowels are not constipated, and there is but little febrile disturbance. The loud and passionate cry, the dread of movement, and the evident relief afforded by resting one side of the head, are evidences of

the ear being affected; while in many instances the movement of the hand to the head, and the redness of the external ear, with the swelling of the meatus, concur to make the diagnosis easy. Sometimes, when in doubt, you will be able to satisfy yourself that the cause of suffering is in the ear, by pressing the cartilages of the organ slightly inwards, which will produce very evident pain on the affected side, while, if practised on the other side, it will not occasion any suffering.

The *treatment* of this painful affection is very simple. In many instances the suffering is greatly relieved by warm fomentations, or by applying to the ear a poultice of hot bran or camomile-flowers. A little oil, to which some laudanum has been added, may be dropped into the ear, and repeated from time to time; while, if the pain be extremely severe, or have continued for several hours, it may be wise to apply a few leeches to the mastoid process. If the ear-ache return frequently, a small blister should be applied behind the ear, or slight vesication may be produced by means of the acetum cantharidis.

The possible supervention of inflammation of the brain must of course be borne in mind, and any indication of its approach must be immediately combated; but fortunately this occurs less frequently as a complication of otitis than as a sequela of long-continued purulent discharge from the ear, which has probably been attended with constant though not very severe pain in the head. A little boy, four years old, has for some time been under my care who has suffered for the last eighteen months from purulent discharge of a very offensive character from both ears. After this discharge had continued for six months, an abscess formed behind the left ear, which, on being opened, gave issue to ℥ij. of very fœtid pus. A month afterwards a large portion of the mastoid process of the left temporal bone was exfoliated, and for several weeks after this occurrence the left side of the face was frequently thrown into a state of twitching movement, which showed that some of the branches of the portio dura had been involved in the disease. This symptom has disappeared for the past nine months, but the discharge continues as fœtid as ever, though now much more profuse from the right than from the left ear; and the abscess has long ceased to discharge, though a fistulous opening still continues which leads down to the diseased bone. This little boy is in almost constant suffering from headache. Sometimes the pain is very severe, and quite prevents his sleeping, and then it will abate for several days or weeks without any evident cause. There can, however, be little doubt but that sooner or later an acute attack of inflammation of the membranes of the brain will come on, and prove quickly fatal.

In those cases where offensive puriform discharge from the ear has been of long continuance, and the matter is sometimes tinged or streaked with blood, astringent injections must be used only with the greatest care, while their employment is not at all advisable if exfoliation of bone have

taken place, since in such a case not only is the internal ear disorganized, but the dura mater has very probably become exposed. Attention to cleanliness, by frequently syringing out the ear with warm water, or with a solution of gr. j. or gr. ij. of the acetate of lead in an ounce of water, would be all the topical treatment on which it would be safe to venture, while the most sedulous attention must be paid to the general health of the patient.

It still remains for me to notice one singular form of cerebral disease, which, though not confined to children, is seen much oftener among them than among adults, namely, *phlebitis of the sinuses of the dura mater*. In grown persons it has usually succeeded to some injury of the head, but in the child it has generally been observed as a consequence of long-continued purulent otorrhœa, combined with disease of the temporal bone, or it has been connected with disease of the frontal sinuses, or has followed an abscess of the scalp. In one or two instances, also, it has seemed to be excited by the presence of large collections of pus in distant parts of the body. M. Tonnelé, who has written a very valuable paper on inflammation of the sinuses of the dura mater in children, records one instance in which it coincided with a pleuritic effusion; and a somewhat similar case has come under my own notice, which I will relate, partly on account of its rarity, partly because it illustrates exceedingly well the morbid appearances observed in cases of this description.

A healthy little girl was attacked by scarlatina when eight months old. The attack was not severe, but, after it had passed away, she did not regain her previous health, but continued restless and feverish; she was sometimes sick, and her eyelids were often slightly swollen. A fortnight after the rash appeared, she had one or two violent convulsive seizures, but they ceased after her gums were lanced, and did not appear to be in any way connected with her subsequent illness. She continued out of health until she was 10½ months old, when her mother noticed, in addition to the puffiness of the eyelids, a swelling of the legs and abdomen, for which she came under my care when eleven months old. The legs were then very œdematous, and fluctuation was distinctly felt through the parietes of the abdomen, the urine being scanty and high coloured. In the course of about three weeks her condition had improved considerably, the urine having increased much, the anasarca having greatly diminished, and the abdomen being 1½ inch less in circumference. A fit of convulsions now came on without any apparent cause, but no symptoms of cerebral mischief followed it, and the convulsion did not return. After the lapse of another week a discharge of sero-purulent fluid took place from the umbilicus, and continued for several days in quantities of from a quarter to half a pint daily. This discharge was attended with an improvement rather than a deterioration in the child's health; but after it had continued for eleven days, fever and dyspnœa suddenly came on, with dulness on percussion

over the right side of the chest, and absence of respiratory murmur in that situation. The discharge ceased for a week during the urgency of the thoracic symptoms, but then reappeared, though scantily. The child now grew thinner and weaker, and sank into a state of hectic. No new symptom came on till she was suddenly seized with extreme faintness, amounting to almost perfect syncope. She rallied, however, under the use of stimulants, but forty-eight hours afterwards the faintness returned, and terminated in death, without any convulsion having preceded it, just five months and a half after the attack of scarlatina, and two months after she came under my care.

On an examination of the body after death, pleurisy of the right side was discovered, with about ℥vj. of pus in the right pleura, and peritonitis, with Oiij. of pus in the abdomen; the passage being still traceable through which the fluid had escaped at the umbilicus.

The dura mater adhered firmly to the skull, along the posterior half of the longitudinal sinus, at the torcular Herophili, and along the left lateral sinus; but elsewhere it was easily detached from the cranium.

The sinuses on the right side were healthy, but the blood within them was almost entirely coagulated. The posterior half of the longitudinal sinus, the torcular, the left lateral and left occipital sinuses, were blocked up with fibrinous coagulum, precisely such as one sees in inflamed veins, and the clot extended into the internal jugular vein. The coats of the longitudinal and of the inner half of the lateral sinus were much thickened, and their lining membrane had lost its polish, was uneven, and presented a dirty appearance.

There was some congestion of the arachnoid, a considerable quantity of fluid in the ventricles, and sections of the brain presented more bloody points than natural, especially on the left side. The base of the brain was perfectly healthy on the right side, but there was great venous congestion beneath the middle lobe of the left hemisphere, and the cerebral veins in that situation were distended with coagulum, and their coats were thickened. Towards the anterior part of the left middle lobe were four apoplectic effusions, in all of which the blood retained its natural colour. Each of these effusions was connected with an obliterated and distended vein. The largest clot extended an inch into the substance of the brain; the others were of smaller extent.

I cannot speak to you of any symptom as pathognomic of this occurrence: it usually comes on, as in this instance, in much debilitated children, and though it generally follows some injury or disease in the neighbourhood of the brain, you would bear in mind the possibility of its occurrence whenever large collections of pus exist in any part, and would draw a very unfavourable prognosis in the event of head symptoms coming on under such circumstances.

LECTURE VIII.

Chronic hydrocephalus—Various conditions under which fluid collects in the skull—chiefly a disease of early infancy—Symptoms—Changes in form and size of the head, and their mode of production—Course of the disease—Termination almost always fatal.

Post-mortem appearances—Internal hydrocephalus—cerebral substance not destroyed—changes in the ventricles—External hydrocephalus—circumstances under which it exists.

Treatment—Importance, but difficulty, of distinguishing curable and incurable cases, and external from internal hydrocephalus—Gölis's plan—Compression—Puncture—Cases suited for each mode of treatment.

We have now completed our examination of the acute inflammatory affections of the brain, and with them we may consider that we have dismissed the most important class of diseases of that organ. Before we pass, however, to those in the production of which inflammation bears no part, we must study one malady which forms a kind of connecting link between the two.

Chronic Hydrocephalus, or Dropsy of the Brain, is a morbid condition met with in children at various ages, and coming on under a great variety of circumstances. Sometimes it is congenital, and is then usually, though by no means invariably, associated with malformation of the brain. In subsequent childhood, an excess of blood in the brain, or its deficiency, or the existence of some impediment to the circulation through the organ, are conditions all of which have been found to give rise to the effusion of fluid into the cavities of the brain, or upon its surface. Instances of chronic hydrocephalus are on record which have succeeded to hæmorrhage into the sac of the arachnoid; others, that have been connected with wasting of the brain, in consequence of the supply of blood being inadequate to its due nutrition, or in which obliteration of the sinuses by disease, or the pressure of a morbid growth upon some of the vessels of the brain, has interfered with the due performance of the cerebral circulation. In the majority of cases, however, the disease is not a mere passive dropsy, but is the consequence of a slow kind of inflammation of the arachnoid, especially of that lining the ventricles, which may have existed during fœtal life, or not have attacked the child until after its birth.

A few cases are on record in which a considerable accumulation of fluid

has taken place within the skull of the adult, and has occasioned various cerebral symptoms, followed by death. In other instances the same occurrence has happened in young persons whose skulls, though ossified, were not firmly closed, and have consequently yielded at the sutures, thus producing considerable enlargement of the head. These, however, are exceptional cases,—mere pathological curiosities, which it will suffice to have mentioned, for in most instances chronic hydrocephalus comes on within the first six months of life. I find, indeed, on examining the date of the commencement of the disease in 50 cases (14 of which came under my own observation, and the remaining 36 are recorded by different writers), that some symptoms of it were observed in 46 cases before the child was six months old: that in 12 of these the malady was congenital; and that in 19 more it came on before the completion of the third month.

The early *symptoms of the disease* vary. When it is congenital, indications of cerebral disturbance are generally apparent from the infant's birth. These are sometimes serious—such, for instance, as convulsions, recurring almost daily; at other times they are comparatively slight, and consist in nothing more than strabismus, or a strange rolling of the eyes, unattended with any very definite sign of affection of the brain. The size of the head generally attracts attention before long, and causes importance to be attached to symptoms which otherwise might have given rise to but little anxiety. In some instances, however, the increased size of the head is not very obvious until the child is a few weeks old, although well-marked symptoms of mischief in the brain existed from its birth. Enlargement of the head, indeed, is by no means invariably the first indication of chronic hydrocephalus. In 12 out of 45 cases, fits, returning frequently, had existed for some weeks before the head was observed to increase in size; in 6 the enlargement of the head succeeded to an attack resembling acute hydrocephalus; and in 4 other instances, it had been preceded by some well-marked indication of cerebral disturbance. In the remaining 23 cases, no distinct cerebral symptom preceded the enlargement of the head; but in almost every instance the child's health had been noticed to be failing for some time, although the cause of its illness was not apparent.

In whatever way the disease begins, impairment of the process of nutrition is sure to be one among its earliest symptons. The child may suck well, and, indeed, may seem eager for food, but it loses both flesh and strength; and, often, although the head has not yet attained any disproportionate size, the child is unable to support it, either losing the power it had once possessed, or never attaining that which, with its increasing age, it ought to acquire. The bowels are usually, though not invariably, constipated. Sometimes diarrhœa comes on for a day or two; but, under either condition, the evacuations are almost always of an unhealthy character. Thus far, indeed, there is but little to distinguish the case from any other in which a young infant is imperfectly nourished, but even

though no well-marked cerebral symptom be present, occasional attacks of heat of head will be observed, attended with pulsation or tension of the anterior fontanelle, while crying and restlessness often alternate with a drowsy condition, though the child almost always sleeps ill at night. In many instances, too, the open condition of the fontanelles and sutures excites attention long before any enlargement of the head becomes perceptible.

By and by, however, the increased size of the head grows very manifest, and the child's physiognomy soon assumes the distinguishing features of chronic hydrocephalus. As the disease advances the unossified sutures become wider, the fontanelles increase in size, their angles extend far into the sutures in which they terminate, while the fluid pressing equally in all directions, tends, in obedience to a well-known law, to impart a globular shape to the receptacle in which it is contained. Some of the casts upon the table afford striking illustrations of this change in the form of the cranium, which would be still more remarkable were it not for the very unequal resistance of different parts of its parietes. The bones at the vertex of the skull are much less firmly fixed than the others, and ossification is nowhere so tardy as at the anterior fontanelle, and along the inner edges of the parietal bones. Hence it results that the great increase in the size of the head is effected by enlargement of the anterior fontanelle, and by widening of the sagittal suture. The os frontis consequently becomes pushed forwards, the parietal bones are driven backwards and outwards, and the occipital bone downwards and backwards. This displacement of the bones is very obvious in this hydrocephalic skull, but it is still more striking in the two engravings which I here show you.* You notice the great prominence of the forehead, and the alteration in the position of the parietal bones, which are driven backwards as well as outwards, so that the natural relations of their protuberances are altogether changed, while in this remarkable case of a man named Cardinal, who, though hydrocephalic from his infancy, lived to the age of 29 years, the occipital bone lies almost completely in a horizontal position. You will observe, too, another remarkable alteration produced by the yielding of the orbitar plates of the frontal bone, which are driven by the accumulating fluid from a horizontal into an oblique direction. Sometimes, indeed, they become nearly perpendicular, when, by contracting the orbits, they give to the eyeballs that unnatural prominence, and that peculiar downward direction, which constitute one of the most remarkable features in cases of chronic hydrocephalus.

Few objects are more pitiable than a little child who is the subject of far advanced chronic hydrocephalus. While the skin hangs in wrinkles on its attenuated limbs, the enlarged head appears full, almost to bursting,

* Baillie's Morbid Anatomy, fasc. x. plate iii. fig. 1, and the drawing of Cardinal's skull, in Bright's Reports, vol. ii. part 2, plate xxxv.

owing to the stretching of the scalp, and the scanty growth of hair does not at all conceal the distended veins that run over its whole surface. The size of the skull, too, appears greater than it really is, since the face not only does not partake of the enlargement, but retains its infantile dimensions much longer than natural. The eyes are so displaced by the altered direction of the orbitar plates, that the white sclerotica projects below the upper lid, and the iris is more than half hidden beneath the lower. Often, too, there is a considerable degree of convergent strabismus, or a constant rolling movement of the eyeball, which the child is unable to control; or the pupil is dilated, and quite insensible to light.

The symptoms of cerebral disturbance that attend the advance of the disease differ much in severity. Sometimes there is little besides a state of uneasiness and restlessness, aggravated at intervals when the head grows hot and the fontanelle becomes tense. In other cases convulsions occur very frequently, being induced by extremely slight causes, or coming on without any. In several instances I have observed spasmodic attacks of difficult breathing attended with a crowing sound in inspiration, and those symptoms which constitute spasmodic cramp, seizures of which sometimes come on even before there is much enlargement of the head. But, whether the cerebral symptoms are slight or severe, almost every case of chronic hydrocephalus has pauses in its course, during which the child seems to enjoy a comparative immunity from suffering, and gains flesh, while its head ceases for a time to enlarge. Nothing, however, can be more variable than the frequency of these pauses, or their duration.

Though almost every case of chronic hydrocephalus is fatal, yet death takes place in very different ways. Children who are the subjects of the disease are almost always very weakly: hence, they often give way under the first serious illness that attacks them, and are carried off by maladies totally unconnected with their head affection; while many others sink into that state of atrophy by which the disease of the brain is often accompanied, and die exhausted. Others are carried off suddenly by convulsions, or fall victims to some severe paroxysm of spasmodic croup: and there are other instances in which the disease seems lighted up again, after a pause, by the irritation of teething, or by some trivial accident, and death is preceded by the indications of acute cerebral mischief.

In a very few instances the disease comes to a stand-still; no more fluid is poured out into the brain, the sutures and fontanelles gradually become ossified, and as the child grows older the great disproportion between the head and face diminishes by the development of the latter. It has been suggested by Professor Otto* that in some of these cases a cure is effected by an increased activity in the nutrition of the brain producing hypertrophy of the organ; but I cannot say whether or no this process ever does take

* Rokitansky's Pathologische Anatomie, I. Bd. S. 749-769.

place: in the majority of instances it probably does not occur, and the case is not one of recovery, but simply of arrest of the disease; the head continuing full of fluid, but its quantity neither increasing nor diminishing. This probably was all that occurred in the case of Thomas Cardinal, whose bust I here show you. Having been hydrocephalic from infancy, he yet lived to the age of 29, in the possession of a tolerable amount of bodily and mental activity. On examination of his body after death, between seven and eight pints of fluid were found in his cranium. In the greater number of instances, symptoms exist during life which show clearly enough that the arrest of the disease differs widely from its cure, for the intellectual powers are generally feeble, and the temper very irritable, while the child is often unable to walk, and its sight is very imperfect.

In by far the greater number of instances of hydrocephalus the fluid collects in the interior of the brain, constituting what is called *internal hydrocephalus*, in contradistinction to other cases in which the fluid is contained in the sac of the arachnoid, and to which the name of external hydrocephalus has been given. In cases of the former kind the lateral ventricles are always considerably distended; and if the disease have been of long standing, the cerebral convolutions are often obliterated, and the hemispheres expanded into sacs with exceedingly thin parietes by the enormous accumulation of fluid within them. It was long supposed that there was a real destruction of cerebral substance in these cases, and that the brain had actually melted down, as it were, beneath the encroachments of the fluid. This opinion was the more readily entertained, from the circumstance that the attenuated brain often gave way under examination, and the relation which the different parts had actually borne to each other was thus involved in hopeless confusion. It has been ascertained, however, that this was a mistaken notion; that the cerebral substance is (as you may see in this engraving*) simply unfolded, not destroyed; and even when the walls of the ventricles are not above two or three lines in thickness, the two layers of white and grey matter are still distinctly perceptible. In by far the greater number of instances the fluid is contained entirely within the ventricles, the cerebral substance undergoing no change other than that produced by compression; but on one occasion I found the fluid infiltrated between the fibres of the brain themselves, so that the interior of the organ was split up into a number of irregular pouches communicating with each other, while similar, though smaller, collections of fluid had formed between the fibres of the cerebellum.

Although fluid is often found in all the ventricles, yet it is in the lateral ventricles that it collects most abundantly; and in their interior we discover the most important *changes after death*. Their lining membrane has lost its transparency and polish, is thick and tough, and the vessels

* Vrolik, Traité sur l'Hydrocéphalie Interne, 4to. Amsterdam, 1839, Pl. iii.

which run beneath it are much larger than usual, though it is seldom that we observe the marks of recent congestion. Sometimes a distinct false membrane lines their floor, and may even occlude the foramen of Monro, which otherwise is found greatly enlarged, so as to admit of extremely free communication between the two ventricles. In cases where the foramen of Monro is thus closed, the fluid is either entirely confined to one ventricle, or at least much more abundant on one side than the other—a circumstance which accounts for the great want of symmetry occasionally observed in hydrocephalic skulls. Even when no false membrane is found within the ventricles, their lining often presents other evidence, besides mere thickening, of its having been the seat of inflammation. Sometimes it is roughened and granular, presenting an appearance closely resembling shagreen, and communicating a very perceptible sense of roughness to the finger. All parts do not seem equally liable to undergo this change, but I have observed it to be much more marked about the corpora striata than elsewhere. The same circumstance is noticed by Professor Rokitansky*, who states, moreover, that these granulations sometimes become very large, and at length acquire distinct pedicles, and hang down into the cavity of the ventricles; a condition which I have not met with. These and other similar alterations of the lining of the ventricles afford conclusive evidence of the inflammatory origin of most cases of chronic internal hydrocephalus. They are, as far as I know, always associated with traces of inflammation of the arachnoid at other parts, while they are met with in cases where the ventricles contain no excess of fluid, and in adults as well as children. My friend Dr. Ormerod has kindly communicated to me the particulars of six cases in which he observed this granular state of the lining of the ventricles in the adult, and in every instance it was associated with other indications of old inflammation of the arachnoid.

The central parts of the brain often do not appear much altered, but sometimes they are in a state of great softening; while in other cases fluid is infiltrated between the fibres of the brain, though without any great diminution of its consistence.

MM. Rilliet and Barthez*, who regard chronic hydrocephalus (when not combined with congenital malformation of the brain) as a passive dropsy, the result of obstruction to the cerebral circulation, speak of tubercular or other tumors pressing on the venæ Galeni, as if they were of almost constant occurrence in these cases, while they take no notice of the very important changes in the lining of the ventricles. Now, though there can be no doubt but that effusion of fluid in the interior of the brain does sometimes arise from such a cause, yet an effusion so considerable as to

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* Pathologische Anatomie, ii. 748. The same appearance has also been noticed by Dr. Bright, in his Reports, vol. ii. part 2, p. 693, though not in connection with chronic hydrocephalus.

† Traité des Maladies des Enfans, i. 808.

occasion manifest enlargement of the head, and other symptoms of chronic hydrocephalus, is, I believe, but seldom thus produced. The greater number of recorded cases of chronic hydrocephalus, too, do not by any means bear out this statement.

The marks of inflammation of the membranes at the base of the brain are usually very evident, and often there is an extremely abundant effusion of that hyaline matter in the meshes of the pia mater to which I called your attention when speaking of acute hydrocephalus; but there is nothing in the state of the membranes *characteristic* of the chronic form of the disease.

In cases where vision has been lost, the optic nerves are often found spread out into flat bands of nervous matter, owing to the compression to which they have been subjected.

The presence of a large quantity of fluid in the sac of the arachnoid, constituting what is called *external hydrocephalus*, may arise from several causes.

1st. The commissures of the distended brain may yield, and a portion or the whole of the fluid which it contained may escape into the cavity of the cranium. This seems to have taken place in the case of Cardinal, whose skull contained seven or eight pints of fluid, while "the brain lay at its base, with its hemispheres opened outwards like the leaves of a book."*

2d. An atrophied condition of the brain may exist, and fluid may be poured out to fill up the vacuum thus produced in the skull. In most cases where atrophy of the brain is unconnected with congenital malformation of the organ, the quantity of fluid thus effused is too inconsiderable to produce any enlargement of the patient's head, though I once met with a case which would seem to show that this rule is not without exception.

3d. A large quantity of fluid is sometimes found in the sac of the arachnoid, as the result of hæmorrhage into its cavity, and of the changes subsequently undergone by the effused blood. MM. Rilliet and Barthez, who have most ably investigated the subject of hæmorrhage into the arachnoid, believe that chronic hydrocephalus frequently has this origin. I have once or twice seen cases which I suspect were of this nature, but have never had the opportunity of confirming my suspicions by a post-mortem examination.

The reputed means of cure of any disease are generally numerous in a directly inverse proportion to its curability, and to this rule chronic hydrocephalus certainly forms no exception; "its remedies have been derived," as Gölis says, "from all the kingdoms of nature, and include almost every kind of surgical contrivance and pharmaceutical compound." It would be an almost endless task to attempt estimating the comparative value of them all; and I think it more useful to direct your attention to a few points of real importance.

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* Bright's Reports, vol. i. part 1, p. 433.

First of all, I would have you bear in mind that there are some cases in which you can do no permanent good, but in which *treatment* must fail, not because it is improper, but because the malady does not admit of cure. Such cases are those in which the accumulation of fluid within the brain is associated with extensive congenital disease, or malformation of the organ. If aware of its existence, our treatment would, of course, be simply palliative, and our efforts would be limited to securing euthanasia, since we could not hope to avert death. We should suspect the affection to be incurable, if, though the head were large, and its ossification very imperfect, the forehead were low and shelving; if a considerable degree of paralysis were present, if convulsions occurred daily and causelessly, and especially if these or other indications of serious cerebral disorder had existed almost from birth. Unfortunately these hopeless cases are by no means invariably characterized by peculiar symptoms, and the amount of functional disturbance often affords but a very incorrect index to the extent of organic lesion: your prognosis, therefore, must always be most guarded, and even when you see every reason to expect success, you must yet be prepared for failure.

On the other hand, you must not regard a case as hopeless, and abstain from remedial measures, merely on account of the head having been larger than natural at birth, or its ossification having been less advanced than usual, since we have evidence of perfect recovery from chronic hydrocephalus in cases where many circumstances had appeared to indicate that the disease was congenital. The state of the cerebral functions must influence your prognosis as much as the size of the head, or even more.

If we were able accurately to determine the seat of the fluid within the cranium, such knowledge would often exert a considerable influence both on our prognosis and our treatment, since there are some measures from which much benefit might be hoped in external hydrocephalus, that would avail little, or even do harm, if the fluid were contained within the ventricles. There are, however, no means of distinguishing with certainty between external and internal hydrocephalus. The shape of the head appears to be much the same in both forms of the disease, though in external hydrocephalus, consequent on hæmorrhage into the arachnoid, the skull never attains the enormous dimensions which it sometimes acquires in cases when the fluid was originally poured out into the interior of the brain: in such cases, too, the patient's history would probably furnish some clue to a diagnosis. The disease would almost certainly not be congenital,—in all probability it would not have begun before the sixth or eighth month,—and the commencement of the child's illness would most likely have been marked by a sudden and distinct convulsive seizure.*

In either form of chronic hydrocephalus, the success of treatment must

* Legendre, Recherches Anatomo-pathologiques, etc. p. 135; and Rilliet et Barthez, op. cit., tome ii. p. 46.

depend, to a great degree, upon its being adopted early, but in no stage of the disease can good be expected from violent remedies; rough measures would be likely to destroy the patient rather than the malady. I do not know of any plan, on the whole, more likely to be of service, than that which Professor Gölis, of Vienna, recommended as the result of many years' experience. He advises that the head of the child be shorn, or its hair cut close, and that one or two drachms of the mild mercurial ointment be rubbed daily into its scalp. At the same time, the head is to be kept constantly covered with a flannel cap, to prevent the risk of the perspiration being checked by the cold air, and gr. ¼, or gr. ss. of calomel, should be given twice a day, unless diarrhœa come on, when the inunction alone must be employed. This plan should be persevered in for thirty or forty days, when, if the patient appear improving, the remedies may be very gradually diminished, but the cap should be still worn even after the inunction has been discontinued. Should no great improvement appear after a lapse of six or eight weeks, some mild diuretic may be conjoined with the other remedies, and a couple of issues may be inserted in the occiput. For this measure, however, I have always substituted the frequent application of blisters to the back of the neck.

The woollen cap, recommended by Gölis, often seems agreeable to the child, but sometimes I have had to discontinue it, in consequence of the heat of head which it produced. In most cases, too, you will be compelled to resort to occasional leeching, in order to subdue the attacks of heat of head and restlessness, which are exacerbated from time to time, and often attended with other symptoms that threaten the supervention of acute disease.

The observation that in some cases where spontaneous cure of a chronic hydrocephalus takes place, the ossification of the head, previously so imperfect, makes rapid advances, and the bones become early united, led Mr. Barnard,* of Bath, to imitate nature's processes, and to bandage the head so as to prevent its yielding to the accumulating fluid. He has related several cases of the successful adoption of this practice, though, like many other persons, he rides his hobby rather too hard, and advocates his mechanical method to the exclusion of all other treatment. It is, however, a valuable adjunct to other treatment in some cases. Unless you apply it well it will be of little service, and the plasters by which the compression is exerted will come off. You cannot do better than follow M. Trousseau's rules for their application.† He uses strips of diachylon plaster about one-third of an inch broad; and applies them—1st, from each mastoid process to the outer part of the orbit of the opposite side; 2d, from the hair at the back of the neck along the longitudinal suture to the root of the nose; 3d, across the whole head, in such a manner that the different

* Cases of Chronic Hydrocephalus, &c. by J. H. Barnard, 8vo. London, 1839.

† Journal de Médecine, April 1843.

strips shall cross each other at the vertex ; 4th, a strip is cut long enough to go thrice round the head. Its first turn passes over the eyebrows, above the ears, and a little below the occipital protuberance, so that the ends of all the other strips shall project about one-fourth of an inch below the circular strip. These ends are next to be doubled up on the circular strip, and its remaining two turns are then to be passed over them just in the same direction as the first turn. By this means you secure a firm and equal and very powerful pressure on the head. You must watch the results of this proceeding very carefully, and loosen the plasters if symptoms of compression appear, since it once happened to M. Trousseau from neglect of this precaution, that the fluid acted on the base of the skull, detaching the ethmoid bone from its connections, and occasioned the infant's death.

You will naturally inquire whether pressure is applicable to every case, and if not, when should it be employed? I regret that I cannot answer these inquiries so satisfactorily as I could wish. It is my belief, however, that cases of external hydrocephalus, which have succeeded to previous hæmorrhage into the arachnoid, would be found better adapted than any others to treatment by mechanical means ; while I am quite sure, from actual experience, that when there is any appearance of *active* cerebral disease, pressure will not do good.

Puncture of the cranium, and the evacuation of the fluid, is another proceeding which has been strongly advocated by some writers, and this not merely as a palliative, or as an adjunct to other remedies, but as a means of effecting the radical cure of the disease. It appears, on a comparison of the results obtained in 63 cases which were operated on by different persons, that 18, or 2 out of every 7, terminated favourably. Unfortunately, however, very few of the cases of alleged recovery are related with any degree of minuteness ; while with reference to many, no further information is given, than that a certain quantity of fluid was removed by so many punctures, and that the patient got well. It seems doubtful, therefore, whether the amount of real success has not been overstated, while it is certain that in several cases the death of the child was materially hastened by the operation. On the other hand, there are some instances of a permanent cure following its performance ; and, though I would not have you be very sanguine as to the result, you would, I think, be justified in trying the operation in a case that seemed in itself favourable for the experiment, and in which you could feel sure of your directions being intelligently followed out by the friends of the child.*

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* See, with reference to this subject, " An Enquiry into the Results of Puncture of the Head, in Cases of Chronic Internal Hydrocephalus, published by the writer, in Med. Gazette, April 1842 ; and the very valuable paper of M. Durand-Fardel, in Bull. Gén. de Thérapeutique, vol. xxiii. p. 190.

I should regard any case as favourable for the operation, which, on the whole, there was good ground for believing to be one of external hydrocephalus, or in which the enlargement of the head had not been attended with indications of active cerebral disease. Though less promising, I should not reject the operation simply because enlargement of the head had been congenital; while I should always be more ready to operate if nutrition were well performed than if the child were emaciated. I would not, however, have you operate simply because the head is large; for it does not appear that diminution in its size has resulted from the puncture, but only arrest of its enlargement: and if the disease be at a stand-still, and the cerebral functions tolerably well performed, you would risk much with the chance of gaining but very little.

The proper situation for the puncture is the coronal suture, about an inch or an inch and a half from the anterior fontanelle. A fine trocar and canula are the best instruments; and care must be taken not merely to withdraw only a very few ounces of fluid at a time, but to keep up pressure both during the escape of the fluid as well as afterwards.

LECTURE IX.

Hypertrophy of the brain—usually associated with general disorder of nutrition—symptoms and course—seldom directly fatal—nature of change in brain—alterations in form of skull, and difference from chronic hydrocephalus.—Treatment.—Partial hypertrophy.

Atrophy of the brain—case illustrative of its defective development.—Wasting of the brain in protracted illness.—Temporary retrocession of mental powers in children after long illness.—Case of partial atrophy.

The anxiety of parents is sometimes needlessly excited in consequence of an infant's head being larger than common, and even though the child's health be good, the relations are apprehensive lest it should be affected with water in the brain. Now you must not be too ready to take up this cry, which is one often raised by nurses and ignorant persons, or to suppose that every large head is therefore unnatural; for one child may have a bigger head than another, just as it may have a bigger hand or foot. But it may be that the child's head is not only larger than natural, but that well-marked symptoms of cerebral disturbance are present, and you may feel yourselves compelled to adopt the opinion that the case is one of incipient chronic hydrocephalus. The subsequent history of the patient may in many respects confirm your original diagnosis, so that great will be your surprise, on examining the body after death, at not finding a drop of serum in the ventricles, although, when you opened the skull, the cerebral convolutions had appeared flattened, as if the brain were greatly distended with fluid.

Individual cases of this kind had been mentioned by medical writers at different times, but Laennec* was the first who drew attention to *hypertrophy of the brain* as a condition resembling chronic hydrocephalus in many of its symptoms, and liable to be mistaken for it. It has since then been frequently noticed, and I am not sure that an undue importance has not sometimes been attached to it, as though it were of much more common occurrence than you will really find it to be in practice.

I have placed upon the table a cast taken from the head of a child who

* Journal de Médecine, Chirurgie, et Pharmacie, 1806, t. xi. p. 669.

was affected with hypertrophy of the brain, and whose very remarkable case is related by Dr. Watson.* He came under the care of the late Dr. Sweatman when two years old, and his head, which had been gradually increasing from the age of six months, was then so large as by its weight to prevent the child from continuing long in the upright posture. The boy was active and lively, though thin. He never had any fit or convulsion, but occasionally seemed uneasy, and would then relieve himself by laying his head upon a chair. He had never squinted, nor was he subject to drowsiness or starting during sleep, and his pupils contracted naturally. His appetite was good, and all the animal functions were well performed. The case was supposed to be one of chronic hydrocephalus, but no urgent symptoms being present, active remedies were not employed. About six months afterwards the child died of inflammation of the chest, and Dr. Sweatman examined the head. It measured 12 inches from ear to ear over the vertex, 13 inches from the superciliary ridges to the occipital, and 21 inches in circumference. The anterior fontanelle, which was quite flat, measured 2¼ inches by 1½ across its opposite angles; the posterior fontanelle was completely closed, as was the frontal suture. The skull generally was increased in thickness; the morbid appearances in the membranes of the brain were quite trivial; the ventricles were empty, not dilated; the convolutions were perfectly distinct, and retained their proper rounded shape. The medullary matter, however, presented a very unusual vascularity.

It is not merely on account of the great size which the head attained that I have quoted this history, but because it affords an instance of the overgrowth of the brain unconnected with any general disorder of the processes of nutrition. Such an occurrence is very rare, for hypertrophy of the brain is usually only one manifestation of a deep-seated disorder of the nutritive processes, and is met with, in connection with rickets or scrofula, in the narrow lanes of a crowded city, or in the unhealthy valleys of mountainous districts, where goitre and cretinism are endemic.

The majority of cases of hypertrophy of the brain that have come under my notice in London, have occurred in infants about six or eight months old. Their history had usually been, that without any definite illness, they had lost their appetite, and grown by degrees dull and apathetic, though restless and uneasy. Notwithstanding the general apathy, this restlessness is often very considerable, though it does not show itself in cries so much as in a state of general uneasiness, and in frequent startings from sleep. Short gleams of cheerfulness occur when the children are awake, but these are usually very transient. The head seems too heavy to be borne, and even when its size is not much greater than natural it hangs backwards, or to one side, as if the muscles were too weak to support

* Lectures, vol. i. p. 413.

it. If placed in its cot, a child who is thus affected bores with its occiput in the pillow, while its head is almost constantly in a state of profuse perspiration. Convulsions sometimes occur without any evident cause, but threatenings of their attack are much more frequent than their actual occurrence, the child awaking suddenly with a start and a peculiar cry, like that of spasmodic croup, the surface turning livid, and the respiration becoming difficult for a few moments, and the symptoms then subsiding of their own accord. Such attacks may issue in general convulsions, which may terminate fatally ; but infants thus affected do not by any means invariably die of the cerebral disorder, but, being weakly, they are often cut off by the first malady which attacks them.

If life be prolonged, it becomes more and more evident that the process of nutrition is imperfectly performed : the child loses flesh, and looks out of health, and enlargement of the wrists and ankles shews the connection between this disease and rickets,—a connection which becomes more evident in the second and third years of the child's life. When the child survives infancy, or when, as occasionally happens, the symptoms of hypertrophy of the brain do not come on until dentition has been in a great measure accomplished, convulsions are of very rare occurrence. Complaints of headache, however, are frequent and severe ; and, though drowsy in the day-time, the child generally rests ill at night, and often awakes crying and alarmed. Besides these symptoms, too, the child has occasional attacks of feverishness, with great increase of the headache, and giddiness, which last for a few hours or a day, and then subside of their own accord, while it grows by degrees more and more dull and listless, and its mental powers become obviously impaired.

It happens, in some cases, that, as the child grows older, these symptoms become less and less severe ; the health improves, the rickety deformity of the limbs gradually disappears, and the infant who had excited so much solicitude becomes at length a healthy child. There is a termination in complete idiocy, which I have never seen in this country, but I recently observed some instances of it in the Hospital for Cretins, near Interlachen ; and Dr. Guggenbühl, the director of the institution, informed me that the association of cretinism and idiocy with hypertrophy of the brain is by no means of unusual occurrence. Death is not often the direct result of the affection of the brain, but generally takes place owing to the supervention of some other disease. Those affections, however, which prove most fatal are those which favour cerebral congestion,—such as hooping-cough, or the eruptive fevers, especially scarlatina.

You must not infer that hypertrophy of the brain has existed in every instance in which the organ may appear to be large, and its convolutions somewhat flattened, although the ventricles are free from fluid. The weight and apparent size of the brain are much influenced by the quantity of blood contained within it, and it may appear too large for the skull,

simply because its vessels are over-full.* In true hypertrophy, on the contrary, the brain is generally pale and anæmic, unless death should chance to have taken place as the result of an attack of cerebral congestion. Neither, indeed, is the process one of mere increased growth, but the nutrition of the organ is modified in character as well as increased in activity. The grey matter of the brain is but little involved in it, and, with the exception of its colour being somewhat paler than natural, it shews scarcely any alteration. The white matter, on the contrary, is both paler and firmer than in a state of health; and Professor Rokitansky† states, as the result of many microscopic examinations, that its augmented bulk is not produced either by the development of new nervous fibrils, or by the enlargement of those already existing, but by an increase in the intermediate granular matter. These changes, too, do not affect indifferently all parts of the brain, but are confined to the hemispheres, and do not implicate either the base of the organ or the cerebellum.

Chronic hydrocephalus is the only affection with which hypertrophy of the brain is liable to be confounded. The diagnosis between the two affections is often by no means easy, though it is of much importance with reference both to our prognosis and our treatment, for we should have more hope of the recovery of a child whose brain is merely hypertrophied, than of one whose brain is distended with fluid, while the means by which we should endeavour to effect a cure would differ widely in the two cases. The history of the patient would afford some help towards determining this question, for the symptoms of chronic hydrocephalus generally come on earlier, and soon grow much more serious, than those of hypertrophy of the brain, and the cerebral disturbance is throughout much more marked in cases of the former than in those of the latter kind. The form and size of the head, too, present peculiarities by which you may often be enabled to distinguish between the two conditions. Both diseases are attended by enlargement of the head, and in both the ossification of the skull is very tardy, but the head does not attain so large a size in hypertrophy of the brain as in chronic hydrocephalus, neither are the fontanelles and sutures so widely open. The skull, likewise, presents some peculiarities in form, which are so remarkable as to have attracted the attention of several observers, though I must own that I do not thoroughly understand how they are produced. The head not merely shews no tendency to assume the rounded form characteristic of chronic hydrocephalus, but its enlargement is first apparent at the occiput, and the bulging of the hind head continues throughout especially striking. The forehead may, in the course of time, become prominent and overhanging, but the eye remains deep sunk in its socket, for no change takes place in the direction

* See Mauthner's elaborate tables of the weight of the brain under various circumstances, lib. cit. Sect. V.

† Lib. cit., vol. ii. p. 771.

of the orbitar plates such as is produced by the pressure of fluid within the brain, and which gives to the eye that unnatural prominence, and that peculiar downward direction, which are so striking in cases of chronic hydrocephalus. In hydrocephalus the anterior fontanelle is tense and prominent, owing to the pressure of the fluid within, but when the brain is hypertrophied there is no prominence, but an actual depression in this situation. I have more than once observed this condition in a very remarkable degree, the depression not being limited to the anterior fontanelle, but being observable at all the sutures; and you may notice something of the kind in this cast.

When hypertrophy of the brain occurs in the adult, the symptoms that arise are in great measure due to the compression which the organ undergoes from its bony case being too small to contain it. These symptoms are of course obscure, while, even if the nature of the affection could be recognised, its cure must be hopeless. In the infant, however, and the child whose head is incompletely ossified, the immediate consequences of the evil are far less serious, while some benefit may be expected from the judicious employment of *remedies*, since over-development of the brain in childhood is almost always associated with general disorder of the processes of growth and nutrition. We are not, indeed, acquainted with any means by which we can directly check the morbid increase of the brain, but all our efforts should be turned towards improving the general health, while we interfere directly with the cerebral symptoms only in so far as their urgency may render it absolutely necessary. The child, therefore, must not be dosed with calomel merely because its head is affected, though the deficient secretion of bile may often render the employment of small doses of mercurials necessary. Similar restrictions would apply to depletion, for we have seen that the hypertrophied brain is characterised by a want of blood rather than by its superabundance; but nevertheless, occasional attacks of cerebral congestion may render local depletion necessary, and the exacerbations of headache, with vertigo and fever, will, if severe, be often benefited by its employment. I have now and then tried counter-irritation by means of the tartar emetic ointment rubbed into the back of the neck, with much relief to the head symptoms, in the case of children who were suffering from the indications of hypertrophy of the brain, but I should fear to have recourse to this measure in infants. In them, indeed, one of our first efforts must be to relieve the brain from the constant irritation to which it is exposed when the child is in the recumbent posture, and the head rests on the yielding and imperfectly ossified occiput. For this purpose we cannot do better than follow the suggestion of a German physician, Dr. Elsässer,* and have a small horsehair cushion prepared for the child's head to rest on, a piece being cut out of it large enough to receive the occiput. In cases both of hypertrophy of the brain

* Der weiche Hinterkopf, 8vo. Stuttgart, 1843, p. 205.

and of chronic hydrocephalus, I have seen the adoption of this simple contrivance followed by almost immediate cessation of the rotatory movement of the head, and by quiet sleep in its cot, to which perhaps for weeks before the child had been a stranger.

It is not desirable that a child who suffers from this affection should sleep entirely without covering to the head. The profuse perspiration of the head is more effectually checked by a thin linen cap, which may be changed once or twice in the night, while at the same time the child is saved from the danger of catching cold.

While these hygienic proceedings, which have especial reference to the head, are attended to, the child should be daily sponged with salt and water, or with sea water, if it were possible to remove it to some place on the coast, such as Brighton, or it would probably be benefited by immersion in a tan-bath, in which it should remain for several minutes.*

The remedies under the continued use of which I have seen the most good result are the extract of bark, from which you might pass to the preparations of iron—such as the Vinum Ferri, or that very elegant syrup of the Ferro-citrate of Quinine, prepared by Mr. Bullock, of Conduit Street. I have not made much trial of the iodide of potassium, since in all the cases that I have seen some more decided tonic appeared necessary. I have, however, given the syrup of the iodide of iron sometimes with advantage; and in cases where the tendency to rickets was well marked, I have observed a most decided improvement follow the use of the cod-liver oil, in doses of a drachm twice a day for a child of three years old. I may just mention that, notwithstanding its nauseous taste, this medicine is usually readily taken by children, some of whom even become fond of it.

With reference to diet, it will probably be desirable, if the child be not weaned, to obtain for it a healthy wet-nurse, while, after weaning, a diet of milk with an egg once or twice daily, will often agree better than any other food. In cases of this kind, and, indeed, in all where the digestive powers are feeble, a preponderance of farinaceous food is not desirable, while the child may with safety be allowed a little veal broth or beef-tea daily, or even a little meat if it have cut some of its molar teeth.

Cases of *partial hypertrophy* of the brain are on record, in which one hemisphere alone was affected, or in which some one or more of the central parts of the brain greatly exceeded the natural size, whilst the rest of the organ deviated in no respect from its normal condition. An instance of the kind you see represented in this drawing of Dr. Mauthner's,*

* The tan-bath, which I have employed with very marked benefit in the case of weakly and rickety children among the poor, is prepared, as directed by Dr. Elsässer, by boiling three handfuls of bruised oak bark, tied up in a linen bag, in three quarts of water for half an hour, and adding the decoction to the water of the child's bath. These baths should be employed tepid, and their use should be continued every day for several weeks.

† Lib. cit. Plate I., and page 189.

in which the right optic thalamus was as large as a hen's egg in a girl of three years old. In cases of this sort sometimes no symptoms are present, and the anomaly is only accidentally discovered after death; whilst in others, although there are indications of cerebral disturbance, yet they are not such as to enable us to determine the nature of the evil of which they are the expression.

There is a condition of the brain the direct opposite of that which we have been examining, in which the organ falls below the natural size, or in which *atrophy of the brain* exists. I do not refer here to those cases where the brain is imperfectly formed, the head exceedingly small, and the child idiotic from birth, but this state of microcephalus appears sometimes to come on afterwards, owing probably, as has been suggested, to premature closure of the fontanelles and sutures. Such a case I saw several years ago, when a woman brought to me her boy, who was three years old, the elder of two children of perfectly healthy parents, none of whose relatives had ever shown any sign of consumption, idiocy, or mental derangement. When born, this boy was perfectly well formed, neither did he present any peculiarity till he was six months old, when his mother began to observe that he did not look any one in the face, and that he seemed to take but little notice of anything. When eight months old, he began to have fits, which had since returned about once a week, being preceded by extreme restlessness for a day or two. The fits lasted for a quarter of an hour; they were attended by convulsive movements of both sides, and followed by drowsiness, which continued for some days. The child ate and drank, though not heartily, and he never seemed anxious for food. He did not distinguish between what was nice and what was nasty, swallowing all things with the same readiness, though deglutition appeared to be difficultly performed. He had cut all his teeth, he seemed tolerably well nourished, and his body and limbs were well formed. He was, however, quite unable to stand; he passed his urine and fæces under him without appearing to take the slightest notice of it, and he seemed destitute of every glimmering of understanding. His mother said that his head was smaller than that of her infant which was only six months old. It measured 17 inches in circumference around the parietal protuberances, and 11 inches across the head from the centre of the meatus of one ear to the same point on the opposite side. The forehead was extremely narrow, and the head shelved upwards quite in a sugar-loaf shape. All the sutures and fontanelles were firmly ossified, but I have unfortunately omitted to record at what age they became so. I never saw this boy again, but two or three similar cases have since come under my notice. I have nothing more to say about them, for their cure is manifestly quite hopeless, and, therefore, though they may interest us as pathologists, they scarcely concern us as practical physicians.

Of much higher practical importance are those instances in which the *brain* of children *wastes during long-continued illness*. The scalp, in

such cases, will usually be found bloodless, the fontanelles collapsed, and the process of ossification will be seen to have been unusually tardy. Fluid will be found within the sac of the arachnoid, and effused into the subjacent pia mater. The brain will be far from filling up the cavity of the skull, so that a knife may be passed in many places between it and the cranial walls. The sulci between the convolutions appear unusally deep, and fluid will be found both at the base of the brain and in the ventricles, as well as in the pia mater. The cerebral substance is pale, and its texture firmer than usual.

The important point about such cases is, that cerebral symptoms and frequently recurring convulsions may be observed in a child whose brain is nevertheless not diseased, but too feeble and too wasted to perform its functions. If, then, you find indications of cerebral disturbance come on in infants who have been exhausted and emaciated by previous illness, you must not interpose too hastily with remedies directed against a supposed disease of the brain, but bethink you whether these symptoms may not be merely the signs of the brain having become unequal to its duties from its having been imperfectly nourished, and do not, without consideration, abandon the tonic plan of treatment which you had been previously pursuing.

It is only in infants that accidents of this grave nature are likely to ensue, from the imperfect nutrition of the brain consequent on protracted illness; but symptoms arise in older children under similar circumstances well calculated to excite the apprehension of parents. In children who had but lately learned to talk I have sometimes known loss of speech follow a long illness, the child being too weak to talk, just for the same reason as it is too weak to walk. Occasionally, however, the child apparently regains its previous health, and yet makes no efforts to articulate, even for two or three months. In cases of this kind I have seen parents thrown into great anxiety from the fear lest the child's continued silence should be the result of the intellect having become impaired during its illness. I imagine that in many of these cases the child has forgotten during its illness much of its newly-acquired knowledge, and that it is some time before it again feels equal to the mental effort of shaping its ideas into words. Usually, however, when it begins to make the effort, it recovers its speech rapidly, and you may therefore console the parents with this prospect.

Even a manifest retrocession of the intellectual endowments should not be regarded with too much anxiety, when it has followed some long-continued disease, for it may be the result of mere weakness; the vacant look, the unmeaning laugh, and the silly manner, gradually disappearing as the child gains strength. The brain seems to regain its lower powers, and to perform its humbler functions, before it resumes its nobler office as the organ of the mind.

Partial Atrophy, like partial hypertrophy of the brain, may occur we

know not why, and may be discovered, after death, where the existence of cerebral disease had never been suspected; or we may find the explanation of a number of anomalous symptoms, which had existed during life, in a wasted condition of some portion of the organ. This state may be the result of original conformation, or it may come on as the result of disease, in which latter case the substance of the wasted portion of the brain is usually found to be much firmer than natural. We are greatly in the dark as to the nature of the process by which this change is effected, but it is thought in some cases to be the remote consequence of hæmorrhage into the cerebral substance, and in others, to be induced by a slow kind of inflammation. One case of this kind has come under my own notice, which, for its rarity, I will relate to you.

The patient was a little girl, aged 3 years and 10 months, the child of phthisical parents, but whose health, though delicate, had never been interrupted by any serious illness until she had an attack of remittent fever in the early part of the spring of 1845: she recovered from it without any bad symptom, and seemed doing pretty well for about a month, when she became sleepy and heavy, and feverish, for which symptoms she was brought to me on May 19th. After being under a mild antiphlogistic treatment for a week, she got better, and was beginning to walk about again, when she awoke one morning with her face drawn to one side,—a condition, however, which did not continue. When she attempted to walk, it was noticed that she halted very much on her left leg, and that it sometimes gave way under her, so that she fell down on that side, and then turned round upon her back. She had, besides, but little power with her left hand and arm, so that she could not grasp any thing firmly, nor hold it steadily. The child's bowels were at that time constipated: I purged her freely, and sent her into the country, whence she returned in the beginning of August, much improved in every respect, though still limping a little with the left leg, and using her right arm in preference to the left. At the end of September I saw her again, she having then a bad impetiginous eruption on the scalp, which was treated with warm poultices and water dressing, when, on October 6th, she began to limp with her right leg, just as she had previously done with her left; though in other respects she continued pretty well. On October 17th, the affection of the right leg was a good deal less marked, but the child now became unwilling to walk, often turning giddy, and always catching hold of something by which to steady herself. When attempting to walk, she often fell down into a sitting posture; and then would sit on the floor, laughing loudly. Fits of uncontrollable laughter often came on without any cause, and the face began to assume an idiotic expression. There was occasionally slight inward strabismus with both eyes, but the pulse was soft and undisturbed; the bowels were regular, and the evacuations natural, and the child rested well at night, though her head was often rather hot. A week afterwards there was no new symptom, except

that the child kept her neck quite stiff, as though she feared to move it; her head grew hotter, and she began to have a frequent teazing cough, while her power of walking varied almost every day; she now, too, grew more restless at night. On the morning of the 27th, frequent convulsive twitches of the muscles of the face and extremities came on, and the left eye became permanently turned inwards. She had no sleep in the night; general convulsions came on at 8 A.M. on the 28th, and she died convulsed two hours afterwards.

I found some deposit of tubercle in the bronchial glands, but none in the brain, where I had expected to discover it. The left hemisphere of the cerebellum, however, was, as you see both in this drawing and in the preparation itself, fully a third smaller than the right: it was of extremely firm consistence, quite leathery, and on making a section of it, its surface presented a rose tint. The halves of the pons and medulla oblongata were of equal size, as were the two hemispheres of the cerebrum. It was evident, too, that this condition was not congenital, since the two halves of the skull were of equal size, and the elevations and depressions in the interior of its base were precisely the same on both sides. There was a little fluid at the base of the brain, but none in the ventricles; a state of general congestion of the brain and its membranes being the only other remarkable appearances.

The spinal cord could not be examined.

There was no trace of any old effusion of blood in the substance of the cerebellum, though the symptoms that occurred in May, and the subsequent gradual improvement of the patient, are not easily explicable on any other supposition than that hæmorrhage had at that time taken place into the substance of the brain. The history of the case presents another difficulty, in the circumstance that the disease was seated on the same side as that to which the symptoms had been chiefly referred. Another problem which I cannot pretend to solve is, why the paralysis should in the first instance have affected the left side, while, on the occurrence of the relapse in October, the right leg was palsied? I must therefore content myself with the bare relation of this history.

LECTURE X.

Hydrocephaloid disease—often succeeds to sympathetic disturbance of brain in course of various affections—supervening on diarrhœa, pneumonia, and cerebral congestion—diagnosis under each of these circumstances.—Prophylaxis, and treatment.

Tubercle of the brain—its frequency in childhood—its anatomical characters—symptoms—occasionally absent—generally very obscure—diversities in this respect cannot be explained by the morbid appearances.—Occasional recovery where symptoms of cerebral tubercle have long existed.—Treatment.

Hydatids and cancer of the brain.

Closely connected with the state of atrophy of the brain, which we examined in the last lecture, is that condition which is induced if the organ be somewhat suddenly deprived of its usual supply of blood. Even in the adult a profuse loss of blood is followed, as you well know, by extremely severe headache, and by various other cerebral symptoms. In the child, whose brain needs for the due performance of its functions a proportionably larger quantity of blood, the symptoms that follow its excessive loss are of a corresponding gravity. Often, indeed, they present a striking similarity to those which betoken inflammation of the brain; a fact implied in the name of the *hydrocephaloid disease*, by which Dr. Marshall Hall, who was among the first to call the notice of the profession to this affection, has proposed that it should be designated.

"This affection," says he, in his admirable essay on the subject,* "may be divided into two stages: the first, that of irritability; the second, that of torpor. In the former there appears to be a feeble attempt at reaction; in the latter, the powers appear to be more prostrate. These two stages resemble in many of their symptoms the first and second stages of hydrocephalus respectively.

"In the first stage the infant becomes irritable, restless, and feverish; the face flushed, the surface hot, and the pulse frequent; there is an undue sensitiveness of the nerves of feeling, and the little patient starts on being touched, or from any sudden noise; there are sighing and moaning during

* Republished in his work On the Diseases and Derangement of the Nervous System. 8vo. London, 1841. Chap. v. Section iii. It can scarcely be necessary to refer to Dr. Gooch's paper "On Symptoms in Children erroneously attributed to Congestion of the Brain," for another most graphic account of this disorder.

sleep, and screaming; the bowels are flatulent and loose, and the evacuations are mucous and disordered.

"If, through an erroneous notion as to the nature of this affection, nourishment and cordials be not given, or if the diarrhœa continue, either spontaneously, or from the administration of medicine, the exhaustion which ensues is apt to lead to a very different train of symptoms. The countenance becomes pale, and the cheeks cool or cold; the eyelids are half closed; the eyes are unfixed, and unattracted by any object placed before them, the pupils unmoved on the approach of light; the breathing, from being quick, becomes irregular, and effected by sighs; the voice becomes husky; and there is sometimes a husky, teazing cough; and eventually, if the strength of the little patient continue to decline, there is a crepitus or rattling in the breathing; the evacuations are usually green; the feet are apt to be cold."

In early infancy *symptoms* of this kind sometimes succeed to premature weaning, especially if that be followed by an unsuitable diet, but afterwards they generally succeed to some definite attack of illness, either exhausting in itself, or for the cure of which active measures had been necessary. It is important, too, to bear in mind that they are not equally apt to come on in the course of all diseases, but that those in the early stages of which considerable cerebral irritation has existed, are much more likely to assume the characters of this spurious hydrocephalus when the bodily powers are exhausted.

There is no disorder in which the two conditions of considerable sympathetic disturbance of the brain, coupled with rapid exhaustion of the vital powers, are so completely fulfilled as in infantile diarrhœa, and in no other affection do we meet with such frequent or such well-marked instances of the supervention of the hydrocephaloid disease.

It is not long since a previously healthy boy, aged 18 months, was brought to me suffering from vomiting and diarrhœa which had existed for three days previously. After treatment had been continued for two days the purging ceased, but the child seemed to have a distaste for all nourishment, and refused both milk and arrow-root, and the mother made but few attempts to overcome this repugnance, so that for twenty-four hours the child took hardly anything except water and barley water, and those in small quantities. On the afternoon of the sixth day the child became faint, and seemed so feeble during the night that the mother became much alarmed, and came again to me on the morning of the seventh day. The child's face was then sunken and very anxious; it lay, as if dozing, with half closed eyes; breathing hurriedly; suddenly waking up from time to time in a state of alarm and restlessness, and then in a few moments subsiding into its former condition. The skin was dry but cool; the extremities were almost cold; the lips were dry and parched, and some sordes had

collected about the teeth; the tongue was dry, red, and glazed, and coated in the centre and towards the root with yellowish fur. The pulse was extremely feeble. There was very great thirst. The bowels had not acted for twelve hours.

I ordered the child a tablespoonful of equal parts of milk and barley water every half hour, with the addition of fifteen drops of brandy every hour, and directed that some strong veal broth should be prepared and given every two hours. At the same time, a draught containing ten grains of aromatic confection, half a drachm of the compound tincture of bark, and six drops of sal volatile, was given every three hours, and a grain of Dover's powder was directed to be taken at bed-time.

Within six hours after the commencement of this treatment the child began to improve; it slept tolerably well in the night, and the next day was lying tranquilly in bed, looking about and smiling cheerfully; the extremities were warmer, and the skin had lost its harshness; the tongue was no longer dry, and the pulse had increased in power. The stimulants were gradually withdrawn; no further bad symptom came on, and the child was soon convalescent.

It is of great importance rightly to interpret the meaning of the symptoms which attend the first stage of this affection, and to discriminate between the cerebral disturbance of approaching exhaustion, and that which implies the existence of real mischief in the brain.

A little girl was seized with diarrhœa on Aug. 8th, which at first was severe, but soon yielded to treatment, and she was again convalescent, when, on the 15th, vomiting and purging returned with great violence, and were attended with much febrile disturbance. On the following day she was still worse in all respects, but was not brought to me again until the 17th. She then looked exceedingly ill; her face was sallow, but with a flush on each cheek, and her eyes were deeply sunk. She lay in a half dozing state, with her eyelids half closed, and the eyeballs turned upwards, so that nothing but the sclerotica was visible; but from this condition she awoke frequently and suddenly in a state of great alarm, and looking as if she were about to have a fit of convulsions. Her skin was hot and very dry; her pulse very frequent, but not strong, and there was some subsultus of the tendons of the wrist. The abdomen was rather tympanitic; the tongue red, coated with white mucus; the thirst was great, the vomiting very frequent, and the bowels acted two or three times in the course of an hour, the evacuations having the appearance of dirty water.

The child was immediately placed in a tepid bath; an enema containing five drops of laudanum was next administered, and the abdomen was covered with a large bran poultice. The extreme irritability was almost immediately relieved by the warm bath, and still further soothed by the enema. The bowels ceased to act so frequently, and the stomach began

to bear small quantities of barley water and other drinks which were given cold. In a few hours the imminent danger had passed away, and the child recovered in the course of a few days.

If, in a case of this kind, you fall into the error of regarding the cerebral symptoms as the signs of active disease, and withhold the Dover's powder, or the opiate enema that might have checked the diarrhœa and soothed the irritability, while you apply cold lotions to the head, and give the child nothing more nutritious than barley water in small quantities, because the irritability of the stomach which results from weakness seems to you to be the indication of disease in the brain, the restlessness will before long alternate with coma, and the child will die either comatose or in convulsions.

But it is not only in the course of diarrhœa that errors of this sort may be committed. The early stages of pneumonia are often attended with so much sympathetic disturbance of the brain, as to throw the other symptoms into the back ground. The child vomits, it refers all its suffering to its head, and possibly has an attack of convulsions almost at the outset. You not unnaturally assume the case to be one of cerebral congestion, and treat it accordingly with free local depletion. On the next day the indications of disordered respiration are more apparent; you think your former diagnosis was incorrect, and probably apply more leeches to the chest to combat the pneumonia you had overlooked. The urgency of the symptoms may be relieved by these means, or, if that be not the case, still the reaction will diminish with the diminished power, and the child for a short time seems to suffer less. But soon the restlessness of exhaustion comes on, and then follow the soporose condition and the apparent coma; you condemn yourself for having overlooked the cerebral mischief, of which you fancy that you now have most convincing proof: you renew your antiphlogistic measures, to arrest, if it be not too late, this imaginary hydrocephalus, and your patient dies.

Something of the same kind, too, may happen in cases where the brain has really been congested, and where the depletion, which you practised somewhat too freely, was in reality indicated, though to a smaller amount. The restlessness and heat of head may have been diminished by your treatment, and the bowels may have been relieved by the purgatives you administered. In a few hours, however, restlessness returns, though not to so great a degree as before, the child moans sadly when awake, and this suffering state alternates with a drowsy condition, while the stomach, irritable before, now rejects every thing almost as soon as swallowed, though the child still seems eager for drink. The previous arrest of very similar symptoms, though but for a few hours, by active treatment, seems to you to indicate the propriety of continuing the same plan, but nevertheless the drowsiness deepens into coma, and the child dies, of hydrocephalus, as you suppose,—in reality of the *nimia cura medici*.

"Forewarned, forearmed," says the old proverb. When head symptoms come on in the infant, do not judge of their import simply from the present condition of the child, but ascertain its previous history. Learn whether any other members of the family have had hydrocephalus or been consumptive. Inquire whether this infant has thriven at the breast, or whether it has for some time been drooping; if already weaned, ascertain on what it is now fed, whether signs of declining health soon followed on the change of diet, while it throve so long as it was suckled. Ask what signs of disorder of the bowels there have been, and observe at what times the vomiting comes on; whether only after sucking or taking food, or whether efforts to vomit occur when the stomach is quite empty.

In a case where the symptoms of cerebral disturbance, and those of disordered respiration, come on almost at the same time in a previously healthy child, and so alternate with each other as to render your diagnosis difficult, you will do well to remember that pneumonia often sets in with much sympathetic disorder of the nervous symptom, and that the disease is much more likely to be seated in the lungs than in the brain. In most cases auscultation will enable you to decide the question, and if you once accustom yourselves to listen to a child's chest as invariably as you would look at its tongue or count its pulse, you will but seldom have to reproach yourselves for the uncertain diagnosis and the vacillating treatment into which, in cases of this description, you will otherwise be too often betrayed.

In a child suffering from diarrhœa, you will be prepared to meet with sympathetic disturbance of the brain, and will not allow the occurrence of its symptoms to deter you from adopting the treatment which the diarrhœa requires. If doubt cross your mind as to their signification, and you fear lest mischief be really going on in the brain, it will usually suffice to watch the symptoms closely, in order to detect a want of correspondence between them, which would not exist if true cerebral disease were present. Attention to this point will guard you from error during the stage of excitement, as well as in that of exhaustion and stupor, which simulates the last stage of hydrocephalus.

Under no circumstances are mistakes more easily committed, and never are their results more mischievous, than when real congestion of the brain has been somewhat over-treated, and the consequent symptoms of exhaustion are supposed to be those of advancing disease. In such a case, however, it would usually be observed that great faintness had been induced by the first depletion, and that the quiet which succeeded it was that of exhaustion as much as of mitigated suffering. If so, the returning restlessness would probably be the index of the feeble power of the brain, no longer adequate to the performance of its wonted functions, rather than the evidence of active disease of the organ. Nor would the history be the only safeguard from error, but the fontanelle sunk below the level of the cranial bones, instead of being tense and pulsating, the cool surface, and

the pulse presenting no other characters than those of frequency and feebleness, would all point to the real nature of the case. You do not need to be told that to deplete under such circumstances would be to destroy your patient—that food is needed, not physic. The sunken powers of life are to be rallied; and as their strength returns, the functions of the brain will again go on harmoniously.

Although the diagnosis of this affection is sometimes attended with difficulty, the *rules for its prevention and its cure* are happily very simple. Bearing in mind the possible supervention of the hydrocephaloid disease, you would never keep an infant from the breast, nor put a young child on a spare diet for several days, without most absolute necessity; you would pay especial attention to its food, if the disease from which it suffers be, like diarrhœa, such as interferes directly with its nutrition. Again, you would not trust depletion of a young child, especially if suffering from head affection, to a nurse, but would yourselves exercise the supervision of it. And, lastly, in the treatment of every disease you would at once suspend the antiphlogistic measures that you had previously been adopting, and resort to the use of stimulants and tonics so soon as any of the symptoms that we have been examining make their appearance.

The state of general restlessness and irritability that attends the early stages of exhaustion is often greatly soothed by the tepid bath, continued for not more than five minutes, for fear of still further depressing the infant's powers. While you secure a free access of air, too, you must be extremely cautious to maintain the room at a sufficient temperature; for the power of generating heat is diminished in a very remarkable degree in young animals who from any cause are insufficiently nourished. The irritability of the stomach is best overcome by giving nourishment in extremely small quantities,—as a dessert-spoonful of asses' milk for an infant, or of veal-tea for an older child, given by little and little every half hour. If the symptoms have succeeded to weaning, a healthy wet-nurse should, if possible, be at once obtained; but as the effort to suck seems sometimes to exhaust the child, and, probably, thereby to favour vomiting, it is sometimes better at first to give the nurse's milk by a tea-spoon. If the exhaustion be very great, and a state analogous to coma impending, a hot mustard bath is sometimes serviceable in rousing the child, while, at the same time, a few drops of sal volatile, or of brandy, may be given every few hours. It is desirable, however, to suspend the use of the more powerful direct stimulants so soon as it can safely be done, though a nutritious diet will be necessary for some time. Tonic medicines, likewise, are often of much service, few of which are preferable to the extract of bark, which, dissolved in caraway water, mixed with a few drops of the tincture, and well sweetened, will be taken very readily by most children. The addition of a little milk to the medicine when taken still further covers any unpleasant taste.

Those cases in which the brain becomes the seat of various *morbid growths* still remain for us to consider, before we pass to the study of affections of the spinal cord.

In the child, as in the adult, the brain may become the seat of hydatid cysts, or of cancerous tumors, or of *tubercular deposits;* but I should not detain you long with their study, if it were not that the last of these three morbid conditions, though exceedingly rare in the adult, is by no means unusual in the child. Thus, while M. Louis met with only a single case in which the brain contained tubercle, out of 117 examinations of adults who had died of phthisis, MM. Rilliet and Barthez discovered tubercle in the brain of 37 out of 312 children, between the ages of 1 and 15, in some organ or other of whose body this morbid deposit existed. You will remember that I am not now speaking of cases where tubercle is present merely in the membranes of the brain, producing that granular appearance to which I called your attention when treating of acute hydrocephalus; but my remarks refer to separate deposits of tubercular matter in the substance of the brain. These deposits are for the most part distinctly circumscribed, of a rounded form, and varying in dimensions from the size of a millet seed to that of a split pea, or of a bean, or even larger. The largest mass that I ever met with in the brain of a child was almost as big as a sugared almond, but they have been seen three or four times as large. Sometimes there is but a single deposit in the brain, but in the great majority of cases there are three or four small deposits, of the size of a millet seed, or rather larger, as well as a single mass of greater magnitude. Sometimes, though not often, the deposits of tubercle are limited to one hemisphere of the brain; but it generally happens that there is a marked preponderance of the affection on one side. The situation of these deposits varies greatly, and they have been found in all parts of the brain, both on its surface and in its interior. The smaller deposits are, I think, most frequently observed on the convexity of the brain, and they are then found closely adherent to the pia mater, to which they remain attached if that membrane be stripped off. They seem, however, to have some connection with the cerebral substance besides mere juxta-position, since a thin investment of it clings to them, and the place where they were situated may be seen after their removal to be quite uneven. Even when situated at the base of the brain, or in the cerebellum, they often retain this relation to the pia mater; and those larger masses, which generally appear more deeply seated, will often be found, if the convolntions be unfolded, to have been in reality not far removed from the surface. Sometimes a distinct, firm, fibrous capsule may be found investing the deposit; but this is often absent, or at any rate so delicate as not to be clearly perceptible. I have never seen these deposits presenting the characters of the grey semi-transparent tubercle frequently noticed in the lungs, but Rokitansky mentions having occasionally found portions of a deposit in this stage, while the

remainder had undergone the transformation into the ordinary friable yellow tuberculous matter. Softening sometimes goes on in cerebral tubercles; the process beginning in the centre, and gradually extending towards the periphery, till the contents of the capsule become of a puriform appearance and consistence. This change, however, is comparatively rare, for in the majority of cases, fatal cerebral disturbance comes on while the tubercle is yet in a crude state, and the cerebral substance immediately around it is then very often found in a condition of acute softening, perfectly diffluent, and of a bright rose tint, though this change generally does not reach beyond a depth of two or three lines.

Cerebral tubercle does not invariably affect the rounded form, but it occasionally extends as a patch, half an inch or more in length, by two or three lines in breadth, immediately beneath the pia mater, and not reaching above one or two lines deep into the cerebral substance, which is usually slightly softened beneath it.

Very often, but by no means invariably, these tubercular deposits in the cerebral substance are associated with that granular state of the membranes which I described to you as occurring in many cases of hydrocephalus. Thickening of the membranes, and effusion of hyaline matter into the pia mater at the base of the brain,—the evidences, in short, of meningitis—are often present, as well as abundant effusion of fluid into the ventricles, and softening of the central parts of the brain. Sometimes, however, the signs of inflammation of the membranes exist without any effusion into the ventricles, and in a few instances the ventricles contain an abundance of fluid, but no softening of the central parts of the brain exists, nor any sign of inflammation of the membranes.

I know of no instance in which tubercle was limited to the brain in childhood, but if present there it always exists in other viscera, and is but one of the results of that general cachexia which may shew itself in any of the various forms of scrofulous or phthisical disease.

I am unacquainted with any special cause that renders the brain more liable to this disease in childhood than in adult age, or even in youth. It certainly is not owing simply to the intensity of the tuberculous cachexia, and the consequently greater abundance of the morbid deposit, for I have met with many instances of far more extensive tubercular degeneration than existed in those cases where the brain had become its seat.

Cases are not yet recorded in numbers sufficient for us to determine accurately the time of the greatest liability to this affection: Dr. Green states from three to seven years of age to be the period of its greatest frequency, and MM. Rilliet and Barthez likewise consider it to be less usual before than after three years of age. Their observations, it should be remembered, were made at the Hôpital des Enfans at Paris, into which children under three years old are comparatively seldom admitted. It seems probable that their estimate of the age at which the disease most commonly occurs is some-

what too high, for 17 out of 32 cases recorded by Dr. Mauthner occurred in children whose age did not exceed three years, and the same holds good with reference to 7 out of 9 fatal cases that came under my own notice.

We come now to the examination of a very difficult question—namely, that of the *symptoms* of this affection. The difficulty arises from many sources; for sometimes the disease gives rise to no symptoms at all, and its existence is not discovered till after death; and even when symptoms are present, neither their character nor their intensity bear any invariable relation to the extent of the local mischief or its seat; while, lastly, the symptoms that usually betoken tubercle of the brain sometimes exist where no such morbid growth occupies the organ.

Cases in which no symptom whatever marks during life the presence of the morbid deposit in the brain, are unusual. Much more frequent are those in which the signs of cerebral disturbance, though not entirely absent, are too vague to excite much attention, and too slight to occasion much suffering; so that, if they do not wholly escape notice, they are confounded with other indications of ill health attendant on the general tuberculization with which this disease of the brain is frequently associated. No reason can be assigned for this latency of the affection in some instances, for it does not appear to depend either on the small size of the tubercle or on its situation. To the best of my knowledge, however, the brain in the immediate neighbourhood of the tubercular deposit does not present any sign of softening in cases which have been characterised by this absence of the signs of cerebral disturbance. It would be a plausible way of explaining these cases, to assume that, when symptoms are observed, they do not depend simply on the presence of tubercle, but rather on the changes in the surrounding brain. This hypothesis, however, is contradicted by the fact that cerebral symptoms sometimes occur in cases where no perceptible disorganization of the brain has taken place either around the tubercle or elsewhere.

In the greater number of instances, the absence of cerebral symptoms lasts only to within a short time of the patient's death, which takes place rather suddenly under the indications of most serious cerebral disease. This acute stage lasts sometimes for a few hours only, and a child who had shown no sign of head affection, though probably the symptoms of phthisis had long been present, suddenly sinks into a state of stupor, which deepens into profound and fatal coma. In other cases a fit suddenly takes place, followed by paralysis of one limb, or of the whole of one side, and either is immediately succeeded by coma, or the comatose condition does not come on till after the recurrence once or oftener of the convulsions. In other instances the fatal event is preceded by the symptoms of acute hydrocephalus, which make their appearance suddenly, and run their course in a few days. This sudden outbreak of symptoms usually takes place causelessly, but I have seen it succeed to a blow on the head,

even though not severe. You must here observe, that, though I have mentioned various ways in which the cerebral disturbance may manifest itself, yet we cannot predicate, from differences in this respect, either the seat or the extent of the deposit, or the nature of the mischief that is associated with it.

Quite as variable, and equally difficult of interpretation, are the symptoms of the previous stage, in which, though life is not in immediate jeopardy, yet the functions of the brain are manifestly disordered. Dr. Hennis Green, in his valuable paper on Tubercle of the Brain in Children, published in Vol. XXV. of the Medico-Chirurgical Transactions, mentions pain in the head as the most constant symptom of this stage of the affection, he having met with it as a prominent feature of the disease in seventeen out of twenty cases. The symptom is certainly of very frequent occurrence, but it attends upon so many affections of the brain, that, taken by itself, its diagnostic value is but small.

It is but seldom that any connection can be traced between the seat of the tubercle and the situation of the pain, which is, for the most part, referred to the forehead. It is often very severe; so that during its continuance, the child is entirely taken up with its suffering, and shrieks with the severity of the pain; but it does not continue with this intensity for more than a few hours, and on the next day the child will be found to be no worse than usual. Vomiting in many instances attends these exacerbations of pain; and, when this is the case, the absence of any gastric disorder sufficient to account for it will lead you to suspect the presence of tubercle in the brain. In some cases, however, the headache, though severe, does not present this remarkable intensity, while there is so much permanent impairment of the general health, that an occasional attack of sickness does not surprise you. On the other hand, you will meet with delicate children in whom attacks of violent headache, sometimes accompanied by vomiting, will come on from very slight causes, or apparently without any cause at all, and will return at irregular intervals for years together, till they gradually subside as the health becomes more robust, and cease altogether at the period of puberty, or sooner. In infants, and in children under two years of age, we of course lose the evidence which is afforded by the patient's complaints of headache, and can only infer it to be present from the occasional loss of cheerfulness and the attacks of fretfulness and crying. Sometimes, too, the suffering of the brain shews itself in other ways besides headache. The temper becomes wayward and passionate, or a general dulness steals over all the faculties, and the child grows quite indifferent to what is going on around it. One little boy, aged two years, whom I watched for some weeks before his death, never made any complaint of headache. He was fretful, and cried if moved, but was perfectly quiet if allowed to remain in his chair, where he would sit half dozing for hours together.

Affections of the motor system are often among the early indications of this disease, but neither are they so definite as to present any thing pathognomonic of cerebral tubercle. A boy who died at three and a half years old, and in the left hemisphere of whose cerebellum there was a tubercle as large as a pea, had been subject from his earliest infancy to an almost constant and involuntary rotatory movement of the head when in the recumbent posture. And in another boy, who was two years old at death, the head had hung for four months towards the left shoulder before any other symptom of mischief in the brain appeared: convulsions then suddenly came on, and the child died in 72 hours. Sometimes paralysis of a limb comes on gradually, or though actual paralysis does not exist, yet the power over one side becomes greatly weakened, and the child drags one leg, or is observed invariably to use one arm in preference to the other. Convulsive movements, however, are the most frequent of the affections of the motor system; and paralysis of a limb, or impaired power over it, usually succeed to their occurrence, and but seldom take place independently of them. Sometimes we observe nothing more than an occasional attack of convulsive twitching of one limb (oftener of the arm than of the leg), unattended by any loss of consciousness or impairment of intellect; but the seizure is more frequently attended by insensibility, though the convulsive movement may be limited to one side or even to one limb. Convulsions affecting one side only are sometimes seen, although tubercle is present in both hemispheres; or in other instances both sides are affected by the convulsions, and yet the deposit is found only in one hemisphere of the brain. When convulsions, whether general or partial, have once occurred, they are seldom absent for many days together, though to this there are occasional exceptions in which a pause of many months ensues after the first convulsive seizure; the general health, indeed, being impaired, but no sign indicating the special mischief that exists in the brain.

The transition from the premonitory to the acute stage sometimes takes place gradually, the convulsions becoming more and more frequent, and the other cerebral symptoms more serious, and the intervals of freedom from suffering shorter; or the change takes place suddenly, and without such previous increase in the severity of the child's sufferings as to make you anticipate its approaching death; and yet we cannot always discover such differences between the morbid appearances in the two cases as should explain the dissimilar course of the disease.

I do not wish for one moment to exaggerate the difficulties that attend the *diagnosis* of this affection; but at the same time, if we assume that we have to do with an incurable disease, we are less likely to use efficient means of treatment than if we feel that that there is still some room for hope. While, therefore, I would have you bear in mind that the symptoms which we have been passing in review, especially if associated with indications of tubercle in other organs, render the presence of tubercle in the

brain in the highest degree probable, they yet do not afford any absolutely certain evidence of it. Headache, aggravated at intervals, and associated with occasional convulsive movements of one limb, and even with attacks of an epileptic character, may occur in children who yet after a time may recover, and shew, by the robust health they subsequently attain to, that some cause of a less abiding nature than tubercular deposit must have given rise to the disturbance of the brain; or, on the other hand, though serious cerebral disease may exist, and such as gives rise at length to a fatal result, yet it may appear after death that it was such as would have been mitigated, if not cured, by appropriate treatment.

You must not, then, be merely passive spectators of these symptoms; and, if you watch cases of this kind with attention, you will generally find that they afford you some clue to the *treatment* that you should follow. Either there is manifest gastric and intestinal disorder, or there are indications of a state of general debility, or there are signs of inflammatory disease in the brain. In the first case, the regulation of the bowels, and the careful management of the diet, are obviously indicated; in the second, iron may be given with advantage, and the shower-bath may be cautiously tried, and, if it do not alarm the child, it may often be continued with much benefit. In those cases where there seems to be some slow mischief in the brain, I have once or twice seen recovery take place, contrary to all my anticipations, from the employment of small doses of mercury night and morning, persevered with for many weeks. In such cases, too, counter-irritation by means of the tartar-emetic ointment rubbed into the back of the neck is often followed by the happiest effects. A little girl, 14 months old, is at present under my care for the frequent recurrence of convulsive attacks of a very anomalous character. So long as a discharge is kept up from her neck by the tartar-emetic ointment, the fits do not occur; but if the discharge ceases for two or three days, they are sure to return.

These are the principles by which your conduct must be governed; but you will find that each case will present some special peculiarity, and will need to be studied and treated for itself.

Tumors of other kinds may exist in the brain in childhood, though they appear to be more frequent in the middle-aged or the old. I once saw a case in which *hydatids* had formed in the substance of the brain in a girl of seven years old; and once also I saw *cancer* affecting the brain and its membranes in a boy two and a half years old. But, though such occurrences are interesting from their rarity, I do not know any circumstance, except the absence of the signs of tubercular disease in the patient, by which you could determine during life that certain cerebral symptoms arise from hydatids or cancer of the brain, and not from tubercle in that organ.

LECTURE XI.

Diseases of the Spinal Cord—their study rendered more difficult by the tender age of children. Irritation and congestion of the cord.

Inflammation of the membranes of the cord—sometimes epidemic—not common as a sporadic affection. Illustrative cases.—Inflammation of the substance of the cord—extremely rare in its acute form—in its chronic form gives rise to symptoms similar to those which occur when bones of the spine are diseased. Cases.

Trismus—extremely rare in this country—symptoms—post-mortem appearances—uncertainty as to natural vascularity of the cord in early infancy. Causes of the disease—influence of vitiated air—treatment almost hopeless.

At the commencement of these lectures, I called your attention to the predominance of the spinal over the cerebral part of the nervous system, as constituting one of the grand characteristics of early life. Since then our daily course of inquiry has brought before us numerous confirmations of this truth, and has shewn us how slight a disturbance of the functions of the brain may suffice to destroy the harmony of those which belong to the spinal cord.

This morning we pass from the consideration of those cases in which the brain is the original seat of disorder, and in which the spinal cord suffers only secondarily, to the study of others, in which that organ is itself primarily affected. I need not remind you how much obscurity hangs over the ailments of the spinal cord at all periods of life; but in the young subject this is not a little increased by the difficulty that attends the observation of some of those symptoms which would be obvious enough in the adult. Thus, for instance, while impairment or loss of the locomotive power in the grown person could hardly escape our notice for a moment, it might fail to attract much attention in a young child who often totters in his gait, or even becomes unable to walk, if from any cause his health should fail. Or, again, the impaired sensation, or the vague pains in the limbs, which the adult would be sure to tell us of, would be but ill described by a child, even though it had long been able to talk, while terror might cause it to cry if any attempt were made to examine its back, and might thus prevent our ascertaining the presence or absence of

tenderness of the spine. These are difficulties, however, which patience and tact will overcome; for not only the diseases of the spinal cord, but the symptoms by which they manifest themselves, are much the same at all ages; the chief difference being that in the one case they strike the eye even of the careless, while in the other, careful observation is necessary for their detection.

Irritation of the cord, however produced, gives rise in the child, as well as in the adult, to impairment of the motor power. A little boy, between two and three years old, remarkably strong and healthy, was observed, without any obvious cause, to fail in his general health, and at the same time to totter in his gait, to become indisposed to move, and, at last, almost entirely to cease walking; and this impairment of his power of walking was quite out of all proportion to the signs of ill health by which it was attended. After watching him for a time, it was discovered that the child had become addicted to the practice of masturbation. This was put a stop to, and he soon regained his health, and with it his power of walking.

The mischief to the cord may be more serious, and the symptoms will then present a corresponding increase of severity.

In May 1845, a little girl, four years old, was brought to me by her mother, who said that ten days before the child had had a fall on her back, while left in the charge of a girl, and that on the following morning she was unable to stand or move, unless supported; and that she had ever since continued in the same condition. Her appearance was rather anxious; her face slightly flushed; skin warm and dry; tongue slightly furred; pulse frequent, and with power. If placed on her feet she clung hold of her mother, sank down into a stooping, half-squatting posture, and immediately began to cry. She could walk if firmly supported, but hurriedly and unsteadily, stepping on her toes, her legs moving in a semicircle with her toes turned inwards, and one foot being put down just in front of the other. On examining the spine, the integuments from the tenth to the twelfth dorsal vertebra presented a little puffiness, and there was very great tenderness of the spine in that situation; and even when not touched, the child complained of pain in her back. There was no appetite, but great thirst; the bowels were constipated; the appearance of the urine was natural, and neither fæces nor urine were voided unconsciously.

She was cupped on the loins to ℥iv., and on the following day was much relieved, moving her legs more readily, and suffering much less from pain in the back. On the 17th she was able to stand, and could walk a little without suffering. Attention was paid to keep the bowels open, and in a few days she was quite well.

It is probable that in this case nothing more serious was the matter than some degree of *congestion of the spinal cord* or its membranes; but we likewise meet occasionally with instances of inflammation of these parts.

Inflammation of the membranes of the spinal cord prevailed epidemically in many parts of France from 1842 to 1844. The victims of the disease, which proved very fatal, were almost entirely youths a little past the period of puberty. An epidemic of a similar kind is now prevalent in many of the hospitals and workhouses of Ireland; but in that country boys under twelve years of age have been almost the only persons who have suffered from it. The arachnoid of the spinal cord has been found in every instance to be the part chiefly affected though in most cases the membranes of the brain seem to have been slightly involved in the disease. Notwithstanding the great extent of the inflammation of the membranes of the cord, and the effusion of lymph beneath them, the nervous substance appears to have been comparatively seldom attacked by it, and never with much severity. The disease generally came on very suddenly, and its course was often extremely rapid, some patients dying in twenty-four hours, while few survived the fourth day. Severe pain in the abdomen, attended with vomiting and purging, and a condition of general collapse, marked the outset of the affection. A state of reaction soon succeeded, the surface in the course of a few hours becoming hot, the pulse full, and its frequency varying from 120 to 140, while the face assumed a tetanic expression, and the head was retracted and firmly fixed. General convulsions, or coma, succeeded to this condition, and failure of deglutition, with a slow and laboured pulse, followed as the immediate precursors of death.

I must refer you to Dr. Mayne's account of this epidemic, which is contained in the Dublin Quarterly Journal for August, 1846, for I have not seen the disease in any other than a sporadic form, and even then but seldom. Perhaps, therefore, I shall convey to you a more truthful impression of the general characters of inflammatory affections of the spinal cord and its membranes, by relating to you a few of those instances that have come under my own notice, rather than by attempting to draw a general portraiture of them from too small a number of examples.

A boy, aged 11 years, of phthisical family, who seven months previously had had severe and long-continued attacks of headache, was greatly distressed by hearing of the sudden death of a relation. On the following day he had slight nausea, with pain in the head; but in a day or two he suffered more from pain in his limbs, especially in the calves of the legs, and also shooting from the situation of the coccyx to the middle of the back. He complained, moreover, of a constant pain at the epigastrium, which, as well as that about the lower part of the back, was always much aggravated when the bowels acted; they being, however, usually constipated. These symptoms were associated with great weakness of the legs, which he dragged when walking, and reached the Children's Infirmary, from which his home was about a mile distant, with much difficulty. On the following day I visited him, and ascertained, on examining the spine, that there was considerable tenderness on pressure from about the middle

of the dorsal vertebræ to the apex of the sacrum, but greatest about the lumbar region. There was no intolerance of light, but very distressing sense of giddiness, complete loss of appetite, constant sensation of sickness, and a nasty taste in the mouth. The intellect during the whole illness was only once affected, and then but for a few hours; and the child was remarkably acute, and described his different sensations with great exactness.

The pain in the loins was relieved by cupping; but on the next day the headache was increased in severity, and there was some subsultus of the tendons of the forearms, and a good deal of twitching of the hands. This symptom disappeared after the boy had been depleted copiously by leeches to the head, and after his gums had begun to be affected by mercury, which was freely administered to him; but his pulse, which during the whole of his illness never exceeded 75, sank to 60 in the minute, and its beat became irregular. As the mouth became decidedly sore, first the shooting pains in the back and limbs ceased; then the pulse became regular, and rose in frequency; then the epigastric pain disappeared, and was succeeded for a time by a sense of weight there. By degrees the tenderness of the spine diminished and finally ceased, and the headache grew less; but his legs long continued weak, so that he could not tread firmly, and the slightest noise, or any kind of over-exertion, brought on an immediate increase of his sufferings. A seton was put in the back of his neck, and the influence of mercury on the system was cautiously maintained for four months before the boy appeared sufficiently well to justify the discontinuance of remedies.

But the disease may run a more acute course, and to a less favourable termination.

A little boy, one year old, who had cut four incisor teeth, and whose health had been habitually good, was brought to me by his mother after three weeks' illness. She told me that he had been suddenly seized with great fever and heat of skin, accompanied, after the lapse of four days, with violent screams. At the outset of his illness he had been cupped at the back of his neck, and leeches had been applied to his head without amendment, and for a week before I saw him all treatment had been discontinued. The child then lay in his mother's lap, frequently crying with a low distressed whimper; his face was pale, but occasionally flushed; his head thrown back, so that the occiput and back of the neck were nearly in contact with each other. The sterno-mastoid muscles were rather rigid, though there was no trismus. The hands were clenched, the thumbs drawn into the palm, and occasional attacks came on, in which he uttered a scream, and then bent his body back into an arch. The child sucked eagerly, but frequently dropped the nipple as if in pain; the pupils acted naturally; the pulse was frequent, small, and hard. In the course of the succeeding day frequent convulsive twitchings and startings of the limbs

took place, affecting the left arm more than any other part. His face grew habitually pale and more sunken, and the spine became habitually, though slightly, curved forwards, notwithstanding which, occasional attacks of opisthotonos still occurred. The pupils still acted well, but a new symptom appeared, in the laboured breathing, which sometimes became so difficult that the child seemed almost choking, while phlegm collected in his throat, which he appeared unable to get rid of. This dyspnœa would almost imply that the inflammation had been gradually travelling upwards till it began to involve the origins of the cerebral nerves—a supposition still further confirmed by finding two days afterwards that the eyeballs were in a state of constant convulsive rotation. After this, which was the fifth day from that on which I first saw the child, he was not again brought to me; but, though this case is incomplete, it yet helps to fill up the portraiture of the disease. To complete it, however, I must relate one instance more, in which the results of examination after death confirmed the diagnosis.

Six years ago, I saw a little boy, five months old, of whom his mother gave me the following history:—A month before, he had been attacked with shivering (an unusual occurrence in a young child), and, in the night following this seizure, had many fits, during which he screamed much and became very stiff. After they had continued for three days, returning at intervals of an hour or half an hour, a little diminution in their severity followed the use of some medicine prescribed for him by a surgeon; but, even when I saw him, ten or twelve often occurred in the twenty-four hours, though a day would now and then pass without any. The fits were described as presenting the characters of opisthotonos, though in a less marked degree than when they first came on. The retraction of the head with which they were attended at first subsided after their cessation; but in the course of two or three days a tendency to keep the head constantly thrown back became evident, and for a fortnight the head had never been brought out of that position. The mother thought, too, that the child had been blind for that period.

The child appeared well grown and well nourished, and the face was not expressive of particular suffering, but the head was drawn back so that the occiput rested between the shoulders, while the back was bent forwards in a state of perfect emprosthotonos: the legs were drawn up towards the abdomen, the palms of the hands turned backwards and outwards, the fingers clenched, and the thumbs drawn into the palm. On turning the child round on its face, its body formed a complete arch resting on the chin and knees. The whole spine was very tender, and this tenderness was greatest about its upper part. The pupils were dilated and immoveable; suction was difficultly performed, though there was no trismus, but the child vomited every thing it took almost immediately. The pulse was at this time too rapid and too feeble to be counted, and the child died in a fit of convulsions twenty-four hours afterwards.

On examining the body, blood was found effused, though not in any considerable quantity, within the spinal canal, but external to the dura mater, from the third cervical to the third dorsal vertebra. A thick layer of white lymph was present both under the arachnoid and in its cavity along the whole posterior surface of the lumbar and dorsal portions of the cord, and likewise existed in the cervical portion, though in a less degree. Anteriorly blood and lymph occupied the whole cervical portion of the sac of the arachnoid, and were effused beneath the membrane; but in the remainder of the front of the cord there were merely patches of lymph beneath the arachnoid. The substance of the cord was apparently healthy. On lifting up the cerebellum, a considerable quantity of serum, with flakes of lymph, escaped from the base of the skull, and the whole under surface of the cerebellum had a uniform coating of white lymph at least a line and a half in thickness, which extended over the medulla oblongata, and was continuous with the deposit of lymph along the spinal cord. The lateral ventricles of the brain were much distended with fluid, in which large irregular masses of yellow lymph were floating. The corpora striata and the fornix were much softened, but the rest of the brain and the membranes at its convexity were quite healthy.

It can scarcely be necessary that I should comment on these cases, either to point out to you the many respects in which inflammation of the spinal cord differs from that of the brain, or to insist on the absolute necessity of active antiphlogistic treatment being adopted at the very outset of the disease.

I apprehend that in the case that recovered, as well as in the other two which terminated fatally, the membranes were chiefly, if not exclusively, affected. I have not met with any instance of *acute inflammation* and consequent softening of the substance *of the spinal cord,* although there are many such on record. It has been supposed that paralytic symptoms usually attend this affection, while stiffness and spasm of the muscles characterise spinal meningitis; but though this is probably true in many instances, yet it does not by any means hold good in all. Three cases are related by MM. Rilliet and Barthez, in which the disease ran its course with symptoms of tetanus and trismus, which continued up to the time of the patient's death. In one of these cases the child died in 36 hours; in the second, in 96 hours; but in the third, a temporary remission having occurred, the patient survived for thirteen days.

I select from Dr. Mauthner's valuable Treatise on the Diseases of the Brain and Spinal Cord in Children, a very characteristic case of acute inflammatory softening of the spinal marrow.*

A girl aged 11 years, whose occupations compelled her to remain for many hours daily in a sitting posture, with her head bent forwards, while she was at the same time much exposed to currents of cold air, was seized,

* Lib. cit. p. 421, Case 117.

after she had followed this employment for three weeks, with dragging and tearing pains in the back of her neck. As these pains increased, voluntary power over the arms became impaired, and, the paralysis increasing rapidly in spite of the application of leeches to the back of the neck, she was admitted into the Hospital for Children at Vienna, under Dr. Mauthner's care, on Dec. 26th. Both arms were at that time completely palsied, flaccid, cool, and almost insensible; the lower extremities still obeyed the will, but the girl was unable to stand firmly. The mind was perfectly clear, the appetite good, deglutition easy, and pulse natural; and in these respects her condition continued unchanged to the very last, except that the pulse became very frequent on the day of the child's death. On the 28th the legs were palsied, and the urine was passed involuntarily. On the 29th, voluntary power over the hands and feet was likewise completely lost, and sensation in them was very imperfect. On the 30th, sensation was perfectly lost in all the extremities. The child had desire to pass fæces, the bowels not having acted for three days, but she had not power to do so. On the 31st, the sphincter ani was likewise paralysed, and opened to the size of a shilling. On January 4th the hardened fæces began to fall out of the gaping anus; the respiration was feeble, articulation difficult. On the 6th the child was in much distress, and for many days had scarcely slept at all; the whole left side of the body was completely paralysed, and only the right side of the chest moved in respiration. Her exhaustion was so extreme that her voice was scarcely audible, but the muscles of the face still retained the power of motion and sensation perfectly, and the intellect was quite clear, though the child died the same night.

The spinal cord presented the only morbid appearance, the membranes being perfectly healthy. The medulla oblongata was as soft as butter, of a yellow colour, not presenting a trace of its natural organisation; and the same condition was presented by the whole of the spinal cord as low as the cauda equina, where it once more resumed its natural appearance and characters.

The *chronic form of inflammation of the cord* will much oftener come under your notice as one of the consequences of caries of the vertebræ. You will remember, too, that this serious result, and the paralysis to which it gives rise, are not produced simply by the distortion of the spine and the mechanical compression of the cord, but rather by extension to it of the inflammatory action. You have, then, in these cases a double danger to combat; both that which arises from the disease in the spinal column itself, and that which depends on the probable extension to the cord of the disease which began in the bones. The symptoms of the two affections present likewise so many points of resemblance in their early stages, that you can never feel sure that the cord is uninvolved. Of this we have ample proof in those rare cases in which chronic softening of the cord occurs independent of any affection of the bones of the spine. You will

find a case that illustrates this fact very well in M. Louis's valuable paper, On the Condition of the Spinal Marrow in Cases of Caries of the Vertebræ*;" and I will relate to you another still more remarkable instance of it which came under my own notice.

On March 31, 1846, a little girl, aged three years and a quarter, the strumous child of unhealthy parents, in whose family phthisis was hereditary, was brought to me by her mother. Nine months previously, her father having taken her in his arms and tossed her, she suddenly cried out that she was hurt, and for several days afterwards refused to walk, and seemed unable to stand, sinking down on her hams if set on her feet. She made no definite complaint, however; no injury was anywhere observable, and in about three weeks she seemed to have recovered her health, and continued well until the middle of March. At that time, however, her frequent complaints of pain in the neck attracted her mother's attention. The appearance of the little girl, when first placed under my care, was very remarkable; for though the face wore no expression of suffering, yet the neck was so much bent as to give an unusual prominence to the seventh cervical vertebra, and the head was constantly directed downwards. No part of the spine seemed particularly tender; but any attempt to raise the head was forcibly resisted, and seemed to occasion considerable pain. The child walked, though with a tottering gait, and if left alone for a few minutes sank down upon her knees to play. Her constant complaint was of being tired and drowsy, notwithstanding which she slept ill; her appetite was bad, and her bowels were constipated. I regarded the case as one of incipient disease of the cervical vertebræ, and was anxious to make an issue in the back of the neck, but the parents refused to consent to this proceeding. Medical treatment therefore was confined to the administration of the cod-liver oil, and afterwards of the syrup of the iodide of iron; but though no fresh symptoms appeared, the child gradually lost strength. On the 12th of May she was able to walk a distance of nearly half a mile; but on the 14th, though not worse in other respects, she was unable to raise her hands, and was forced to be fed by another person. In the evening she complained of her eyes aching, but nevertheless slept tolerably well till 1 A.M. She then awoke crying and fretful; but on being taken up passed an evacuation, and on lying down again, after a few efforts to vomit which soon subsided, spoke a few words to her mother, in whose arms she was lying. After breathing in a sighing manner for a few moments she seemed to fall asleep, and in this sleep died so quietly, that her mother was ignorant of it until awakened by her daughter's corpse beginning to grow cold.

On examining the body after death the brain was found to be quite

* Mémoires, ou Recherches Anatomico-Pathologiques. 8vo. Paris, 1826. VIII. Mémoire, I. Observ. p. 411.

healthy, with the exception of some venous congestion of the arachnoid. The muscles of the back and the bones of the spinal column were perfectly healthy; but on laying open the vertebral canal, the spinal cord, from a level with the third down to the seventh cervical vertebra, bulged considerably, so as completely to occupy the canal, though above and below this its size was natural.

In this situation the two layers of the arachnoid of the cord were firmly connected together by numerous filamentous adhesions, and the membrane itself was opaque and thickened.

The cord in the situation of this bulging had a shining gelatinous appearance, not unlike turbid and badly made jelly, with a yellowish lymph-like matter infiltrated into it. This softening involved the *posterior* columns of the cord much more than the anterior; the bulging, too, seemed due to the posterior columns, though the anterior presented some degree of softening.

Three apoplectic effusions were discovered in the spinal cord. The first was situated just below the calamus scriptorius, and was about the size of a lentil; the nervous matter all around being perfectly healthy. The second, which was larger, was just at the commencement of the swelling of the cord, and partially extended into the sound parts. It just shewed through the surface of the cord as big as half a pea, but on longitudinally dividing the cord was seen to be of the bigness of a kidney bean; and the third effusion, just above the termination of the swelling of the cord, was about as large as a big pea. Besides these there were several small ecchymosed spots in the softened parts of the cord, but all the effusions of blood were strictly limited to the posterior columns of the cord.

This case presents many points of interest. The scrofulous diathesis in the family; the probable injury to the spine, followed, for a short time, by impairment of the motor power; the subsequent occurrence of pain in the bended neck, and the fixed position of the head, all seemed to warrant the opinion that the vertebræ were diseased, but all resulted from inflammatory softening of the spinal cord, while the bones were perfectly healthy. The softening of the posterior columns of the cord, and the extravasation of blood into their substance, while the anterior columns were in a state of comparative integrity, are occurrences very remarkable when coupled with the impaired motor power.* Cases such as this are warnings to us to avoid hasty generalisations on physiological subjects; they show us how hard some of the Sphinx's riddles are to read.

There still remains one affection which we must notice in connection with the diseases of the spinal cord, although it is one whose pathology is by no means thoroughly understood. The *trismus* or *tetanus* of new-born children is a malady which, though frequent in the West Indian

* It is almost impossible in so young a subject to ascertain accurately the state of sensation, but there was no obvious indication of its impairment in this case.

Islands, is seldom seen in this country. Three instances of it have come under my own notice, all of which occurred in the Dublin Lying-in Hospital, and I have seen no case of it among my patients at the Children's Infirmary.

The disease may come on within twelve hours after birth, or, on the other hand, may not occur for several days ; but it very rarely makes its appearance after the lapse of a week. I once saw it attack a child fifteen hours after its birth, but in the other two cases it did not come on until the sixth day. Though it runs a rapid course, yet its onset is gradual ; one of the first things that attracts the mother's notice being, in general, that the child does not take the breast when put to it, but utters a whimpering cry, and if the mouth be then examined it will be found more or less firmly fixed. Sometimes general convulsions come on suddenly, and usher in the other symptoms, but they more frequently follow than precede the trismus. When fully developed, these fits, which come on in paroxysms, are ushered in by a screech, or attended with some impairment of the respiration, and during their continuance the whole surface becomes livid. The hands are strongly clenched, the feet forcibly flexed on the ankles, and the toes bent, and remain so during the fit, while the trunk is curved backwards in a condition of opisthotonos : the mouth is generally drawn slightly open, and the lower jaw firmly fixed. When the fit subsides, the muscles do not become generally relaxed, but the child still lies with its hands clenched, and its thumbs drawn into the palm, the legs being generally crossed, and the great toe separated widely from the others, while the head is thrown back, and the opisthotonos continues, though in a diminished degree. The condition of the mouth is peculiar and characteristic. The jaws at first are slightly open, and the corners of the mouth drawn downwards and backwards, but as the disease advances the jaws become quite closed, the corners of the mouth even more drawn down, and the lips firmly compressed against the gums. The power of sucking is early lost, but for some time the child continues able to swallow ; at length, however, it accomplishes this with great difficulty, a convulsion sometimes following the attempt, while even that fluid which had apparently been swallowed is for the most part speedily regurgitated. The child dies either during some paroxysm of convulsions, or, seeming much exhausted, it sinks into a comatose condition, and so expires. There are few affections that run so fearfully a rapid a course as this ; its fatal termination almost always taking place within thirty-six, often within twenty-four hours from the appearance of the first symptoms.

The most frequent *post-mortem appearance* in these cases, and that which I found in the bodies of all the three children whom I observed, consists of effusion of blood, either fluid or coagulated, into the cellular tissue surrounding the theca of the cord. Conjoined with this there is generally a congested state of the vessels of the spinal arachnoid, and

sometimes an effusion of blood or serum into its cavity. The signs of congestion about the head are less constant, though much oftener present than absent, and in one instance I found not merely a highly congested state of the cerebral vessels, but also an effusion of blood in considerable quantity, between the skull and dura mater, and also a slighter effusion into the arachnoid cavity.

There is one circumstance, however, which makes me hesitate to refer the symptoms we have been describing to this apoplexy of the cord. When in Dublin, I examined the bodies of almost all the children who, during a period of six months, either were still-born, or who died soon after their birth, in the lying-in hospital of that city. I found in almost all cases a considerable quantity of blood on cutting through the dorsal muscles, as I likewise did in the cases of trismus. The cellular tissue surrounding the dura mater of the cord contained a gelatinous semi-fluid matter, often mingled with blood, and a similar matter was often contained within the theca, while the vessels of the arachnoid were generally distended with blood. I found, moreover, that while the effusion of blood in coagula within the sac of the cerebral arachnoid was very rare, its effusion between the dura mater and the skull was by no means so unusual; and lastly, that it was not possible to draw any conclusion from the distension of the sinuses with blood, or from the presence of many bloody points on the surface of the divided brain. Since my return to England, I have had no opportunity of pursuing this inquiry so as to arrive at any definite conclusion with reference to the natural degree of vascularity of the spinal cord in early life. Similar observations should be repeated with children of different ages, and whose bodies have after death been placed in a variety of positions; not always on the back, as in the cases which I examined.

There are few diseases respecting the *cause* of which opinions so various have prevailed as with regard to trismus. Bearing in mind the frequency of external injury as a cause of locked-jaw in the adult, some writers have sought to find in every case the history of some blow or other injury to which it might plausibly be attributed; while others have conceived that it depended on awkward management of the navel-string, or injury of some kind or other inflicted on it. This last opinion has appeared to derive support from some cases in which the umbilical vein has presented the signs of phlebitis: but further observation has shewn these appearances to be anything but constant.

The remarkable frequency of the disease in hot climates, where the heat of the day is succeeded by intense cold at night, favours the opinion that interruption of the function of the skin, by sudden alternations of temperature, is a powerful cause of the disease. In an epidemic of this disease in the lying-in hospital at Stockholm, in 1834,* there seemed also to be a most marked connection between the periods of its greatest prevalence and

* Cederschjold, in Busch's Zeitschrift für Geburtsk. x. 345.

the fluctuations of temperature. Nothing, however, can be more satisfactorily proved, than the tendency of a vitiated state of atmosphere to produce it. Sixty years ago, every sixth child born in the Dublin Lying-in Hospital died within a fortnight after birth, and trismus was the cause of the death of $\frac{1}{2}\frac{9}{0}$ of these children. Dr. Joseph Clarke adopted means to secure the efficient ventilation of the hospital, and the mortality of the children fell at once to 1 in $19\frac{1}{3}$; and during Dr. Collins's mastership, from 1826 to 1833, was only 1 in $58\frac{1}{2}$, and but little more than the ninth part of that mortality depended on trismus.*

Though we may hope by wise hygienic measures to avert this disease, yet when once it has become developed, our prospects of *cure* are so slender that I may almost say the task is hopeless. I have not seen leeches employed, but, bearing in mind the post-mortem appearances, should certainly be disposed to apply them freely at the outset of the disease. I have seen the hot bath used with temporary relief; but though I have witnessed the employment of calomel and of antispasmodics, as assafœtida, and the administration of an enema of gr. iij. of tobacco infused for half an hour in ℥viij. of water, yet I have never known any of these means followed by even a momentary pause in the symptoms; and the endeavour to excite the action of the skin is the only measure that in the cases which I witnessed seemed to be of the slightest service.

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* Collins's Treatise on Midwifery, p. 513.

LECTURE XII.

Night terrors—usually depend on intestinal disorder, not on primary disease of the brain—their symptoms not to be mistaken for those of incipient hydrocephalus—sometimes continue to occur for many weeks—Treatment.

Epilepsy—a disease of youth rather than of childhood—frequently recurring convulsions in childhood never to be neglected.

Chorea—often connected with disorders of approaching puberty—not peculiar to childhood—principles of treatment—Partial chorea.

Paralysis—sometimes congenital—often follows very slight and temporary symptoms of cerebral disturbance—most frequent during process of dentition—Recovery very uncertain—great importance of early treatment—serious results of its remaining uncured.—Diagnosis—Treatment.

Facial hemiplegia in new-born infants.

We have now nearly completed our examination of the diseases of the brain and spinal cord in childhood, but there are some affections of the nervous system which are often independent of any change in the nervous centres, such as our means of anatomical investigation can discover, or which are but the expression of the sympathy of the brain and spinal cord, with the sufferings of some distant organ. To their brief study we must devote the present hour.

It happens sometimes that a child who has gone to bed apparently well, and has slept soundly for a short time, awakes suddenly in great terror, and with a loud and piercing cry. The child will be found sitting up in its bed, crying out, as if in an agony of fear, "Oh dear! oh dear! take it away! father! mother!" while terror is depicted in its countenance, and it does not recognise its parents, who alarmed by the shriek have come into its room, but seems wholly occupied with the fearful impression that has aroused it from sleep. By degrees consciousness returns, the child now clings to its mother or its nurse, sometimes wants to be taken up and carried about the room, and, by degrees, sometimes in ten minutes, sometimes in half an hour, it grows quiet, and again falls asleep. As the terror abates, the child in some instances grows quiet at once, but frequently it bursts into a fit of passionate weeping, and sobs itself to rest in its mother's arms. In some instances a quantity of limpid urine is voided

as the fit passes off, but this occurrence is by no means constant. Usually the remainder of the night is passed in tolerably sound sleep, and the following night the child may rest quite undisturbed, or the terrors may again return, and with precisely the same symptoms as before. The attack usually comes on after the child has been from half an hour to a couple of hours asleep; and two attacks do not generally occur in the same night. They are always more or less distinctly associated with the impression of some object which occasions alarm,—as a cat or dog, which is fancied to be on the bed; and this illusion continues even after the child has recognised those who are around it. The condition is not one of delirium, for the child has no other hallucinations, but the attack may return night after night with precisely the same characters. The previous sleep sometimes seems sound, and though often uneasy, yet talking in the sleep does not usually occur, and after the child has been pacified it generally sleeps heavily, perhaps till morning, or till a second, usually slighter attack comes on: but this scarcely ever occurs, until after sleep has again lasted for an hour or longer.

Seizures of this kind may come on under a great variety of circumstances, and, according to the cause whence they have arisen, may continue to return for many weeks together, or may occur but a few times. As far as I have had the opportunity of judging, they are never the indications of primary mischief in the brain, but are always associated with some disturbance of the intestinal canal, and more or less obvious gastric disorder.

A few months ago I saw a little boy, aged 11 months, in whom the process of dentition was just beginning, and who for ten days had had slight diarrhœa, with dark and slimy evacuations. He then awoke one night, though before apparently sleeping soundly, with a sudden start, and a scream so violent that all the people in the house heard it. When taken out of bed he continued crying loudly for some minutes, but by degrees grew quiet and fell asleep again, sweating profusely. This sleep was as heavy as it had been before, though the eyes were not always closed during it, but after an uncertain interval of from half an hour to two hours he would again awake with the same loud and terrified scream, and again in a few minutes sink into slumber. The first of these attacks had taken place six days before the child was brought to me: they were increasing in frequency, as many as seven or eight having occurred in the course of a single night, and even during his sleep in the day-time the child was not free from them. He was cheerful, however, at other times; he sucked well, did not vomit, his head was not hot, and the anterior fontanelle was depressed rather than prominent; but the abdomen was rather full, and somewhat tender; the gums were much swollen, and the tongue rather furred.

The gums were lanced, the child was put in a tepid bath every night: a powder containing one grain of Hydr. c. Cretâ, and one of Dover's

powder, was given daily at bed-time, and ʒj. of castor oil every morning, and the attacks subsided.

Cases of this kind illustrate a point of practice, which, though important in the adult (you will find it insisted on by Andral in his Clinique Médicale) is still more so in the child. It is, that in many affections of the brain there is a stage quite at the commencement in which depletion may be out of place, but opiates or sedatives will allay the irritation, which, if let alone, would issue in dangerous or fatal congestion, or inflammation.

In the majority of cases of these *night terrors* the condition of the bowels is one of constipation, not of diarrhœa. Sometimes, after gastric disorder has continued for a few days, in the course of which perhaps vomiting may have occurred, an attack of this nocturnal alarm may throw the parents into a state of great apprehension lest hydrocephalus should be impending. I have seen a very severe attack of jaundice come on with these symptoms, and in such a case it is important to bear in mind the difference between the sudden, sympathetic, disturbance of the brain, and the more gradual approach of hydrocephalus, with the drowsiness the child experiences, and yet the difficulty it has in going to sleep, the restlessness all night long, or the unquiet slumber, with the moaning and starting which I pointed out to you when speaking of that disease. If, then, bearing in mind these facts, you find that the child who has had this attack in the night yet does not complain of intolerance of light, or of much or any headache, and that while the head is cool and the pulse regular, the abdomen is full and hard, and perhaps slightly tender, you will scarcely take the less for the more dangerous affection.

But these symptoms may last for weeks or months together, neither diminishing nor much increasing in severity, so that they seem almost to constitute an independent disease: a view which Dr. Hesse of Altona,* who has written a very good pamphlet on it, is disposed to take somewhat too generally.

Such a case was that of a delicate boy, 7 years old, who, during the previous twelve months, had been cutting his first permanent molar teeth, and for the whole of that time had suffered from attacks of night terrors, which usually came on about half an hour after he had fallen asleep. He then started up with a wild and terrified look, and loud outcries, appearing not to know any one for some time, then begging to be taken up, and becoming pacified after being carried about for half an hour in his father's arms. As the seizure passed off he used to void a large quantity of limpid urine, and having fallen asleep again, never but once had a second attack of it in the same night, while sometimes none occurred for two or three nights together. In other respects he seemed to be tolerably well, and was a lively and intelligent child, though for about fourteen days before

* Ueber das nächtliche Aufschrecken der Kinder im Schlafe. 8vo. Altenburg, 1845.

he was brought to me his health had appeared less good, and there were evident indications of gastric disorder. I never saw this child but once again, so I cannot tell you his subsequent history, but his case affords a good illustration of the occasional persistence of these symptoms for a long time without the supervention of any really serious disease.

Although these symptoms may be the result of sympathetic affection of the brain through the medium of the abdominal viscera, still you should watch a child in whom they had frequently occurred with especial care, knowing that long-continued irritation of the nervous centres may, under the influence of comparatively trivial causes, issue in serious disease. Your chief attention, however, must be directed to the removal of the disorder of the intestinal canal, and this should be attempted by gentle means, —by the careful regulation of the diet, and the judicious combination of aperients and tonics, rather than by drastic purgatives. At the same time, too, it is right that the child should not be left in the dark, or alone ; the affection resembles night-mare, and in childhood dream-images seem to mingle with the waking impressions much more than in adult age. A light burning brightly in the room, and a familiar face meeting the child's eye at once on waking, will do much towards breaking the spell, and towards allaying its fears. Harshness in such cases is quite out of place, and few pieces of cruelty can be greater than forcing a timid little child, in whom threatenings of these attacks have occurred, to go to bed in the dark, or to lie there without a candle, while its active imagination conjures up before its eyes out of the bed-curtains, or other objects in the room, the outlines of all sorts of terrific forms.

But occurrences much more alarming may take place independent of any primary disease of the nervous centres. Convulsions may come on, and these convulsions may occur again and again until the patient dies, and yet we may find few or no morbid appearances in the brain or spinal cord to account for their occurrence. I shall not, however, say more on this subject now, for I explained to you some time since that, in the great majority of instances, such attacks of convulsions depend on a state of temporary congestion of the brain produced in some indirect way. Any other remarks that it may be desirable to make upon them will be most in place when I speak of the different diseases in the course of which they are likely to occur.

When general convulsions continue to recur at intervals, and without any very evident cause, for weeks or months together, the affection then receives the name of *epilepsy*. Epilepsy is a disease of all ages ; its foundation may be laid in early infancy, and the fits may continue to recur up to adult age, or it may come on at any subsequent period of life. It seems, however, to be less one of the diseases of childhood, than of that period of youth during which the great changes that are accomplished at puberty are preparing or being carried out I seldom, indeed, see cases of

epilepsy at the Children's Infirmary; and, in the few instances where I have met with it, it has usually been traceable either to a fall, or a blow on the head, or to fright. Terror I believe to be by no means an infrequent exciting cause of epileptic seizures in childhood. A little girl, 10 years old, is now under my care, who will, I fear, become permanently epileptic. She was at home, in the same room with her parents, when a quarrel arose between them, and her father struck her mother; the child in terror ran into the street, and was picked up in a fit. After this had passed off she continued well for five days; but another fit then came on while she was at the Sunday school, and she has since had several. They have, indeed, returned almost every other day, and on some days two or three of these seizures, which present all the characters of epilepsy, have occurred. It is now fourteen days since the child experienced the first attack; she is cheerful, her tongue is clean, and her bowels are regular; and the only signs of indisposition about her are, that her pulse is rather feeble, and her appetite less good than usual.

The sight of another person in a paroxysm of epilepsy has been mentioned by many writers as peculiarly likely to give rise to its occurrence. Some time since, I had the painful task of watching the gradual blunting of all the mental powers in a fine boy, between 13 and 14 years old, who had been epileptic since his fifth year. Down to that time he had had no cerebral affection; but then, while weak from a recent attack of remittent fever, he saw his elder brother fall down in a fit of convulsions. This so frightened the child that he was immediately seized with violent convulsions, which lasted for twelve hours. Consciousness was restored only after very copious depletion and other active remedies, but he remained an epileptic for life, and when I saw himwas fast sinking into a state of idiocy.

Hereditary tendency to epilepsy seems to be a very frequent cause of its occurrence in life; but besides this there seem to be few so powerful as the practice of masturbation, to which, unhappily, children sometimes become addicted long before puberty.

Fits may occur in children, and return at intervals, even for several weeks, owing to the irritation of ascarides in the intestines. In such cases, however, you would generally have good evidence of the presence of the entozoa, and you would find the fits permanently subside on obtaining their complete expulsion.

I do not know that there are any points which call for your special attention in the treatment of epilepsy during childhood. You must look on the frequent recurrence of convulsions in early life as of the greatest moment, and must not allow yourselves to be seduced into inertness in their treatment, by the hope, which you will generally find a very mistaken one, that they will cease with the changes in the system that puberty brings with it.

There is a form of partial convulsion, in which, while the consciousness is unimpaired, and the muscles to a certain extent obey the will, they do not completely so, but some of them are in a state of almost constant involuntary movement. With this affection, *Chorea*, or *St. Vitus's dance*, as it is called, you are doubtless acquainted. Though more frequent before puberty than afterwards, it is by no means of common occurrence; but it certainly is not so rare as, if I judged merely from my own experience at the Children's Infirmary, where I do not meet with it in above 1 out of 1000 cases, I might conclude it to be. Sydenham, and other writers of his day, supposed that it was almost peculiar to the period shortly preceding puberty, and the circumstance that it attacks girls almost thrice as often as it does boys, seems to favour the supposition that it depends on some interruption of the great processes which ought at that time to take place in the organism. And it unquestionably does so in many instances, though by no means so constantly as was once supposed; for, on a comparison of a large number of cases, we find that it occurs nearly as frequently between the ages of six and ten years, as between the latter date and the period of puberty. The predominance of females over males, among those who are attacked by it, though especially marked in chorea, is observed in the case of many of the non-inflammatory affections of the nervous system in childhood as well as in adult life.

When chorea does not come on in connection with that derangement of the general health which often precedes puberty, a sudden fright seems to be one of its most frequent exciting causes. At other times it appears to be connected with a state of intestinal disorder, or with some irregularity in the progress of the second dentition; while occasionally we cannot detect any signs of disease to which the involuntary muscular movements may be attributed. In some few instances of organic disease of the brain or spinal cord, involuntary movements have been noticed like those of chorea; and you are doubtless aware of the connection that has now and then been observed between chorea and pericarditis.

The study of all points connected with this disease would bring before us many questions of physiological and pathological interest, but at the same time would lead us away from the special object of these lectures, which is, the investigation of diseases that are either peculiar to childhood, or which undergo important modifications when they occur during early life.

For this reason it is that I have noticed this affection so briefly, and that I shall be equally short in speaking of its treatment. In the great majority of cases purgatives are indicated not only at the commencement, but throughout the course of the disease, the bowels having a great tendency to become constipated, even though the functions of the digestive organs be not otherwise disordered. At the outset it is often necessary to administer

the more active purgatives, such as scammony, but you will, I think, find that the due action of the bowels is better secured by some of the warmer aperients, such as aloes, which, though so bitter, is generally readily taken by children, since, owing to its small bulk, it can be very well given in a little coarse sugar or treacle. Tonics must generally go hand in hand with aperients, and by common consent the ferruginous preparations are regarded as of peculiar value in this affection. Though much has been said about the virtues of the carbonate of iron, I do not apprehend that any one preparation has a decided superiority over the others, but having continued one for a time it will usually be desirable to substitute for it another form of the remedy. The cold shower bath is a tonic often of remarkable service in this disease. Its use, however, must be begun with care; the child must not be frightened by being subjected all at once to too copious or too cold an affusion, but if you begin with but a small quantity of water, and that tepid, you will generally be able in the course of a few days to employ the bath in such a manner as shall be really efficacious.

Of course, while you are pursuing this tonic plan of treatment, the general management of the child must be in harmony with it. Residence in the country, sea-air and sea-bathing, a well-regulated but nutritious diet, from which even wine is not always to be excluded, will, when combined with the avoidance of over-excitement in any form, often do as much as medicine, or even more, for the restoration of your patient.

In the great majority of cases of chorea you may assure the friends of your patient that the disease will ultimately subside, though it may last for several weeks. You cannot, however, speak with the same confidence with reference to a kind of *partial chorea* that you will occasionally meet with, and in which some muscles only are affected.

A few years ago, I saw a young lady, nine years old, whose health had never been robust, and who had often suffered from headache and gastric disorder. When seven years of age, she began, without any special cause, to have frequent twitchings of the muscles of the face; and almost ever since, some muscles, either of the face, neck, mouth, or extremities, had been similarly affected, though it had scarcely ever happened that two sets of muscles were thus disturbed at the same time. She had been under the care of several practitioners, and by some had been leeched and mercurialised with manifest disadvantage. Some benefit had been derived from large doses of carbonate of iron, and, when in the country during the summer before I saw her, the involuntary movements almost entirely ceased. She had not long returned home, however, when a slight twitching began about the muscles of the lower jaw; but this ceased in a few weeks, and, instead of it, there was now a convulsive twitching of the head towards one or other shoulder. A month afterwards she began to have occasional contractions of the muscles of the right hand, so that the pen would drop from her hand while writing, and the fingers would be gathered up into the hand. On the last time

that I saw her, the contraction of the fingers had ceased to occur; the spasmodic movement of the neck was much less frequent, and was slighter, but there were slight movements of the back. This child's bowels had been disordered and constipated, and her general condition was weakly. I regulated the bowels, gave the ferro-citrate of quinine, and afterwards other preparations of iron, and, when the spring came on, sent her into the country, where, as I afterwards heard, she became quite well.

The danger in these cases, and one which you cannot even with the most judicious management always guard against, is, lest some one or two muscles should become permanently affected by this spasmodic movement—an occurrence which, though not otherwise of importance, is very distressing if that patient be a female.

Disturbance of the nervous system shews itself in children as well by loss of the motor power as by the occurrence of involuntary movements; and such an accident as the palsy of a limb naturally occasions parents the greatest anxiety. In the adult, a paralytic seizure is generally the result of very serious disease either in the brain or spinal cord, and the sign of the commencement of a series of morbid processes which issue sooner or later in the destruction of the patient's life. Non-professional persons are aware of this fact, and suppose that the same rule holds good in the case of the child as in that of the adult; but you may in most instances quiet their fears with the assurance that paralysis in infancy and childhood seldom bespeaks any peril to life, though the affection is often very slow in disappearing, and sometimes is quite incurable.

Paralysis in childhood occasionally dates from so early a period that there seems every reason for believing it to be the result of some original defect of conformation. In such cases the power over both extremities on one side is greatly impaired, and the limbs on that side are much smaller and less well-nourished, and sometimes the defective growth and want of power are evident on the whole of the same side of the face and body. Some years ago, I saw a girl, 18 years old, in whom not only were the left extremities much shorter and smaller than the right, but the left half of the face and body was so likewise. The parents of the girl stated that this inequality in size of the two halves of the body had existed from earliest infancy, and that the defective power over her limbs had not succeeded to a fit, or to any other indication of acute cerebral disease. The left side was weak, and motion imperfect, but sensation seemed to be unimpaired. The patient in this case was rather deficient in intellectual endowments. In another instance the body was well formed, but the patient, a girl of 8 years of age, had had from her earliest infancy but very imperfect use of her right side. She limped with her right leg as she walked, always treading on her toes, with the heel raised considerably above the ground, and turning the foot inwards at every step. She had but very incomplete power over her right arm; the fingers of that hand were constantly flexed

and drawn into the palm ; and though by a great effort she could extend them, yet the moment her attention was withdrawn, they returned to their former flexed position. Sensation was as perfect in the right limbs as in the left, but their wasted condition and smaller size, as compared with the left extremities, shewed that their nutrition had been but very imperfectly carried on.

It is almost needless to observe, that in cases such as these there is no room for treatment other than the employment of such mechanical means as may be calculated to relieve inconvenience or to diminish deformity.

Real congenital paralysis, however, is a much less frequent accident than the occurrence of partial or complete loss of power over certain limbs or muscles at a subsequent period. In many instances its commencement can be traced to some attack, though often a very brief one, of cerebral disturbance, which showed itself perhaps by nothing more than a single convulsive seizure, or by an unusual heaviness of the head that lasted for a day or two, and then subsided of its own accord. In the majority of cases, indeed, the cerebral disturbance that precedes infantile paralysis is neither severe nor long-continued; and only two instances have come under my notice in which there seemed to be reason for supposing that it was associated with abiding mischief in the brain. It is therefore of importance to examine an infant carefully, even after a very mild convulsive seizure, in order to make sure that it moves its limbs as freely as before, or that, if its power over them be impaired, appropriate treatment may be at once adopted.

Paralysis sometimes comes on independently of any evident cerebral disturbance, seeming to be induced by the irritation of dentition, or supervening on the long continuance of a constipated state of the bowels, or appearing in connection with all the indications of general debility, or succeeding to a short feverish seizure which came on suddenly when the child was in bed at night, and left it with one limb palsied in the morning. The local action of cold sometimes produces paralysis. I have met with one or two instances in which, after sitting for some time on a stone step, a child has lost power over one leg ; and paralysis of the portio dura is doubtless in some cases produced by cold air, though I do not at this moment recal an instance of this having been the case in children.

The duration of infantile paralysis, under whatever circumstances it may have come on, is extremely variable. In some instances it disappears during the employment of some simple remedy directed against the symptoms of constitutional disorder with which it was accompanied, and the same medicine suffices at once to remove the child's indisposition, and to cure its paralysis. In other cases, even though all signs of disordered health may pass away with the same rapidity, the child may continue for weeks or months with the power over one side of its body, or one half of its face, or one of its limbs, greatly impaired, or this condition may persist through the remainder of its life.

Cases might be related in illustration of all these varieties in the form of infantile paralysis, in its onset and its duration; but time will not allow me to do more than refer you to this table, which embodies the most important points in the history of twenty cases of paralysis in infants or children.—[See pp. 138-9.]

If we leave out of the question the two cases in which the paralysis seemed to be congenital, we shall find that, in thirteen out of eighteen instances, it occurred between eight months and three years of age,—or, in other words, during that time when the process of dentition is going on most actively. In many of these cases, indeed, it was not preceded by any of the local signs of difficult dentition; but still it is quite apparent that the changes that are going on in the constitution during that important period of development powerfully predispose to the affection. There were but two instances in which there seemed to be any reason for regarding the paralysis as connected with permanent disease of the brain; and in eight out of the eighteen cases no indication of cerebral disturbance occurred before the paralysis, or came on afterwards.

In the two cases in which the disorder was congenital, both extremities of one side were palsied, and in one of them the power over the same side of the face was likewise impaired. In seven of the other eighteen cases the leg only was affected, and in two of these the power over both legs was lost; in five both the leg and arm were palsied, while in six instances facial paralysis existed. In four of these six cases the paralysis of the portio dura was not associated with impaired power over any of the limbs; once it was combined with palsy of the leg, and once with a general impairment of the power of walking.

One point which it behoves us to bear in mind in connection with these cases is, that though cerebral symptoms, or any other form of disturbance of the general health that may have preceded the paralysis, generally subside in a short time, there is still very great danger of the paralysis continuing in such a degree as to cause much disfigurement, or to interfere greatly with the usefulness of the limb. In only six of the eighteen cases did a cure of the palsy take place: in two of these cases the portio dura alone was affected; in two others the paralysis of both leg and arm was incomplete, and was associated with a state of general debility; and in one the loss of power over one leg had come on after the child had been sitting for some hours on a stone door-step. In four of these cases treatment was commenced within two or three days after the occurrence of the paralysis, and continued uninterruptedly until the patient's recovery. In one the treatment was begun after the lapse of nearly three weeks; and in another, though begun immediately, it was discontinued for some weeks. In four instances partial improvement took place, and there seems reason for anticipating that in one (No. 20) this improvement will go on to complete recovery. In Nos. 7 and 17 the improvement was but slight; in both these cases, however, there was more serious cerebral disease than in any others. The

No.	Sex.	Age at Time of Attack.	Previous Symptoms.	Part Paralysed.	Period at which Treatment was begun.	Result.
1	F.	Congenital	.....	Right leg and arm	.....	At 8 years old, limbs on that side wasted and shortened; power very imperfect.
2	F.	Congenital	.....	Whole of left side	.....	At 18 years old, left limbs wasted and shortened, and left half of face wasted; power very imperfect; intellect weak.
3	F.	9 months .	Convulsions and general illness at 5 months.	Left leg	Illness at 5th month not treated; galvanism, and other means, tried for a short time when 1 year old.	At 7½ years old, left leg wasted and shortened; treads on toes; left heel 1½ inches from ground; power imperfect.
4	M.	8 months .	None, except that gums were swollen and tender; no teeth cut.	Portio dura of right side	Next day	Relief after lancing gums and cutting two incisors; cured in 6 weeks.
5	F.	1 year 9 months.	Screaming in night, followed by pain in limbs, said to be rheumatic; paralysis perceived at end of 3 weeks.	Left leg; sensation exalted.	Alleged rheumatism treated at once; paralysis after it had been observed 9 weeks.	At 7¼ years, leg wasted and shortened, and power imperfect.
6	M.	1 year 6 months.	None, came on gradually when he had cut six teeth.	Right leg	Not treated at all	At 3 years, leg wasted and shortened, but power over it was on the increase.
7	M.	1 year	Indifferent health for 6 months, associated with laryngismus and occasional convulsions.	Portio dura of right side	Within 1 month.....	Slight improvement. Death from pneumonia at 16 months; arachnoid at base of brain opaque, but no sign of recent cerebral disease.
8	M.	1 year 4 months.	Febrile attack in night—paralysis in morning; bowels constipated.	Right leg	On 3d day	Much improved. Died of pneumonia at 1 year and 6 months.
9	M.	1 year 2 months.	Weakly after measles; fits followed by paralysis; intestinal disorder.	Left arm, leg, and eyelid	Next day	Arm and eyelid recovered before leg, but quite well at 15 months old.
10	F.	2 years....	One fit, not connected with teething	Portio dura of right side and right leg.	Not treated at all	Power over both face and leg very small at 13 years old, and leg shortened and wasted.
11	F.	2 years 1 month.	None; well at night, arose paralysed in the morning.	Right leg; sensation also slightly impaired.	Not treated at all	At 2 years 9 months, wasting but no shortening of limb; power imperfect, but increasing.

12	M.	2 years 8 months.	Came on gradually; no previous symptoms.	Left arm and leg; latter only partial.	Not treated at all	At 3½ years, power complete over leg; humerus hangs out of socket, so that left arm is ¾ of an inch longer than right; power over fingers, none over hand or arm.
13	M.	3 years 6 months.	Two fits on successive days; paralysis after second.	Portio dura of right side	Next day	Purgation, and leeching behind ear, followed by perfect cure in 10 days.
14	F.	3 years 8 months.	Succeeded to remittent fever	Right arm and leg	Treatment begun at once, but continued only for a week.	At 3 years 11 months, had gained power over arm, but none over leg.
15	F.	3 years 7 months.	General health indifferent; heaviness of head for a few days.	Right arm and leg	Treatment begun at once; discontinued in a few weeks.	At 4 years, power over leg, little over arm, and fingers contracted; improved under use of tonics; quite well at 4¼ years.
16	M.	7 years 6 months.	Came on gradually; no previous symptoms.	Partial of left arm and leg.	Within 3 weeks	Improved under use of steel; quite well at 7 years 8 months.
17	M.	8 years. ...	Ptosis of left eyelid, and double vision occasionally for 3 weeks; then giddiness for a week; then paralysis, with severe aching of right ear.	Complete paralysis of portio dura of right side; with general tottering gait.	Within 1 month.....	Head symptoms relieved by local depletion; leeches behind ear had no influence on paralysis of face. At 8¼ years, health good, but face no better, although he had been frequently electrified.
18	M.	11 months	Poorly one evening while cutting first molars; paralysis observed next day.	Nearly complete of left portio dura.	Immediate adoption of severe counter-irritation to head; soon discontinued: no other treatment adopted.	At 15 months, paralysis continued the same.
19	M	1 year	General health indifferent, but walked at 10 months; had cut all incisors, and four molars; as well as usual over-night; paralysed in the morning.	Complete loss of power over both legs; slight power over right foot; sensation somewhat impaired.	Not treated for 6 months ...	At 18 months, condition unchanged; electricity, blisters to spine; nux-vomica internally; no amendment at 20 months.
20	M.	1 year 7 months.	No symptoms preceded, but signs of suffering in head attended it for first 8 days.	Absolute loss of power over left leg; slight power over right.	Within 1 week	Bowels regulated, tonics and liniments to spine, improvement in right leg within three weeks; electricity without benefit, blisters to spine, and nux-vomica internally. At 2 years 4 months, power over right leg perfect, considerable over left thigh; slight, but increasing, over left leg.

treatment of No. 14 was continued only for a week; and though the child gradually recovered power over the arm, yet the leg remained quite useless. In the other three cases treatment was begun within a few days, and was continued without interruption. In the eight cases in which no treatment was adopted, or not till after the lapse of a period of six months, no improvement took place in the patient's condition. It would be difficult to find an argument to enforce the necessity for the early adoption of appropriate treatment more cogent than is furnished by these facts. The evil results of neglecting it, too, are in some respects more serious in the child than in the adult, since the disfigurement that is produced by paralysis is greater in childhood than in adult age. The muscles of a paralysed limb are almost always observed to waste; but in childhood the growth of the part becomes arrested, and in the course of a year or two it will be half or three-quarters of an inch shorter than the corresponding member on the opposite side. On two occasions I have seen the arm completely dislocated, owing to its long-standing paralysis, the ligaments about the shoulder-joint having become so relaxed that the head of the humerus hung quite out of the glenoid cavity; and, on measuring the distance from the acromion to the tip of the finger in one of these cases, I found that an apparent elongation of the paralysed limb, to the extent of three-quarters of an inch, had thus been produced.

The *diagnosis* of these cases is not likely to be attended with any difficulty; for the history of the case, and the painlessness of the affected limb, will at once shew that the loss of power over it is not the result of any injury. Now and then, however, sensation in the affected limb appears to be exalted,—a circumstance which, when the leg is the seat of the affection, and the paralysis is incomplete, may lead to the apprehension of hip-joint disease. In such a case the child bears all its weight on the healthy limb, turns the foot of the affected side inwards when walking, and stands with the toes of that foot resting on the dorsum of the foot of the healthy side. Still it will usually be found that the exaggerated sensibility of the paralysed limb varies greatly at different times, while that extreme increase of suffering produced in cases of hip-joint disease, on striking the head of the femur against the acetabulum by a blow upon the heel, and the fixed pain in the knee of the affected side, so characteristic of disease of the hip-joint, are absent; and these points of difference will usually enable you to distinguish between the two affections.

Another important question is, how we may distinguish between forms of paralysis, such as I am here speaking of, and those more serious cases in which the palsy is a sign of organic disease in the brain. In many cases the history of the patient will of itself be sufficient to guard you from error; for if paralysis occur suddenly, affecting both limbs on one side, and be neither preceded by nor attended with any cerebral symptom, it is almost certain that it does not depend on serious organic disease of the brain. Our decision will be more difficult if the loss of power have been

gradual, and especially if only one limb be affected; but if the brain be diseased, you will rarely find a mere weakening of the motor power; for connected with it there will usually be occasional involuntary tremor or nervous twitching of the limb, or contraction of the fingers or toes. When the paralysis succeeds to convulsions, the case will be still more obscure. In most cases of simple paralysis, however, the palsy comes on after a single fit; while, if it depend on some local mischief in the brain, it is generally preceded by several convulsive seizures, during each of which the limb that afterwards becomes palsied is in a state of peculiar movement, or is sometimes the only part where convulsive movements occur.

Each one of these cases must be *treated* according to the peculiar features that it may present. Purgatives and tonics are the remedies which I have most frequently employed; for the bowels are usually constipated, and the child often debilitated. The gentler aperients are more suitable in these cases than drastic purgatives, and you will gain more good from the preparations of iron than from other tonics. I have sometimes used stimulating embrocations to the spine and to the paralysed limb, though rather for the sake of satisfying the relations, than with the hope of doing any very great good to the patient. I have not yet had the opportunity of employing electricity sufficiently often, to be warranted in speaking very decidedly about it. Its effects, indeed, appear to be rather uncertain; for while in a few instances very marked improvement has followed its use, in other cases, for which it seemed equally suitable, its employment has occasioned much pain, without being followed by any increase of power over the limbs. In Case XX. the application of blisters to the spine was succeeded by marked improvement, though, as I was giving at the same time the spirituous extract of the nux vomica, I do not know how much of the improvement to attribute to the external, and how much to the internal remedy.

If the portio dura be paralysed, you must adopt the same general treatment, but must bear in mind the possibility of the nerve having undergone pressure from some enlarged gland; and if you find reason to believe this to be the case, you may apply a leech in the situation where the nerve passes out of the skull,—a proceeding which I once adopted with advantage.

Lastly, I will mention that infants are sometimes born with *facial hemiplegia*, as the result of injury to the nerve from application of the midwifery forceps, or, as has in one or two cases been observed, from injury received during the passage of the head through the pelvis without any instruments having been employed. Such occurrences are rare, but it is well that you should be aware of the possibility of their being met with, independent of any injury to the brain. The paralysis in these cases generally disappears in the course of a few days or weeks*.

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* Kennedy's Observations on Apoplexy, Paralysis, &c. of New-born Infants,—in Dublin Jour. of Med. Science, 1836; and Landouzy sur l'Hémiplégie Faciale chez les enfans nouveaunés. 8vo. Paris, 1839.

LECTURE XIII.

Diseases of the Respiratory Organs, their frequency and fatality.—Peculiarities of the respiratory function in early life—causes of the rapid pulse and quick breathing in infancy—feebleness of inspiratory power, and consequent tendency to collapse of the lung.

Imperfect expansion of the lungs—sometimes congenital.—Appearance of the lung—influence of inflation upon it—its causes and symptoms.—Case of its fatal termination—case of recovery from it.—Diagnosis from congenital phthisis.—Treatment.

We now come to the examination of the diseases of those two grand systems of the organism by which the blood is kept in motion, the requisite changes in it are effected, and the animal heat is maintained. Your attention was lately called to the fatality of the diseases of the nervous system in early life as one grand reason for their attentive study; but this argument is still more cogent if applied to the maladies of the organs of respiration and circulation, since they destroy a far greater number of children, and occasion a mortality almost equal to that produced by diseases of the nervous and digestive systems together. It appears, indeed, from our tables of mortality, that a third of all deaths under five years of age are due to the *diseases of the respiratory organs;* while not above one child in four dies under that age from diseases of the nervous system, and not above one in six from those of the digestive system.*

While the study of these diseases is of paramount importance, we meet with inducements to their investigation which in a great measure failed us in the case of diseases of the nervous system. Peculiar difficulties then

* Table showing the proportion per cent. of deaths from different causes in childhood, in the metropolis, as compared with subsequent life. [Deduced from the 5th Report of the Registrar General.]

	Under 1 year.	Between 1 and 3.	Between 3 and 5.	Under 5.	5 to 10.	10 to 15.	At all Ages above 15.
From Diseases of the Nervous System	32·5	19·5	18·3	25·4	15·8	9·7	9·1
Ditto, ditto, Respiratory System	28·2	41·	37·2	34·2	30·9	34·1	31·5
Ditto, ditto, Digestive System...	17·5	13.5	5·2	14·2	6·5	8·3	5·2

attended us, and the truth was veiled in so much obscurity that we often saw it but indistinctly—sometimes, perhaps, altogether failed to perceive it. The same means, however, as have enabled us to bring medical knowledge, with reference to the diseases of the chest in the adult, almost to the state of one of the exact sciences, still stand us in stead here; and care and patience will enable us to discover the condition of the lungs with nearly as much certainty in an infant as in a grown person.

Nor is the greater facility of their diagnosis the only circumstance that lightens their study, but a feeling of hopefulness attends their investigation which we often missed in the subjects that have lately engaged our attention. They, indeed, furnished us with interesting pathological studies: we stood around the sick bed, and watched nature's struggles with disease that was irremediable, and we traced its effects afterwards as we examined the dead body; but the diagnosis of the affection was in many instances but the sentence of the patient's death; and we often felt that, as practical physicians, there was but little for us to do. We shall, it is true, meet with some such affections in our study of diseases of the chest, but happily they are few in comparison with those that, in addition to much that would interest the mere pathologist, present still more that will give ample scope for all the skill of the practical physician.

At first sight, it may seem to you that there can be little in the organs of respiration and circulation in early life different from their condition in riper years. And it is true that the part they play is as important at the first hour of existence as in the most advanced old age, and that their structure and function undergo no such changes as we have noticed taking place in the brain during infancy and childhood; but, nevertheless, they present some *important peculiarities in the young*, with which you must be acquainted before you can hope to treat their diseases with success.

The condition of infancy is one of unceasing development; all the organs of vegetative life have, so to speak, double work to do, not merely to supply the daily waste, and to remove effete and useless matter, but to build up that wondrous edifice, the human body. It is probably in great measure on this account that the blood in infancy and childhood runs its course more rapidly, and that the lungs vivify it more frequently than in adult age. We shall probably not be far wrong if we estimate the average frequency of the pulse in the grown person, when making no exertion, at 75, and of the respirations at 12 in the minute.* In infants not above a week old, the average frequency of the respiration is 39, and of the pulse 102; but the former may rise to 84, and the latter to 140, as the result of some transient excitement or disturbance, and wholly independent of

* This result is afforded by the numerous and careful observations of Professor Vierordt: see his article Respiration, in Wagner's Handwörterbuch der Physiologie, Part 12, 8vo. Brunswick, 1845, p. 874.

disease. Until the sixth year the average frequency of the pulse continues at 102 ; and though that of the respiration diminishes, yet it does not fall below 30. The variations between their maximum and minimum frequency are now, however, circumscribed within limits which grow narrower as the child approaches manhood.*

Although the rapid pulse and quick breathing of early life are probably in great measure due to the activity of the vital processes, yet the wide variations in their frequency induced by very slight accidents, lead to the suspicion that this is not their only cause, but that both phenomena are to a certain extent indications of the infant's weakness. This suspicion is still further strengthened by our knowledge of the fact, that the quantity of carbonic acid exhaled at each expiration diminishes in proportion as the expirations are more frequent† ; so that it is plain that the rapidity of the respiratory movements is not of itself a measure of the activity of the respiratory process. But still stronger proof of this fact may be adduced. Animal heat is generated by respiration. If, therefore, the activity of the vital processes were in proportion to the rapidity of the breathing, the new-born infant should be warmer than the child, and the child than the youth. But this is not so, for M. Roger has found, as the result of many most elaborate investigations, that the temperature of the child at six years of age exceeds that of the infant of a week old by more than half a degree of Fahrenheit, although the respiration is nearly a fourth less frequent.

There seems, then, good reason for believing that the rapid breathing of the child is to some extent the result of its more delicate frame, rendering it unable, at a single effort, to inspire as deeply as the more robust adult, so that it is compelled, by the frequent repetition of its efforts, to make up for their comparative feebleness. Quite in keeping with this is the small power of resisting cold, or of maintaining an independent temperature, which is a distinguishing peculiarity of early life. If the young of any warm-blooded animal be exposed to a low temperature, its respiration at first increases in frequency, but if not soon restored to a warmer atmosphere, the nervous energy that should set the respiratory apparatus in motion becomes still more depressed ; air enters the lungs imperfectly, the inspirations grow less frequent, and the warmth of the body sinks rapidly down to that of the surrounding medium. Nor is this all ; but it often happens, if a young infant has been thus exposed to the cold, and especially if this has been done before the respiration had become properly established, that no subsequent removal to a warmer atmosphere will suffice to raise the temperature, or to set in proper activity the respiratory process.

But not merely is the respiratory apparatus more delicate in the child than in the adult, for so are all the organs in early life, but it is feebler, as

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* The chief authority for the statements in the text is the valuable essay of M. Roger, De la Température chez les Enfants, 8vo. Paris, 1844.

† See Vierordt's Experiments on this subject, loc. cit. p. 887.

compared with the work it has to do, with the difficulties it has to overcome: and this constitutes a most important peculiarity in the physiology of respiration in early life, and greatly modifies its pathology.

The interesting researches of Mr. Hutchinson* have shown us that in the case of the adult, "the resistance to the *ordinary breathing* force, *independently* of the elastic power of the lungs, is equal to lifting more than 100 lbs. at every ordinary inspiration." The elasticity of the walls of the chest which present this resistance, is, in proportion to the size of the thorax, as great in the infant as in the adult; but how much smaller is the muscular power by which this resistance is to be overcome! You see proof of it in the ordinary mode of respiration of a young infant, which presents something almost of difficulty. The breathing is quick and short, then after a few seconds there succeeds a pause, and then the hurried respiratory movements begin again, while the slightest disturbance, or the most trivial excitement, will at any time raise the frequency of the inspirations by ten or twelve in the minute. This respiration, too, is almost entirely abdominal; the chest moves but little, and its walls are but little expanded; and the ear detects in the respiratory murmur little or nothing of that clear loud sound which is so characteristic of a subsequent period of childhood, and with which you all are familiar by the name of puerile respiration. This peculiarity of the breathing in early infancy, to which M. Trousseau was, I believe, the first to call attention, is another token of the feebleness of the inspiratory power. As the child grows older, and its strength increases, and its muscular system becomes more developed, the chest expands with each inspiration, and the faint respiratory murmur is succeeded by the loud puerile breathing which is heard as the air enters into the smaller air-cells.

The resistance of the walls of the chest, however, is not the only obstacle to be overcome at each inspiratory effort, but the lungs themselves are furnished with an elastic fibrous investment, processes of which dip down into their substance, and form the parietes of the different lobules. If you blow air forcibly into the lungs after their removal from the body, the resiliency of their tissue will expel a large proportion of the air the moment your effort at inflation is suspended. This elasticity of the lungs, then, is constantly tending to empty them of air, and constantly resisting the introduction of more. The want of breath, however, puts the respiratory muscles into play; the man takes a deep inspiration, and by this effort he unconsciously overcomes the resistance of the chest and the elasticity of the lungs. The new-born infant feels the same want, and makes the same effort, but its muscular power is small, and its inspirations are often so feeble as to draw the air in some parts only into the larger bronchi, while many of the smaller air-tubes remain undilated, and much

* On the Respiratory Functions, in vol. xxix. of the Medico-Chirurgical Transactions.

of the lung continues in its fœtal state. The blood being thus but imperfectly aerated, all the processes of nutrition go on imperfectly; the vital powers languish, the inspiratory efforts become more and more feeble, the temperature sinks, and the infant dies. But not only may this state persist as the result of imperfect respiration at birth, but cold, or the want of sufficient food, or any other cause that impairs the already feeble muscular power, favours its supervention. As the power of the inspiratory muscles is impaired, the air no longer penetrates into the lungs so far as it once did, while the residual air is gradually driven out of the pulmonary cells by the elasticity of the lung, and portions once permeable to air become, in the course of time, altogether useless. Or, an increase of the ordinary resistance to the entrance of the air will have the same effect; and if the pouring out of mucus into the bronchial tubes should much obstruct them, large portions of lung will by degrees become emptied and collapsed, the dyspnœa will grow urgent, and the child will die with symptoms such as, in the adult, result only from most serious structural disease.

The possibility of a large portion of the respiratory apparatus remaining useless from birth, or becoming so afterwards without any serious disease of these organs, is a most important element in the pathology of infancy and early childhood. It warns us to be on our guard during the course of various maladies, against a danger which, in more advanced life, we have not to apprehend; while, at the same time, it teaches us that the dyspnœa, the hurried breathing, and many other symptoms which, in the adult, would call for most active treatment, may result, in infancy, from simple weakness, and require stimulating rather than depletory measures.

Before we proceed to study the diseases of the respiratory organs in infancy and childhood, we must make ourselves thoroughly acquainted with this state of *imperfect expansion of the lungs*. It presents itself to us under two different circumstances.

1st. As a congenital condition: a more or less considerable portion of the lung never having become penetrated by air, but having remained in its fœtal state.

2d. As an acquired condition: portions of the lung which once were freely traversed by air ceasing to admit it; and this not from alteration of structure, but from a simple collapse of the pulmonary tissue.

It is now sixteen years since Dr. Edward Jörg gave the first clear description of the former of these two conditions, to which he applied the rather cramp name of *atelektasis*, from *ατελης*, imperfect, and *εκτασις*, expansion.* We will first study this, which is the simpler form of the affection, and the examination of which will give us a clue to the understanding of the second form.

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* In his dissertation De pulmonum vitio organico, &c. Leips. 1832; and afterwards more fully in his work Die Fötuslunge im gebornen Kinde, 8vo. Grimma, 1835.

If you examine the body of a new-born infant, or of one that has survived its birth but a few days, you will sometimes find patches of the lung of a dark red colour, and depressed below the surrounding tissue, thus giving to the surface of the organ an uneven appearance. These darker portions, which exactly resemble fœtal lung, are solid to the touch, do not crepitate at all under the finger, and sink immediately if thrown into water, while no minute air-bubbles are intermingled with the small quantity of reddish serum which exudes on pressure from their divided substance. They are not friable, nor easily torn, their cut surface is perfectly smooth, closely resembling a piece of muscle, and, if examined under a lens, the pale collapsed air-tubes are seen intersecting their substance, and scarcely distinguishable from the small vessels, which are almost devoid of blood.

If air be blown into a lung some lobules of which have this appearance, it will permeate the collapsed air-tubes; the pulmonary vesicles will by degrees become distended, and the solid lobules will rise to a level with the rest of the lung, will acquire the same colour and consistence, and, like other parts of the organ, will float in water. A single inflation, however, is by no means sufficient to render this change permanent, but the moment the tube is withdrawn the air will escape, and the lobules recently distended will again collapse, and sink below the rest of the lung; and their colour, too, will become dark, though less so than before. Even if after you have distended the lung to the utmost, you then pass a ligature round the bronchi, and allow the lung to dry, there will generally be a difference very perceptible between the size of the air-vesicles which had been inflated by your efforts, and that of those which had been distended during life by the natural process of respiration.

The force required thus to distend the collapsed portions of the lung is very variable: sometimes it requires all the force that you can possibly exert, and continued for some minutes. If the child have survived for several weeks, the air will penetrate only very imperfectly into the collapsed lobules, while in some parts the resistance will be greater than it can overcome, and the most forcible inflation will be followed by no effect. The situations in which this condition is most frequently met with, are the languette and lower edge of the upper lobes, the middle lobe of the right lung, and the posterior part and lower edge of the lower lobes; and inflation restores these parts to a natural condition much less easily than it does any patches of the same kind in other situations. Whether the impermeability of some collapsed lobules is owing to adhesions having taken place between the opposite surfaces of the minuter bronchi, as has been suggested, I cannot pretend to say, but the supposition is plausible.

It is usual to find, in connection with this state of the parenchyma of the lungs, that the pulmonary vessels contain less blood than usual, that the foramen ovale is unusually open, and the ductus arteriosus but very imperfectly closed. If the child have survived its birth but a short time,

the brain is frequently found congested; but otherwise there is often nothing observable more than anæmia of all the organs, together with a general state of atrophy. Sometimes bronchitis attacks a lung thus affected, and, besides the presence of mucus in the air-passages, there is then very often a state of congestion of the lungs, which renders the contrast between the collapsed and the healthy lobules less striking.

The *causes* of this condition are not clearly made out. Dr. Jörg has attributed great importance to precipitate labour as a frequent cause of its occurrence, and has suggested a somewhat fanciful theory to explain its mode of production. He conceives that one grand use of the uterine contractions is gradually to enfeeble the circulation through the placenta, and thus to induce in the fœtus that *besoin de respirer* which shall excite the complete establishment of respiration immediately on its birth. If, however, by the very rapid course of labour, the child should be born while the fœtal circulation is still going on with unimpaired vigour, the want of air will not be experienced by the child, and its attempts to breathe will be feeble and imperfect. It is probably better, instead of indulging in speculations of this sort, to content ourselves with the simple statement that when, from any cause whatever, the establishment of respiration at all has been attended with difficulty, there is a very great probability that its establishment will never be complete, but that some lobules only will receive the air, while it will not penetrate into other parts of the lungs. The probability of this occurring, too, will be still greater if the children be weakly, or ill-nourished when born, or if they be exposed soon after birth to cold or other unfavourable hygienic influences, such as are calculated to interfere with the due performance of respiration.

Cases in which this condition of the lungs exists usually present the history of the child having been apparently still-born; and, though resuscitated after a time, yet still presenting the peculiarity of the cry never having been strong and loud like that of other children. Even after breathing has gone on for some time, such children usually appear feeble; and though they may have attained the full term of fœtal life, yet they can scarcely suck, although they often make the effort. An infant thus affected sleeps even more than new-born infants usually do; its voice is very feeble, and rather a whimper than a cry; and the chest is seen to be very little, if at all, dilated by the respiratory movements. The temperature falls, the skin becomes pale, and the lips grow livid, and slight twitching is often observed about the muscles of the face in the course of a few hours. The difficulty in sucking increases, the voice grows weaker and more whimpering, or even altogether inaudible, while respiration is attended with a slight râle, or an occasional cough; and the convulsive movements return more frequently, and are no longer confined to the face, but affect also the muscles of the extremities. Any sudden movement suffices to bring on these convulsive seizures; but even while perfectly still the

child's condition is not uniform, but it will suddenly become convulsed, and during this seizure the respiration will be extremely difficult, and death will seem momentarily impending. In a few minutes, however, all this disturbance ceases, and the extreme weakness of the child, its inability to suck, its feeble voice, and its frequent and imperfect inspirations, are the only abiding indications of the serious disorder from which it suffers. But the other *symptoms* return again and again, till at length, after the lapse of a few days, or a few weeks, the infant dies.

But I will relate a case which may serve to impress these characteristics on your memory. A little boy, three weeks old, was brought to me at the Children's Infirmary on March 13, 1846. He was puny, emaciated, with a cold surface and bloodless conjunctivæ. His face, which was wizened like that of an old man, was occasionally distorted by slight convulsive twitches; and these fits, as the mother termed them, were, according to her account, sometimes much more severe. The abdomen was tympanitic, and it alone was seen to move during respiration, there being hardly any lateral expansion of the chest. The ear applied to the chest heard but little air entering, and the cry was a stifled whimper, in which none of the inspiratory sound, the *reprise* of the French writers, was distinguishable. The child sucked with difficulty, and had wasted ever since its birth, though no diarrhœa existed, but the bowels on the contrary shewed a tendency to constipation.

The chest was rubbed twice a day with a stimulating liniment, and a mixture was given containing some ammonia and the compound tincture of bark. Under this treatment the child appeared to improve; it began to breathe less rapidly and in a less laboured manner, and its cry became louder. The parents, however, were miserably destitute, the mother in an ill state of health, so that her milk afforded but a very imperfect sustenance for the child. From the beginning of April he grew less well, and began to have occasional attacks of general convulsions, in one of which he died on April 26, 1846.

On examining the body large portions of both lungs presented the appearances which I have described as characteristic of their imperfect expansion, but inflation restored them to a crepitant state. Some patches, however, though they admitted air and assumed the same colour as the rest of the lung, yet could not by any effort be dilated so completely as to rise to a level with the surrounding tissue. The foramen ovale was open, the margin of the valve for fully half its circumference not being adherent, although the valve was sufficiently large for its closure. The ductus arteriosus also was quite permeable, although of considerably less calibre than during fœtal life.

This case affords a very good specimen of one way in which the affection leads on to a fatal termination, but sometimes, and probably in those instances in which the affected portion of lung is not so considerable, a

less formidable train of symptoms usher in the fatal event. Convulsive twitchings, such as I before mentioned, do not occur, nor are periodic exacerbations of the symptoms observed, but the child is merely feeble and its breath is short, and it has an occasional cough. It sucks, though with difficulty, but it loses flesh, the bowels become disordered, and medicine is unable to restrain the diarrhœa. The unchecked diarrhœa increases the emaciation and exhaustion of the child, which dies at length worn out and wasted to a skeleton.

Sometimes, too, we meet with cases in which the child eventually recovers, and it is then very interesting to watch the gradual diminution in the frequency and violence of the paroxysms of dyspnœa, while the respiration grows by degrees more equable, and the cry louder, the power of sucking increases, and the child at length attains to perfect health.

A little boy, four months old, was placed under my care by his mother, who informed me that the child had presented in some unnatural position during labour, so that manual interference was required to effect her delivery: and when born her infant appeared dead, and was recovered only after very great difficulty, and after the occurrence of convulsions; the convulsions had since returned almost every day, sometimes indeed they occurred several times in the same day, and always came on with greater frequency by day than by night. The attempt to suck often induced them, as did also any rapid movement about the room, or any sudden change of posture. During the fits the child did not struggle much, but he always turned extremely livid about the face and mouth. No fit ever lasted longer than five minutes, and during the intervals between them the child seemed pretty well, except that he often suffered from a suffocating cough.

He appeared tolerably well-grown and well-nourished, and the temperature of the surface was nearly natural. The respiration, however, was very hurried, and was almost entirely abdominal, the chest being hardly at all expanded. The cry, moreover, was feeble, and without *reprise*. There was a considerable want of resonance of both sides of the chest posteriorly, and deficient entrance of air into the back of both lungs. Both the dulness and the scanty admission of air were more obvious in the left than in the right infra-scapular region, and some mucous râle was heard in the former situation.

The child was placed in a hot bath, and an emetic was given it every night; the chest both in front and back was rubbed twice a day with a stimulating liniment, and the face was ordered to be sprinkled with cold water whenever any threatenings of the fits came on.

At the end of five days the child was better, and the cry louder, though without any distinct *reprise*. Small doses of the ferro-citrate of quinine were now combined with the other remedies, while the emetics were discontinued, as on some occasions they had appeared to excite the con-

vulsions. First the cry grew louder, then the appearance improved and the manner became more cheerful, then the cough was less troublesome and the breathing less habitually wheezing, and at the same time the chest began to expand more, and the marked dulness of its lower parts gradually diminished. At the end of five weeks the child was discharged with increased flesh and invigorated strength, and with no ailment more serious than a slight degree of wheezing respiration.

The history of this patient may serve to show us that even very serious symptoms should not lead us to despair of recovery, while it illustrates the importance of forming an accurate *diagnosis* between this affection and congenital phthisis, (the only malady with which it is likely to be confounded,) lest we either cherish unfounded expectations, or discourage hopes that might reasonably be entertained.

A little care will usually suffice to enable us to distinguish between these two affections, notwithstanding some general points of resemblance between them. The symptoms of the imperfect inflation of the lungs date from the infant's birth: but it scarcely ever happens that tuberculous disorganization of the lung is so extensive in the new-born child as to interfere with the establishment of the respiratory function. But not only do not the symptoms of phthisis appear so early, but they likewise seldom advance so rapidly as those of atelektasis. Phthisis, too, is not from the beginning attended with the same debility, or with difficulty in sucking, while it is associated with a febrile action which is quite wanting in atelektasis. The head symptoms which in so large a number of cases attend the imperfect inflation of the lungs, are absent in phthisis; while, lastly, auscultation would furnish some clue to the real nature of the case: in the one there would, in general, be simply a deficiency of air; in the other case, respiration, accompanied with râles, and often with bronchial breathing.

The *treatment* required by this affection need not detain us long. The importance of maintaining an equable temperature around every child in whom respiration is not duly performed, cannot be too much insisted on; and the power of generating heat being as you know much diminished, this temperature ought not to be below 70°, and in bad cases may be even 10° higher. Besides attending to preserve this warmth around the child, benefit often accrues from the employment of the hot bath once or twice every day, at a temperature of 100° Fahrenheit, to which mustard may be added to render it more stimulating to the surface. The child should not be allowed to remain longer than five minutes in the bath, and should be enveloped in hot flannels immediately afterwards to prevent its taking cold. The back and chest should be rubbed twice or oftener every day with a stimulating liniment, as camphor or soap liniment, which may be diluted with a little oil, if it be too irritating to the skin. If the child be very feeble, stimulants may be given, of which there are none better than the compound spirits of ammonia or ether; or the spiritus ammoniæ

succinatus ; the unpleasant pungency of which remedies is concealed by milk better than by any other menstruum. The daily employment of a gentle emetic of ipecacuanha has in some instances appeared to be of service, not merely by relieving the air-tubes of any mucus that may have accumulated there, but by inducing several deep inspirations, and thus aiding the complete establishment of respiration. As the child improves, the more directly stimulating medicines may be withdrawn, and tonics substituted for them, among which few are better than the extract of cinchona. Its bitter is not unpleasing, and when duly sweetened and mixed with a little milk few children refuse it. It has, too, the great advantage of not disordering the bowels ; a point of no small importance in any case in which diarrhœa is likely to occur. In some cases there is a sluggishness of the bowels, and a deficiency in the secretion of bile ; very minute doses of the Hydr. c. Cretâ will often remedy the latter, and the use of a soap suppository will frequently render the internal employment of any purgative needless. The child should be put to the breast unless it be very feeble, but in that case should not be allowed to exhaustits strength in fruitless attempts to suck. It will be better to draw the breast, and give the child its mother's milk by means of a spoon or from a bottle, which latter plan has this advantage, that while it costs the child but little effort to get its food, we avoid the risk of its forgetting how to suck, an inconvenience which attends the use of the spoon if continued for any length of time. Artificial feeding is not at all desirable in such cases, though sometimes, if the child be very weak, it may be necessary at first to give a few drops of brandy in its milk every three or four hours. This plan of treatment must be patiently persevered in, nor must the supervention of symptoms of an apparently acute character induce too widea deviation from it. The head symptoms in particular must be combated cautiously, lest by too great a solicitude to overcome them we destroy the patient rather than the disease.

LECTURE XIV.

Collapse of lung that has once been expanded—described as lobular pneumonia by various writers—its characters—symptoms and differences from true pneumonia.—Observations of Bailly and Legendre.—Is not to be regarded as a post-mortem occurrence.—Illustrative cases.—Instances of its occurrence in the adult.—Similar causes tend to produce it at all periods of life—hence very frequent in old age.

Induration of the cellular tissue—its characters—remarkable reduction of temperature that attends it—appearances after death—condition of deficient expansion, or of collapse of the lung, noticed by many observers, though misunderstood by most, is probable cause of the induration, or œdema of the surface.

The condition of the lungs which we were occupied in examining at the last lecture is of importance, even if regarded merely as a congenital state, the result of nature having failed in the attempt to establish respiration, and to fit the child thoroughly for the new mode of existence to which it is destined after birth. But its claims on our attention are still greater when we bear in mind the possibility of its occurrence in consequence of a variety of causes operating after birth, so that lungs once permeable to air may cease to admit it, and death at length occur from apnœa without any serious structural change having taken place in the organs of respiration.

Appearances supposed to be the result of pneumonia had long attracted the notice of writers on diseases of children, by the wide differences which they presented from those which inflammation of the lungs gives rise to in the adult. It had been observed that infants and children under five years of age often died after presenting some of the symptoms of inflammation of the lungs, such as cough and difficult breathing, together with more or less extensive dulness of the chest on percussion, and some or other of the auscultatory signs of solidification of the lung. In such cases these peculiar morbid appearances were especially well marked. But while they seemed to prove that these changes in the lung were the consequences of pneumonia, it happened not unfrequently that the fever and the pneumonic symptoms underwent a great abatement before any sign of approaching death appeared, or that children who had seemed to die worn out from various causes, and during whose lifetime no

indication of inflammation of the lungs had existed, presented the supposed anatomical evidences of pneumonia in a most remarkable degree. The frequency of occurrences of this kind led to the assumption that pneumonia was an extremely frequent concomitant of almost all the diseases of infancy and early childhood, that this pneumonia was very often latent, (that is to say, that it did not manifest its existence by those symptoms which usually attend it,) and lastly, that owing to causes which were differently stated by different observers, it gave rise to alterations in the lung very dissimilar from those which it occasioned in the adult.

One of the most remarkable peculiarities of this supposed infantile pneumonia led to its receiving the appellation of *lobular pneumonia*, as expressive of the fact that it did not attack a large tract of lung, or the whole of a lobe at one time, but that it affected isolated lobules, which might be seen of a dark colour, solid, often depressed below the surrounding parts, and sinking in water if detached from the healthy tissue in the midst of which they were situated. Sometimes the affection was strictly limited to a single lobule, the boundaries of which could be exactly traced; and though it oftener happened that a cluster of lobules was thus hard, and dark, and solid, still there was no gradual shading off from the darker to the lighter parts, so that it was evident that in whatever way the disease extended, at any rate it did not advance by mere continuity of tissue. Sometimes almost the whole of one lobe was thus affected, a few lobules only still retaining a healthy aspect, and crepitating under the finger, and it often happened that the bronchi leading to it were full of mucus or pus, while at other times there was marked congestion of the lung, and in the midst of the congested tissue were two or three solid hepatized patches. All these circumstances, as it may be conceived, variously modified the morbid appearances. In the last case the lobular pneumonia was thought to be becoming *generalized*, or, in other words, the inflammation originally limited to certain lobules was supposed to have begun to extend to the adjacent tissues, constituting a kind of transition state between lobular and lobar pneumonia. The lower edge of the different lobes, the whole of the middle lobe of the right lung, and often a very considerable portion or the whole of one or other lower lobe, were also sometimes found in a state to which, among other names, that of *carnification* was applied, on account of its close resemblance to a piece of muscular tissue. A portion of carnified lung showed the closest possible similarity to a lung that had been compressed by effusion into the pleura. It was dark, tough, solid, contained no air, presented a smooth surface when cut, yielded a small quantity of bloody serum when pressed, and, indeed, seemed almost like a piece of flesh, in all which respects it resembled a portion of lung hepatized by lobular pneumonia, and differed from the lung of the adult when that has been rendered solid by inflammation.

The course of the disease in many of these cases during the life-time of the patient, and the results of medical treatment, tended to enhance the difficulties which the above described anatomical peculiarities placed in the way of referring lobular pneumonia to the same category of affections with the pneumonia of the adult. Venesection, leeches, and mercurials, the ordinary antiphlogistic apparatus in the pneumonia of the adult, often appeared to hasten the child's death; blisters rarely effected any good, and the blistered surface often showed a remarkable indisposition to heal. On the other hand, emetics and rubefacients were frequently of service; a stimulant plan of treatment was almost always necessary at an early period, and sometimes seemed to be required almost from the outset of the affection. The rapidity of the changes that took place in the physical condition of the lung was another point which seemed to render the nature of the affection still more obscure; for where air was heard entering freely on one day, none would be perceptible on the morrow, but percussion of that part of the chest would yield a sound of complete dulness. On the other hand, it happened sometimes, though much less often, that dulness was succeeded just as quickly by resonance on percussion, and that breathing became distinctly audible where on the previous day no sound of air was to be heard.

Nothing can show more forcibly the influence of a name, than the fact that this condition of the lungs should have been described by all writers as lobular pneumonia, and that its symptoms should have been attributed to inflammation, while yet it was evident from the concurrent testimony of every one that neither in its progress nor in its results was it similar to inflammation of the lungs in the adult, much less identical with it. Having, however, once been called pneumonia, every person continued to call it so, though often with a full recognition of its peculiarities. Even the close resemblance which the lung presented to fœtal lung, or to those undilated portions which are characteristic of *atelektasis*, was noticed and discussed by myself, and by many far better observers, apparently without a suspicion that both states were identical.

But while the peculiarities of lobular pneumonia were thus generally commented on, it seems strange that no one should have had recourse to the experiment of inflation in order to obtain a solution of some of the difficulties that existed with reference to its nature. This oversight seems the more extraordinary, when we call to mind that this very means had cleared up so many doubts concerning appearances in the lungs of new-born infants, which had once been supposed to be the result of pneumonia in the fœtus, or of some arrest of development. At length the experiment was tried by MM. Bailly and Legendre,* and though, as in the old tale of

* Nouvelles Recherches sur quelques maladies du poumon; in the Arch. Gén. de Méd., Janv. Févr. Mars. 1844.

Columbus and the egg, the thing seems so obvious that there is some risk of our underrating the merit of those who were the first to do it, it must not be forgotten that, by that simple means, they have thrown more light on the affections of the lungs in infancy and childhood, than all the writers of the previous ten years taken together.

MM. Bailly and Legendre state as the result of their observations that the appearances to which the name of lobular pneumonia has commonly been given are in reality *produced by an occlusion of the pulmonary vesicles*. This occlusion may be the result either of their closure by the contractility of the lung, or of their parietes being compressed by an unusually congested state of the capillaries of the organ, or of the two causes combined. In either case they assure us that the inflation of the lung will remove the solidity of the lobules, and restore them almost, or quite, to a normal state, and a frequent repetition of the experiment enables me to confirm, if it were necessary, their assertion.

It may, however, be objected that this condition of the lung is not in reality a morbid appearance, but that it is only the effect of a somewhat greater degree than usual of that collapse of the lung which takes place when the breath leaves the body. It may be suggested that nothing more is needed to produce the complete emptying of some portions of the lung, and their consequent solidification, than that resiliency which they retain after death, coupled with the pressure of the parietes of the thorax upon them. The possibility of this condition supervening after death cannot be denied, but still it may safely be affirmed that it is not usually, nor, indeed, frequently a post-mortem occurrence. The frequency with which isolated lobules are found dark, unaerated, and solid, while all the surrounding tissue is perfectly healthy, can hardly be accounted for on the supposition that the state comes on after death. But conclusive evidence is afforded by the physical signs of solidification of the lung being observed in many cases in which this condition is found after death, and by the frequency with which sudden and fatal dyspnœa comes on in the course of various affections in early infancy, and leaves no trace of its cause other than a collapsed state of a considerable portion of the lungs.

A little girl was attacked, when a month old, by very severe diarrhœa, which lasted for three weeks, and then left her greatly exhausted and much emaciated. No return of the purging occurred, and the child lived, though in a state of great weakness, till she was five months old. For the last five weeks of her life she was under my care, and sometimes she seemed, for a day or two, as if she were gaining strength and might recover, but these signs of improvement were never of long duration. Three days before she died, her breath suddenly grew hurried ; the dyspnœa was not attended with any cough, but, from the time of its coming on, the child's exhaustion increased, and her respiration grew more and more rapid until her death.

No organ showed any sign of disease, but all presented a most remarkable degree of anæmia. Two-thirds of the upper, and almost the whole of the lower lobe of the right lung, were dark, solid, and non-crepitant, and a few lobules of the left lung presented the same appearance. Inflation restored them to exactly the same state as the rest of the lung. The bronchi were preternaturally pale, and contained no secretions. It is not possible to say why the child's inspiratory power grew too feeble to fill the lungs at one moment rather than at another, but few will doubt that it had become so just at the time when the dyspnœa occurred. A portion of the lung having become collapsed, the elastic ribs tended to render abortive any faint effort to draw in more air, and thus the vital flame went out for want of air to feed it.

Sometimes the occurrence of this condition is long preceded by indications of the imperfect performance of the respiratory functions, but yet they go on sufficiently to keep the machinery of life in motion, till some trivial, perhaps some inappreciable cause,—a draught of cold air, a little over-exertion, the horizontal posture too long continued, the customary food delayed an hour beyond the usual time,—sinks them so low that they soon cease for ever.

Some time ago I saw a little girl ten months old, who had lost her mother soon after her birth, and had been indebted to a stranger for what should have been a mother's cares. She never throve ; her chest presented that peculiar malformation commonly called pigeon-breast, and the diaphragm drew her yielding ribs inwards, and thus produced a circular constriction around the base of the thorax.* But though she was a backward child, and though her respiration was always almost as abdominal as that of a new-born infant, there was no definite evidence of disease until she was nine months old. She then lost flesh rapidly, and began to cough without having had any previous catarrh. Her case seemed to be one of bronchial phthisis.

Four days before she died her breath suddenly became much oppressed, and her cough far more severe than it had been before. The dyspnœa rapidly increased, but her cough soon became less frequent. A few hours before her death her lips were quite livid, she was breathing from 80 to 86 times in the minute, the abdominal muscles acting most violently, but the chest being scarcely at all expanded. Auscultation detected nothing more than some rather large mucous râle in the lung.

After death no tubercle was found in any organ, but large portions of both lungs presented the undilated condition, which disappeared entirely on inflation. The bronchi were pale, and contained very little mucus, but

* A very interesting explanation of the mechanism by which this deformity of the chest is produced, is given by MM. Rilliet and Barthez, op. cit. vol. iii. p. 640.

the right side of the heart was greatly distended with coagulated blood, which its thin, pale, and flaccid substance had evidently been unequal to propel with the requisite vigour.

The imperfect respiration had here for some time manifested itself; the vital powers had long been feeble; nutrition had been ill performed, and the heart itself had shared in the general feebleness, till at length air ceased to permeate a large extent of the pulmonary substance, and the child died for want of air to produce the requisite changes in the blood.

In both of these cases the lung collapsed, because the inspiratory powers were too feeble to fill the minuter vessels with air. The result is the same if the obstacle be increased as if the power be diminished, and hence the supervention of this state of lung becomes one of the most perilous, while it is one of the most frequent, complications of infantile bronchitis. A little girl, previously quite healthy, was seized when ten months old with symptoms of acute bronchitis, a suffocative cough returning in paroxysms, and sometimes followed by the rejection of a muco-purulent fluid. The symptoms throughout did not seem to allow of depletion, but ammonia, with decoction of senega and tincture of squills, and other expectorants of a stimulating kind, were given with temporary amendment. The child did not, however, appear to have undergone any marked change, either for better or worse, except that she had certainly lost both flesh and strength, when coldness, faintness, and exceedingly laboured respiration, suddenly came on, under which symptoms she died in the course of twenty-four hours.

A few recent adhesions were found on each side of the chest, between the costal and pulmonary pleura. The trachea contained a large quantity of muco-purulent matter, and the same secretion abounded in the bronchial tubes, many of which were filled by it, while nowhere did air-bubbles appear intermixed with it. There was some congestion of both lungs, especially posteriorly; the upper and posterior part of the upper lobe of the right lung, the whole of the middle lobe, and the posterior part and lower edge of the lower lobe, were dark, solid, non-crepitant, and depressed below the adjacent tissue. The same state existed in the whole inferior third of the upper lobe, and the lower edge of the lower lobe of the left lung. On inflating the lung, most of these parts were restored to a perfectly natural condition, but some patches still remained less dilated than the others, and some of the darker, almost violet-coloured, portions of the lower lobes appeared but little affected by it.

In the course of his investigations on the structure of the lung, Sir E. Home* ascertained that during the momentary distension of the air-cells in respiration, an interruption is produced between the arterial and venous

* Phil. Trans. 1827, p. 58 and p. 301.

circulation in the lungs; the blood being carried no further than the small arterial branches surrounding the air-cells. Now MM. Bailly and Legendre conceive that, on the other hand, a distended or congested state of the pulmonary capillaries may compress the air-cells, and reduce them to the same collapsed condition as sometimes takes place from a mere want of inspiratory power. This theory, too, I believe to have in it a large measure of correctness, and it is probable that the occurrence of this condition is due to a congested state of the vessels in many cases in which the accumulation of secretions in the air-tubes is not so considerable as to render them impervious to air, and in which long-continued illness has not exhausted the strength and thus impaired the inspiratory power. It is thus that in some cases of hooping-cough, where yet, perhaps, the quantity of fluid in the bronchi is not very considerable, we find after death a generally congested state of the lungs, and in the midst of the congested tissue, patches, more or less extensive, of a dark colour and solid texture, impermeable to air, but still admitting it, though perhaps not freely, on forcible inflation of the bronchi.

But you may naturally inquire whether any occurrence of a similar kind is ever met with in the adult, since there is certainly no such peculiarity in the structure of the lung in childhood as should render it then exclusively liable to a morbid process from which at all other ages it is exempt. My own experience would not enable me to answer this inquiry; but my friend Dr. Baly has communicated to me the particulars of three cases in which he found large portions of the lung in the adult presenting the characters that we have been studying in the child, and like it resuming a natural appearance on the insufflation of air into the bronchi. The patients in all of these cases died of fever, attended with dysenteric symptoms, and for some days before their death were in a state of great exhaustion, such as appeared to indicate the free employment of stimulants. In two of the cases extreme dyspnœa occurred some days previous to death, but though the chest lost its resonance in the situation of the affected parts of the lung, and the breathing there was deficient, yet the minute crepitation of pneumonia was not detected in either case, but merely some large mucous râle. In addition to extensive disease which in each instance existed in the intestines, this collapsed condition of portions of the lung was found; unconnected with any disease of those organs in one of the cases, combined with the effusion of tenacious mucus in the bronchi leading towards the collapsed portions in a second, and associated with true pneumonia and a state of red or yellow hepatization of other parts in a third. In short, the three cases afford examples of the three distinct conditions under which we have noticed this occurrence in the child: the first being an example of collapse of the lung, the result of simple debility; the second illustrating its occurrence in connection with obstruction to the free ad-

mission of air into the lung; and the third shewing it in combination with a congested state of the organ*.

But these are by no means isolated cases; for it would seem as if in some diseases which are attended with much depression of the vital powers, this collapse of the lungs were by no means unusual. To adduce but one illustration of this, it may be mentioned that M. Louis† found in nineteen out of forty-six post-mortem examinations of patients who had died of typhoid fever, a condition of the lungs which he calls "carnification," and which it is evident (although he did not try the effect of inflation) was identical with the state so frequent in the child. He describes the parts thus affected as of a deep purple red, having lost the natural suppleness of the lung, being solid and sinking in water: they were, moreover, tougher than healthy lung; if divided, the section became covered with a reddish fluid, perfectly destitute of air, while the tissue neither resembled that of healthy lung, nor presented the peculiar granular appearance characteristic of lung in the second stage of pneumonia. It can scarcely be necessary to follow M. Louis through his minute description of the differences between this condition and true pneumonia, for you must have already recognized the characteristics of collapsed lung.

It is true, however, that in these cases the condition of the lungs was merely superadded to other lesions, in themselves adequate to occasion the patient's death; and hence, though interesting to the mere pathologist, it yet loses much of its value in the eyes of the practical physician. But it will not seem to you that too much stress has been laid on this state, if it should appear that whenever the power of the inspiratory muscles is much diminished there is a tendency to its supervention, so that it alone may be the cause of death; and this, which I have put hypothetically, really does occur in old age.

The term second childhood is not a mere figure of speech, expressive solely of the decay of the mental powers, by which the evening of life is

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* The minute accuracy of Dr. Baly's description induces me to subjoin the following particulars of one of the examinations, as he allows me to extract them from his case-book:— "No effusion, lungs healthy, except in lower and posterior fourth of right inferior lobe, which is of a dark purple colour, is depressed somewhat below the level of other parts, does not crepitate, feels solid, but flexible and tough, almost leathery, and sinks quickly in water: the part having these characters is distinctly defined by boundaries of lobules. The whole lung being inflated, the part just described receives air with greater difficulty than the other parts, but at length becomes distended, lobule by lobule, and assumes the same pale red colour as the rest of the lungs. The change takes place, as has been stated, lobule by lobule, separate lobules appearing suddenly of the paler colour, not merely at the margins of the dark mass, but also in its centre. On cutting through the lungs and tracing the bronchi, it is found that the ramifications of those tubes which go to the dark, contracted, and condensed parts, are filled up with tough mucus, from which those going to other parts are free.

† Recherches sur la Gastro-enterite. 8vo. Paris, 1829; tome i. p. 361-364.

obscured and made like the twilight of the mind in early infancy, but it is in many points the expression of a physical truth. Thus, as old age creeps on, and the nutrition is no longer adequate to supply the waste, the respiration loses the character which it presented in the adult, and the extremes of life in this respect present a close resemblance to each other. The muscles of the chest are no longer strong enough to dilate it fully; the diaphragm becomes, as it was in early infancy, the principal inspiratory muscle, and the vertical diameter of the thorax is that in which its chief enlargement takes place. The ear applied to the chest no longer detects the puerile breathing of youth, nor the clear vesicular murmur of manhood; but the respiration is coarser, sometimes almost bronchial. There is not, as in infancy, occasion for more rapid breathing to maintain the high activity of the vital processes, but the worn-out machinery needs to be put in motion more frequently than in the adult, in order to obtain oxygen enough to support existence; and, accordingly, MM. Hourman and Dechambre* found the average frequency of the respiration in 255 old women at the Salpetrière to be 21·79 in the minute, while in some whose frame seemed most decayed, it was far more rapid. Just as in infancy, too, so in old age, these respiratory movements are most irregular. Sometimes the parietes of the thorax continue for a long time motionless, and then there succeeds a series of rapid movements, while at other times the intervals between the inspirations are irregular, but the inspiratory movements are of the same intensity and duration. Here, then, without pursuing the comparison further, we have ample proof of the many points of resemblance between the physiological condition of the respiratory function in early life and in old age. The respiratory organs, too, in their pathological state, present, as might be expected, the same resemblance; and, accordingly, MM. Hourman and Dechambre† notice a state in which the pulmonary parenchyma is of a very deep, sometimes almost of a blue colour, or nearly black, non-crepitant, and presenting a smooth surface on a section of it being made. The lung thus altered is often remarkably tough, almost like Indian rubber; while under pressure, a viscous fluid, generally of a reddish colour, and containing no air-bubbles, exudes from it. The idea of inflating the lung had not occurred to these observers; but they remark, that, if portions of lung presenting these characters be dried, the air-cells have a tendency to re-appear, without having undergone any other change than a well-marked contraction.

I have dwelt long on this pathological condition, though I think not longer than its importance demands, because we shall find that in some

* The above facts with respect to the respiration in the aged are derived from the interesting papers of MM. Hourman and Dechambre, in the Arch. de Méd. for 1835 and 6. See especially the number for Nov. 1835.

† Op. cit. Mars 1836, p. 272.

form or other it presents itself, modifying the symptoms, determining the prognosis, and influencing the treatment of almost all the affections of the lung in early infancy.

We shall pass to the study of some of these diseases at the next lecture; but, before doing so, may notice an affection about whose nature much controversy has arisen, but to which, thanks to the researches of MM. Bailly and Legendre, we may now assign a place as one of the results of the imperfect expansion of the lungs, and of the consequently incomplete performance of the respiratory functions. Though very rare in this country, *induration of the cellular tissue* is extremely common in the foundling hospitals of the Continent, where so many causes contribute to depress the new-born infant's feeble powers. The children in whom it occurs are usually weakly, not seldom premature, and its first symptoms generally appear between the first and fifth day after birth, though occasionally they do not come on till later. In many instances a livid redness of the whole surface is obvious from birth; but the appearance of a circumscribed hard spot on one or other extremity, or on some prominent part of the face, as the end of the chin, or the cheek bone, is the first sign of the commencement of this affection. Other spots of a similar kind are soon discovered on different parts of the surface, and the body generally, and the hardened spots in particular, are found to present a temperature much below the natural warmth of the body. It appears, indeed, from M. Roger's researches,* that a general reduction of the temperature precedes the induration, or, at least, exists in a very marked degree, while the induration is still extremely slight. The sinking of the temperature and the extension of the induration advance together, and the warmth of the surface may eventually fall from 100° to 90°, 80°, or even lower. If the induration become very extensive, it affects the integuments of the chest and abdomen, as well as the extremities, and the body feels cold and stiff, as though it were frozen.

This condition is, as might be expected, attended with great impairment of the general health. Children suffering from it are extremely weak, often too weak to suck; their pulse is very small, their respiration abdominal, and their cry faint and whimpering, wholly unlike that of a healthy infant. In some of the worst cases, too, a bloody fluid is discharged in considerable quantity from the nose and mouth. If the indurated parts be punctured, a small quantity of reddish serum escapes from them, though generally without much diminution of their previous hardness.

If the induration be at all general, death almost invariably takes place; and so great is the fatality of the affection, that, including even slight cases, five-sixths of those children who are attacked by it in the hospitals

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* Op. cit. p. 124-151.

of Paris, die. In very slight cases, however, if the infant be at once placed in favourable circumstances, recovery need not be despaired of.

The hardness of the surface still persists after death, and the absence of any peculiarity in the effused serum, or of any sign of active disease, left writers generally in much perplexity as to its cause. The venous system is usually found gorged with fluid blood, and this congestion is often apparent in the cerebral vessels, as well as in those of the abdominal viscera, particularly the liver. Both the thorax and abdomen also frequently contain a quantity of serum, often tinged with blood,—effusions which are evidently of a passive nature, since they are unattended with any trace of inflammation either of the pleura or peritoneum. None of the viscera present any morbid appearances of half so much importance as those which are met with in the lungs, a very great part of which displays those changes to which your attention has already been directed as characteristic of their deficient expansion.* This condition of the lungs had been noticed and most carefully described many years ago, as one of the most striking attendants on induration of the cellular tissue. It was thought by some of those who described it to be the result of pneumonia; while other observers, justly insisting on the absence of the other effects of inflammation of the pulmonary tissue, yet drew the attention of pathologists too much away from the chest, where the clue to the solution of the question as to the cause of the affection was to be found, had they but known how to use it. We, however, are aware that those appearances, once thought to be the result of pneumonia, are in reality due to the unexpanded condition of the lung; and we can understand how it may happen, if children be exposed to cold almost immediately after birth, and then transferred to the ill-ventilated wards of a foundling hospital, and there fed with food far other than that which nature destined for them, that respiration may be but very imperfectly established; that their temperature may consequently fall, and the blood flowing in part through the unclosed fœtal passages may stagnate in its course, may give rise to passive effusions into the great cavities of the body, and to an anasarcous swelling of the surface. There are, it is true, some peculiarities in this

* The observations of J. A. Troccon, in his dissertation, "Sur la maladie connue sous le nom d'endurcissement du tissu cellulaire," 4to. Paris, 1814, are especially remarkable, since he not only described with accuracy the physical condition of the lungs, but even tried the experiment of inflating them, in order to prove that they were not, as had been erroneously supposed, in a state of gangrene. He says—"J'ai insufflé ensuite de l'air dans les poumons par la trachée, aussitôt la couleur noire qui était à leur base s'est changée en une couleur rouge claire, laquelle s'est etendue de proche en proche à mesure que je continuais ces insufflations." After removing a ligature which he had applied around the veins, and allowing the escape of the blood with which the heart and lungs were gorged, he resumed the inflation of the lungs, and "les organes de la respiration ont été presque de suite dans un état absolument naturel, et aussi beaux que ceux que l'on voit pendus devant nos boucheries."—p. 37-8.

It seems strange that neither M. Troccon nor subsequent observers perceived the full bearing of these experiments till similar ones were instituted by MM. Bailly and Legendre.

form of œdema, but not such as to invalidate the above explanation of the cause to which it is due.

The *treatment* of this affection implies the removal of every cause likely to induce it. Hence warmth stands foremost as a curative as well as a preventive measure. The warm bath may be resorted to as a means of raising the child's surface to a proper temperature, provided its extreme weakness do not contra-indicate that measure. Gentle friction with warm oil is a means which has been tried for this purpose with advantage. The child should be nourished with breast-milk, even if it be too feeble to suck, and stimulants, of which white-wine whey is a very good one, will in many instances be needed. Defective respiration being the ultimate source of all the symptoms, the main principles of all your treatment must be the same as have already been laid down for your guidance in cases of atelektasis of the lung, and these it can hardly be necessary to recapitulate.

I should have said more about this affection, its nature and treatment, if it were one with which you were likely to meet often; but, in consideration of its extreme rarity in this country, I may perhaps be excused for passing it over with this cursory notice.

LECTURE XV.

Affections of the Respiratory Mucous Membrane—comparative rarity of catarrh during the first weeks of life—Coryza—simple and pseudo-membranous, or malignant—Catarrh, causes adding to its importance in early life—its treatment—danger of bronchitis or pneumonia.

Post-mortem appearances of Bronchitis—redness of the membrane—nature of the contents of the bronchi—dilatation of their cavity.—Extension of the inflammation to the lining of the pulmonary vesicles, producing vesicular bronchitis.

State of the lungs in bronchitis—frequency of congestion—carnification of some lobules—possible extension of inflammation to the pulmonary tissue, producing lobular pneumonia—suppuration of these patches producing vomicæ.

ALTHOUGH two lectures have already been devoted to the pathology of the respiratory organs, yet, until to-day, we have not been able to commence the study of their special diseases.

They may be divided into the three grand classes—of the inflammatory, the nervous, and those which result from morbid deposits. We will examine these in the order in which I have enumerated them.

At every age *inflammatory affections of the respiratory mucous membrane* exceed all others in frequency, and even when the pulmonary substance becomes eventually involved, it is often by the extension to it of mischief which began in the mucous membrane. But in infancy and childhood this is pre-eminently the case, for the delicate and highly vascular lining of the respiratory organs resists but feebly the influence of noxious impressions from without, while it sympathises most acutely with many morbid processes within.

This extreme susceptibility of the mucous membrane of the respiratory organs in childhood renders its disorders of very frequent occurrence, while we are compelled to study closely the signification of symptoms that may betoken disturbance from such various causes. Something of this sympathy with the affections of other parts exists even in the adult, as we may see exemplified in the cough that attends upon affections of the liver, but in the child the sympathetic disorder of the respiratory mucous membrane is vastly more frequent; and nurses, taught by experience, will speak

to you about a tooth cough, a stomach cough, a worm cough; while you will soon find for yourselves that the intestinal mucous membrane is seldom affected without that of the respiratory apparatus suffering too.

It is a curious fact, however, to which Professor Jörg of Leipsic* was the first person to call attention, that this extreme susceptibility of the lining of the respiratory apparatus does not exist to the same degree during the first month or two of life as it does afterwards. The exposure of an infant two or three weeks old to a low temperature or to a vitiated air, would be followed by disturbance of the function of the liver and the occurrence of jaundice, or, perhaps, the muscular power might be so far depressed as to render the child incapable of taking a full inspiration, so that its lungs collapse, and it dies from disorder of the respiratory organs, but without the cough or bronchitic symptoms, which would not fail, if it were a little older, to announce the irritation of the mucous membrane of the air tubes. Why this is so I do not know, but suppose it to be the result of the generally feeble vitality which renders the lining of the bronchi less susceptible, just as that of the intestine also seems to be at the same period, since, while constipation is frequent, diarrhœa is comparatively rare during the first two months of life.

The mucous membrane of the nares, however, has not by any means this insensibility, and *coryza* is an affection most frequent, and most important, during the first two months of life, when the other forms of catarrh are comparatively rare.

This affection, in its most frequent form, is a source of discomfort rather than of danger. Its most prominent symptom has given rise to its vulgar name of "the snuffles;" for, the mucous membrane of the nares being swollen, the child is no longer able to breathe through its nose as it was wont to do, but is compelled to breathe likewise through its mouth, and its difficult inspirations are attended with a peculiar snuffling noise, which, during sleep, sometimes amounts to a complete snore. As in common catarrh, the secretion from the membrane is at first suppressed, afterwards it flows in an increased quantity, and then at length it is altered in character, and becomes thicker and puriform; and then it sometimes dries and forms crusts about the nostrils, which interfere greatly with free respiration, and cause the child much annoyance. At the outset there is often a degree of heat of skin and febrile disturbance, but these symptoms soon subside, and, with the exception of the snuffling respiration, the child seems quite well. If the attack be more severe, however, it may occasion a good deal of suffering, for if respiration through the nose be very much impeded or altogether prevented, the child is rendered unable to suck, and so soon as it has seized the nipple and begun to draw the milk, it is compelled to leave it in a state of threatening suffocation. Its distress, too, is

* Handbuch der Kinderkrankheiten, 8vo. Leipsig, 1836, p. 531.

further increased by the circumstance that its mouth, being constantly kept open in order to breathe, the tongue and throat become extremely dry, and deglutition, even when the child is fed with a spoon, is often attended with difficulty. Any such severity of the disease, however, is very unusual, though such cases do sometimes occur, and even prove fatal; the difficulty of breathing and sucking, together, wearing out the patient. When this event occurs, something more seems to exist than a simple inflammation of the Schneiderian membrane, since it either secretes a very tenacious mucus in extreme abundance, or becomes coated with false membrane which sometimes extends even to the tonsils and palate. Cases of this kind are usually associated with extreme depression of the vital powers, and have received on this account the name of *coryza maligna*. In the Foundling Hospitals of the continent this malignant coryza is not very uncommon. I have never but once, however, seen anything approaching to it in severity, except where it has occurred as a complication of scarlatina. In that instance, a little boy, six months old, was brought to me on the 25th of October, 1842. His health had been good until the 20th, when he became hoarse; on the 22d this hoarseness had much increased, and he became unable to suck, since which time he had continued to grow worse. When I saw him his skin was warm, face rather flushed, eyes watering, and a thick ropy mucus obstructed his nostrils. He cried with a suppressed but squeaking voice, and breathed with a peculiar wheezing noise, though air entered the chest unattended with any râle. The child was unable to suck, and even when he drank from a cup the fluid often returned through his nose. The inside of the mouth was very red, and the tonsils and soft palate were especially so. The mouth was full of an extremely tenacious mucus, which it was necessary from time to time to take out with the hand.

A lotion was injected up the nostrils, composed of ʒj. of alum to ℥ij. of water, with great relief to the child, the secretion from the nares becoming more decidedly puriform, but less adhesive; and the child became able to suck a little. On the 28th, however, the child's powers seemed much depressed; it sucked eagerly, for the secretion from the nose had become almost watery, but it swallowed with much difficulty. A layer of false membrane of a yellowish-white colour had now appeared on the soft palate and back of the hard plate, and on the tonsils.

A lotion of three grains of the nitrate of silver to an ounce of water was applied to the back of the throat, and a mixture of the extract of bark with ammonia was given every six hours. On the 1st of November the child was better, could swallow as well as suck well, and the false membrane had entirely disappeared from the mouth, but the palate was still red, and presented some broad superficial patches of ulceration. The subsequent recovery was tardy, but the immediate danger was over, and no relapse occurred.

The simple coryza calls, as I have already observed, for but little

treatment, and, indeed, treatment appears to exert but little influence over it. It is desirable, however, if there be much difficulty in breathing, that the child be taken from the breast, though it may still be fed with its mother's milk by means of a spoon, since the fruitless efforts to suck aggravate its sufferings, and should therefore be prevented. If heat of skin and other indications of fever attend its onset, some mild diaphoretic medicine, with a few drops of ipecacuanha wine, may be given: attention must be paid to the state of the bowels, and in the course of ten days or a fortnight the infant will be found again breathing quietly, and the disease will have subsided. As the secretion becomes thicker, care must be taken to prevent its accumulating and drying at the opening of the nostrils, by which it would cause serious discomfort to the child. In the malignant variety of the disease local as well as general treatment becomes necessary. The tendency to the formation of false membrane in the nares must be combated by injections of alum or nitrate of silver, while the condition of the fauces must be watched as narrowly as that of the nares, and similar applications must be made to them on the appearance of any unusual redness there, since such increase of vascularity is only the first stage of that process which would issue in the exudation of false membrane. At the same time, a general tonic plan of treatment will be called for, and care will be needed to ensure the child's taking a proper quantity of nutriment, since its powers of sucking and of deglutition will in all probability both be impaired.

Cases are sometimes met with, in which coryza, though not of a severe kind, is troublesome by its continuance for weeks together. This chronic coryza is, I believe, almost always connected with a syphilitic taint. I have on several occasions met with it when there were not above one or two spots of copper-coloured eruption to mark its character; and a few instances of it have come under my notice in which no positive evidence of venereal taint, either past or present, could be obtained, but which nevertheless got well under the use of small doses of the Hydrarg. c. Cretâ.

With the increasing age of the infant there is a growing liability to *catarrh*, and during the period of dentition the susceptibility of the mucous membrane of the respiratory organs appears to have attained its maximum. Slight variations of temperature now induce catarrhal seizures; or even, independently of any such exciting cause, the mere approach of a tooth towards the surface of the gum often gives rise to its symptoms, which subside when the source of irritation ceases. Such attacks often alternate with attacks of diarrhœa, or the two coexist; the symptoms of disturbance of the intestinal mucous membrane predominating at one time, those of disturbance of the respiratory membrane at another. The preponderance of one or the other affection seems much to depend on atmospheric causes; and children who, during the months of June, July, August, and September, would suffer from diarrhœa, will, under precisely

similar circumstances in the earlier months of spring, or the later months of autumn, suffer from catarrh. From the extreme susceptibility of these two great mucous surfaces arise a large proportion of the ailments, and many even of the serious diseases of infancy. Morbid as well as reparative processes go on most rapidly in early life: the flux of to-day may to-morrow be attended with dysenteric symptoms; the catarrh of to-day may to-morrow have put on the grave features of acute bronchitis.

Now these two circumstances taken together, the extreme susceptibility of the respiratory mucous membrane, and the rapidity with which its trivial disorder sometimes becomes a grave disease, give to the catarrhal affections of infancy an importance which in more advanced life they do not possess. This importance, too, is still further increased by the tendency of the lung to become collapsed when the entrance of air into its minuter cells is impeded even by a comparatively trivial cause; while in other cases, or even in connection with the collapsed condition of the lung, the inflammatory process may invade the pulmonary cells and the general tissue of the lung, and that which had seemed a slight cold may grow to a dangerous bronchitis, or a still more dangerous pneumonia.

Of catarrh itself and its general characters little need be said. Allowing for the difference between the ages of the patients, its symptoms are the same as in the adult. Sneezing and running at the eyes and nose, and cough, a hot skin and quickened pulse, attend it. In some children the febrile disturbance with which even a common attack of cold sets in is very severe for the first twenty-four hours or more, and then the more threatening symptoms subside, and the true nature of the affection becomes apparent. At other times, when catarrh is extremely prevalent, epidemic in short, this severe onset is usual; and the affection closely resembles, or is probably identical with, influenza. Often, too, you will find the commencement of an epidemic of hooping-cough preluded by an unusual prevalence of catarrh, the cough by degrees assuming in more and more numerous cases the paroxysmal character and peculiar sound of pertussis. It is unnecessary to allude to the catarrhal symptoms which precede measles; but bearing in mind that what seems to be a mere cold may turn out to be the first stage of a very serious malady, you are furnished with an additional reason for not slighting it. Lastly, you must not forget that the frequent return of attacks of catarrh is sometimes an indication of that irritable state of the bronchial membrane which the abundant deposit of tubercle in the lungs occasions; and this, again, yields another argument for not neglecting an apparently trivial ailment.

While it is your duty, however, on so many grounds, to watch closely every child, although its indisposition may not seem to be more than a simple catarrh, yet in the way of actual medical *treatment* very little is required. The child must be kept in one temperature; and, if the nursery be an airy room, it is desirable that it be confined to that apartment.

If already weaned, it may be well to withdraw some of the more solid articles of diet; if not, care must be taken that the child does not, in consequence of its thirst, suck too much; and a little barley-water should therefore be given it from time to time. A warm bath at night will do much to allay the heat of skin; and, if the febrile disturbance be considerable, a couple of grains of James's powder, with half a grain of calomel, may be given to a child a year old at bed-time. During the day, a mixture, containing a few drops of ipecacuanha and antimonial wine, with a little of the compound tincture of camphor, if the cough irritate by its frequent return, may be given with advantage, and, as the fever subsides, the spirits of nitrous ether may be substituted for the antimonial wine.

The danger, however, in these cases is of a more grave disorder of the air-passages coming on; and this brings us to a subject which we cannot pass over hurriedly—namely, the *bronchitis* and *pneumonia* of infancy and childhood.

The study of these affections in childhood is beset by some difficulties which we do not meet with in the adult. The points of difference between bronchitis and pneumonia are sufficiently well marked in the adult for all purposes of practical utility, although many inquiries may be started with reference to the intimate nature of the morbid processes, which we may be unable to answer satisfactorily. Besides, whether the capillaries, or the pulmonary cells, or their parietes, be the structures first attacked, it is clear that they are all involved in pneumonia from a very early stage of the disease; and hence we find it attended from the outset with peculiar symptoms, such as do not occur in bronchitis. Pneumonia similar to that of the adult is sometimes observed even in early childhood; but it often happens that, though the pulmonary substance becomes eventually a partaker in the disease, it yet was not so at first; but the inflammation, beginning in the larger air-tubes, has passed along them to the smaller bronchi, and then at length involving the tissue of the lung, the case comes to be one neither of pure bronchitis nor of pure pneumonia, but a mixture of the two, which has not inaptly been termed *bronchio-pneumonia*. Another source of difficulty in the study of these affections, as well as an occasion of the great peril that attends them, is the tendency which we have already observed in the lung during early life to become collapsed, and no longer to admit that air without which the changes in the blood cannot take place, and the absence of which naturally aggravates the mischief that the inflammatory disease itself tends so immediately to produce.

I must beg you, therefore, to pardon me if I enter rather more minutely than is my custom into the description of the *morbid appearances produced by inflammation of the lungs and air-tubes* in infancy and childhood.

An increased degree of *redness of the mucous membrane of the bronchi* is almost constantly observed in the case of children who have died of

inflammation of the lungs or air-tubes. There are three sources of error, however, against which it is essential to guard when examining the bronchi with reference to this point. The first is the occasional disappearance of redness after death, even where the presence of an abundant muco-purulent secretion in the tubes bears evidence to the activity of the inflammatory process; the second is the apparent redness of the smaller tubes in cases where the lungs are congested or inflamed, and which may be due not to the increased vascularity of the bronchi themselves, but to their transparency, allowing that of the subjacent tissue to be seen through them. The third is the occasional staining of the mucous membrane, owing to the transudation of the blood through the coats of the vessels after death. With care, however, none of these circumstances will lead you astray.

The redness of the bronchi varies much both in degree and extent, and in some cases which have approached to the character of pneumonia rather than of bronchitis, is sometimes limited to the inflamed lobes. In cases, however, in which much bronchitis has existed, very marked redness generally begins about an inch above the bifurcation of the trachea, and pervades all the bronchi, being more intense in the secondary than in the primary tubes, and retaining nearly as great an intensity even in the tertiary branches. It may stop here, or it may extend even into the ultimate ramuscules, or into the pulmonary cells themselves.

In the majority of cases no other change besides this intense redness is perceptible in the *mucous membrane*, but *sometimes* it *appears* both *thickened and softened;* and on one occasion in which a fatal attack of acute bronchitis supervened on a long continuance of the chronic stage of the disease, the bronchial mucous membrane was intensely red, and so thickened as to have an almost villous appearance, and closely to resemble red velvet. *Ulceration* of the mucous membrane of the trachea and larger bronchi, which is occasionally met with in the bronchitis of adults, I never observed but once. In that case, a little boy, twenty months old, who had suffered from a not very severe attack of bronchitis, in the course of which, however, he had had occasional difficulty in deglutition, with return of fluids by the nose, died rather suddenly. The only remarkable appearance besides a general redness of the bronchial tubes consisted in the presence of several small excavated ulcerations or erosions in the upper part of the larynx, just above the cordæ vocales.

Associated with the changes in the mucous membrane of the bronchi there is an *alteration* in the character *of their secretion.* At first, no doubt, this secretion is suppressed, just as we see that furnished by the Schneiderian membrane to be in a common cold; but afterwards it is poured out abundantly, and next ceases to present its natural characters of a glairy mucus, becoming opaque, thick, puriform, or actually purulent, while in a few less common instances the secretion assumes the form and consistence of false membrane, constituting a true croup of the bronchi. Any traces of blood

are but very seldom observed in the secretion, and the quantity of air-bubbles intermingled with it is usually in inverse proportion to the thickness of the secretion and its abundance.

But not only are the contents of the air-tubes altered in character, and for the most part increased in quantity, but the *tubes* themselves often undergo a marked alteration in their calibre, and *become* greatly *dilated*. This dilatation is usually observable from the secondary bronchi to the minutest air-tubes; the branches often being as large as the parent trunk, or even larger: but that fusiform dilatation which is met with in the adult has never come under my notice. On one occasion, however, in addition to a general cylindrical enlargement of the tubes, many of them presented a marked dilatation about half an inch from their termination; the tube expanding into a cavity big enough to hold half a nut. The interior of these cavities was not perfectly smooth and regular, but its thickened lining was in many parts thrown into folds or wrinkles. The case in which this appearance was observed was the one already mentioned, where the mucous membrane of the bronchi presented so extraordinary a degree of thickening.

Dilatation of the bronchi was once supposed to be the purely mechanical effect of the accumulation of the secretions within them. There is, however, no constant relation between the quantity of the liquids within the bronchi and the degree of their dilatation, and we must look to two other circumstances as being the primary causes of the occurrence. The first of these is the weakening of the muscular fibres of the bronchi by the inflammatory action; the other, the loss of the ciliary epithelium, which lines the air-tubes when in a state of health, and contributes by the incessant vibration of its cilia to keep them free for the access of air.

Whenever bronchitis has reached such an intensity as to give rise to the abundant pouring out of thick fluid into the air-tubes, so that the air can no longer permeate them with facility, while this difficulty is still further increased by the loss of the ciliary epithelium, and by the weakening of the contractile power of the bronchi, which would have helped to keep them free, it often happens that the feeble inspiratory power of the child becomes wholly inadequate to fill the lungs, large portions of them collapse, and bronchitis thus becomes the indirect cause of carnification of the lung.

In some cases, the inflammation of the respiratory mucous membrane extends further than usual along the smaller bronchi, until it involves their extremities and the pulmonary vesicles themselves, when it produces an appearance almost peculiar to childhood, and which has been described under the names of *vesicular pneumonia*, or *vesicular bronchitis*. A lung, or a portion of lung, thus affected, no longer contains any air—it is dark in colour, and feels tough, though solid; its surface is beset by a number of small, circular yellow, slightly prominent spots, of the size of a millet-

seed, or smaller, which on a hasty glance present a very great resemblance to crude tubercles. A very little attention, however, suffices to distinguish between them, for not only do these yellow spots differ from tubercle in their favourite seat being along the lower margins of the different lobes, but on puncturing any of them with the point of a scalpel, a drop of pus will exude, and the yellow spot will disappear. Sometimes, too, a minute bronchus may be traced running to its termination in one of these little sacs. It has been suggested that this appearance may be due to the secretions formed in the air-tubes being forced by the column of air which enters in inspiration into the smaller bronchi and the pulmonary vesicles, the cavities of which thus become mechanically distended. The opinion that the secretions which occupy these parts are produced at the spot where they are discovered, by inflammation of the ultimate ramuscles of the bronchi, is, however, generally entertained, and is supported by very conclusive evidence. Bronchitis often exists unattended with this peculiar appearance; and on the other hand, vesicular bronchitis is met with independent of general inflammation of the air-tubes, while though usually partial, and often limited to the lower border of one or other lobe it is sometimes very extensive, and occupies nearly the whole of the lower lobe on either side, constituting the most important of the morbid appearances discovered on examining the chest.

It may, and unquestionably often does, happen that children die of bronchitis alone, and without any notable affection of the pulmonary tissue. But it is much more frequent for the pulmonary substance to bear a part in the morbid process; and this share may either be limited to mere congestion, or may rise in degree until it produces all those consequences which we find attendant on inflammation of the tissue of the lung in the adult.

Some degree of *congestion of the lung* is almost constant if bronchitis be at all severe, for the circulation through the organ is disturbed, the blood flows less freely than natural, and its changes take place more slowly. It stagnates first in those depending parts whence position renders its return most difficult; and the portions of the lung thus affected become by degrees more and more extensive. Dark, solid, non-crepitant patches may often be seen in the midst of a lung thus congested; and until the results of inflation shewed that a wrong interpretation had been given of the appearance, these patches were regarded as the centres whence the inflammation was extending to the surrounding tissue. You do not need to be reminded that they are lobules which have collapsed, and become impervious to air; and portions of lung in which this occurrence has taken place seem to have but little disposition to become the seat of active inflammation, and to pass into a state of red or grey hepatization. At the same time, however, it must be borne in mind that this indisposition to active inflammation does not by any means amount to

actual immunity from it; and that carnified lung may sometimes become softened, or even infiltrated with pus.

It does, however, happen now and then that the lung is found in a condition which may justly be called *lobular pneumonia*, as the result of the extension to the surrounding tissue of inflammation beginning in the air-tubes. Patches of lung will then be seen interspersed through the surrounding pulmonary tissue, of a vivid red colour, of various sizes, from that of a pea to that of an almond, irregular in shape, and not circumscribed exactly by the margins of lobules, as is the case with portions of carnified lung. This process going on in a number of different situations, the affected parts may at length coalesce, and a pneumonia, at first lobular, may thus eventually become generalized. Or, though this should not occur, the inflammation may yet go on in the isolated portions of lung to the infiltration of pus into its substance, or the actual destruction of its tissue, when a portion of the lung will appear riddled with small distinct abscesses, seldom larger than a pea, irregular in form, and communicating more or less evidently with a minute air-tube. They may be distinguished from the vomica produced by softened tubercle, partly by the absence of tubercular deposits in other parts of the body, and by their being almost always limited to a single lobe of one lung. Their own characters, however, are sufficiently well marked, for they are altogether destitute of those solid walls which the tubercular deposit forms around a phthisical cavity; though the yellow lymph which often lines them may be mistaken by the inattentive observer for tubercle. MM. Rilliet and Barthez mention having found the pulmonary substance healthy, except in the immediate periphery of these abscesses; but no instance of this kind has come under my own observation, the pneumonia having in each instance become generalized.

The appearances we have hitherto been considering are due almost exclusively to inflammation of the air-tubes; and many of them are peculiar to infancy and childhood. We might next proceed to study the symptoms that betoken their existence; but, on the one hand, they seldom exist quite alone, and, on the other hand, their symptoms present so many points of resemblance to those of pneumonia strictly so called, that it may be better to complete our survey of the morbid appearances that result from inflammation affecting either the air-tubes or the parenchyma of the lung, before we pass to the study of the symptoms that attend the one or the other during life.

The completion of this subject, however, must be postponed to the next lecture.

LECTURE XVI.

Lobar Pneumonia—More common in early life than has been supposed—Its general characters the same as in the adult—Some appearances deserving special notice, viz. subpleural ecchymoses, pneumonic abscess, and emphysema of the uninflamed portions of the lung.

Frequency and causes of inflammation of the respiratory organs—Influence of age—of previous attacks—of various diseases.

Symptoms of ordinary bronchitis—A more serious disease than in the adult, and why—Symptoms of capillary bronchitis—Illustrative case—Results of auscultation.

Treatment of bronchitis—Rules for depletion, and the use of antimony—The dyspnœa not always dependent on severity of the inflammation—Treatment of this nervous dyspnœa—Treatment of bronchitis in its chronic stage.

We were occupied during the last lecture with the examination of some of the results of inflammation of the respiratory organs in early life, and considered more especially those changes which inflammation produces in the air-tubes. You were told on that occasion that the disease does not always remain limited to the bronchi or pulmonary vesicles, but that it sometimes involves the substance of the lung, and thus gives rise to the appearance of a number of small circumscribed patches interspersed throughout its tissue, either red, hard, and solid, or grey from the infiltration of pus; while, if the mischief advance one step further, it may lead to the destruction of the parenchyma of the organ at these points, and thus produce numerous minute abscesses—a condition which has thrice come under my own observation. Cases of this kind, constituting true lobular pneumonia, though somewhat less rare than in the adult, are yet of very infrequent occurrence. It is almost needless to remind you that the contrary opinion resulted from persons not having learned till very lately to distinguish between that solidity of the lung which is produced by inflammation, and that which results from the mere collapse of its air-cells.

The exaggerated estimate of the frequency of lobular pneumonia, and the peculiar character of the field presented at the Hospital for Children at Paris, in which the most diligent and most successful students of children's

diseases laboured, led to an underrating of the frequency and importance of lobar pneumonia such as is met with in the adult; and hence you will find but little said concerning it in many most valuable works of our continental neighbours. *Lobar pneumonia*, however, is often met with in early life both as an idiopathic and a secondary affection, giving rise to the same morbid appearances as in the adult, and requiring a very similar treatment.

Not only are the physical characters of the lung in lobar pneumonia the same in childhood as in adult age, but the three states of engorgement, of red and of grey hepatization, are observed with much the same frequency at the one period of life as at the other. I find that after rejecting all cases in which pneumonia occurred as a complication of phthisis, or of acute pleurisy, and in which the results might be modified by the disease to which the inflammation of the lung succeeded, I have a record of 47 cases in which the condition of the inflamed lung was carefully noticed.

In	5	of these	cases	the 1st and 2d stages of pneumonia	co-existed.
"	4	"	"	1st and 3d "	"
"	13	"	"	2d and 3d "	"
"	11	"	"	all 3 stages "	"
"	3	"	"	lung was in the 1st stage only.	
"	6	"	"	lung was in the 2d "	
"	5	"	"	lung was in the 3d "	
	47				

This result tallies very closely with that obtained by M. Grisolle,* on an examination of 40 cases of pneumonia in the adult.

In	4	cases	the	1st and 2d stages of pneumonia	co-existed.
"	3	"		1st and 3d "	"
"	16	"		2d and 3d "	"
"	2	"		all 3 stages "	"
"	7	"		lung was in the 2d stage only.	
"	8	"		lung was in the 3d "	
	40				

It will be seen, on a comparison of these tables, that the third stage of pneumonia occurs very nearly as often in children as in adults, having been met with in the former in the proportion of 68, in the latter in the proportion of 72 per cent.; and the main difference between the two consists in the greater frequency with which all three stages of pneumonia co-exist in the young subject. This peculiarity of pneumonia in childhood is probably due to the tendency which the disease then displays to involve a large extent of pulmonary tissue; and to the same cause we must attribute

* Traité de la Pneumonie, 8vo. Paris, 1841, p. 18.

the frequency of double pneumonia in early life, which, in the cases that came under my notice, preponderated greatly over those wherein only one lung suffered. The well-known law, according to which pneumonia of the right lung is more common than pneumonia of the left, holds good in childhood, nor is the frequency of concomitant pleurisy much, if at all, less in the child than in the adult. The contrary opinion arose from the error to which reference has so often been made, of regarding cases of collapsed lung, either with or without bronchitis, as instances of red hepatization of the pulmonary substance.

Instead of inflammation of the lungs being less active in the child than in the adult, there are some facts which would seem to lead to a directly opposite conclusion. Such are the frequency with which, in fatal pneumonia in children, ecchymoses are found beneath the pleura covering the inflamed lung, the more common occurrence of pulmonary abscess in early than in adult life, and the very extensive emphysema which is often observed in those parts of the lung to which the inflammation has not extended.

These *sub-pleural ecchymoses* appear to result from the rupture of some of the minute capillaries of the lungs, in consequence of the great disturbance of the circulation through them. They are usually small, like petechiæ, but occasionally they attain a larger size, and once or twice they have presented themselves to me extending a little way into the tissue of the lung, constituting little spots of pulmonary apoplexy, about the size of a millet-seed, or even a little larger. They are most numerous on the posterior surface of the lungs, and especially in parts where the lung has become hepatized, though by no means confined to those situations.

The termination of pneumonia in *abscess of the lung* is so rare an occurrence in the adult, that Laennec did not meet with it above five or six times in the course of several hundred examinations of persons who had died of inflammation of the lungs. In the child, however, the case is otherwise, for abscess of the lung has come under my observation in three out of the forty-seven examinations of cases of lobar pneumonia, on which my present remarks are founded. In one of these cases, that of a boy aged 20 months, who died on the fourteenth day after the commencement of an illness which resembled remittent fever in many of its symptoms, but was associated from the outset with the indications of pneumonia, the following appearances were observed :—The upper and middle lobes of the right lung were connected to each other, and to the walls of the chest, by adhesions which were chiefly recent. Nearly the whole of the upper lobe was solid, and sank in water. It was of a mottled reddish grey colour, in which grey predominated ; it broke with a granular fracture, and was readily reduced to a dirty putrilage. Near the apex was a portion the size of a walnut, which was already soft and in a state of quagmire. The upper two-thirds of the middle lobe were in the same condition as the upper lobe ; the lower third was emphysematous.

In the centre of the middle lobe was a cavity the size of a bean, irregular in form, intersected by the remains of some vessels, lined by a thin layer of yellow lymph, and surrounded by lung in the third stage of pneumonia, but neither in that lobe nor in any part of the pulmonary tissue was there the least trace of tubercle, and the only indication of phthisical disease consisted in one bronchial gland having become converted into tubercle which had undergone the cretaceous transformation. The lower lobe of the right lung was in the first stage of pneumonia; the left upper lobe was quite healthy; the left lower lobe was in a state of mingled red and grey hepatization. The other two cases occurred in children who had suffered for some weeks from hooping-cough, and in both, the lungs contained numerous semi-transparent, grey, tubercular granulations. One of the children was a boy, five years old; the other a little girl, aged two years. In the case of the former, the abscess, as large as a walnut, was situated at the lower border of the upper lobe, extending a little into the lower lobe. In the latter it was of the size of an unshelled almond, and occupied a similar position with reference to the right upper and middle lobes. The characters of the abscess were the same in both instances, being situated almost immediately beneath the pleura; from which a wall of lung not above two lines in thickness separated it. Its cavity was partly filled with a yellowish, puriform, very tenacious fluid, like very tenacious pus, and which did not bear any resemblance to softened tubercle. It was not lined by any membrane: there was no appearance of tubercular deposit in the hepatized lung in its immediate vicinity, which was generally in the second stage of pneumonia, nor was it situated near to, or in communication with, any large bronchial tube.

The lung in childhood shows a much greater tendency to pass into a state of *gangrene*, than in adult age. It may be doubted, however, whether this gangrene is the result of the intensity of the inflammation so much as of some peculiar change in the blood which favours the occurrence of mortification. The occasional prevalence of gangrene of the lung and of other parts, as an endemic affection, in the Hôpital des Enfans at Paris, favours the latter supposition, and the only instance of it that has come under my own observation in the child is quite in accordance with it.

The *emphysematous condition* of the uninflamed portions of the lung, in cases of fatal pneumonia in early life, seems to be connected with the rapidity of the advance of the disease. It is usually most obvious at the anterior part of the upper lobes of the lungs, and at the margin of the other lobes, and almost always bears a marked relation to the shortness of the patient's illness, and the extent of lung which has been invaded by the inflammation. The delicate structure of the lung in early life seems to be the cause why the pulmonary vesicles so easily become dilated during the hurried inspiratory efforts, by which the child endeavours to make up for

the derangement of a part of that machinery by which the vital changes in the blood are effected. It is probably, as suggested by MM. Rilliet and Barthez, to its production in this way, that may be referred the origin of many of those cases of emphysema which we meet with in the adult, but which date back from early childhood.

The *causes* which give rise to inflammation of the lungs and air-tubes are, to a great extent, the same at all periods of life, so that we need not devote much time to the special study of those which tend to produce it in childhood. It should be borne in mind, however, that the fluctuations in temperature, or the biting wind, or the cold weather, which may be encountered with impunity by the robust adult, may prove most deadly when they act on the feeble frame and delicate organs of the child. Hence it is, in great measure, that inflammation of the respiratory organs is so much more frequent, and so much more fatal, in childhood than in adult age, and in infancy than in childhood. The fact is well shown by the fifth Report of the Registrar-General, from which it appears that 72 per cent. of the total mortality from inflammation of the lungs and bronchi, in the metropolis, took place in persons under fifteen years of age; 68 per cent. under five; 61 under three; and 31 per cent. under one year. But the tendency to these affections, as is shown in the following table, is not greatest in the first month of life, diminishing in proportion as the child advances in age and increases in strength, but the time when they are most prevalent coincides exactly with the time when the susceptibility of all the mucous membranes is at its highest point, namely, the period of dentition.

TABLE, *showing out of* 166 *cases of children dying from various diseases, in whom I carefully examined the thoracic viscera, the number of instances in which the lungs, bronchi, and pleura, presented no signs of recent inflammation, and also those in which signs of it were discovered.*

The first line represents the former, the second the latter class of cases.

Under 1 mth.	From 1-6.	From 6-12.	From 12-18.	From 18-2 yrs.	From 2-3.	From 3-4.	From 4-5.	From 5-6.	From 6-7.	From 7-8.	From 8-9.	From 9-10.	From 10-11	From 11-12
4	12	15	12	4	10	6	4	6		2	1	2	1	
	3	10	13	15	12	9	8	4	3	4	2	2		2

This table illustrates the fact mentioned in the last lecture, that, when the child is first born, the mucous membrane of the respiratory organs is endowed with but little of that susceptibility which it afterwards acquires, and that accordingly those diseases whose point of departure is from that membrane are far less frequent during the first six months of life than they

become during the succeeding eighteen months; while, from the completion of the second year up to the time of puberty, they go on diminishing in frequency and fatality. And there are important practical inferences which may be deduced from the facts we have just mentioned. They teach us not only that a catarrh is a much more serious thing in infancy than in adult age, but also that it is more serious at one period of infancy than at another, and they warn us to guard a child, during the time that the process of teething is going on, with double care against all causes that are likely to excite inflammation of its respiratory organs.

There are some diseases which, after having occurred once, confer on persons an immunity from subsequent attacks. This, however, is far from being the case with bronchitis or pneumonia in early life, but the susceptibility of the respiratory organs appears to increase in exact proportion to the frequency with which they have already suffered,* and a child who has once been attacked by inflammation of the lungs or air-tubes is more likely to have a second attack brought on by a slight change of temperature, than another who had never suffered from it would be to experience a seizure from a much graver cause. With advancing age this susceptibility seems to wear out, the child outgrows it; but we should act most unwisely if we were to sanction its exposure to the cold with the view of hardening it against its influence.

The importance of inflammatory diseases of the respiratory organs depends not merely on the frequency of their occurrence as idiopathic affections, but also on their tendency to supervene in the course of other maladies. This tendency, though very evident at all ages, is especially remarkable in early life, as is apparent from the fact that, in 26 only of the 87 cases enumerated in the former table, was the inflammation an idiopathic affection. When we come to the subject of measles, hooping-cough, croup, diarrhœa, and remittent fever, it will be necessary to study these secondary attacks of bronchitis and pneumonia with attention, since they constitute frequent and serious complications of those diseases, against which it behoves us to be most anxiously on the watch.

Before we pass to the examination of the symptoms of bronchitis and pneumonia, it may be as well to see what light can be thrown from the table we have more than once referred to, on the question of what diseases predispose to inflammation of the respiratory organs. The number of observations on which it is based is too small to warrant any very positive conclusions, but some of the results which it yields are not without interest.

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* In a tract on Pneumonia in Children, published some years ago in the British and Foreign Medical Review, I mentioned that of 78 children who came under my care for inflammation of the lungs, 31 were stated to have had previous attacks of the disease; 21 once; 4 twice; 2 four times; and 4 were said to have had it several times, though the exact number of seizures was not mentioned. Of these 31, 10 were under two years of age, 10 between two and three, and the remaining 11 between three and six.

In 65 cases the respiratory organs presented no sign of recent inflammation; the children having died of the following diseases:—

Trismus	3
Meningeal apoplexy	2
Cerebral congestion	1
Inflammation of the brain	1
Acute hydrocephalus	25
Cerebro-spinal arachnitis	3
Chronic hydrocephalus	1
Tubercle of the brain	3
Cancer of the brain	1
Croup	2
Laryngismus stridulus	2
Phthisis	5
Anasarca	1
Anasarca after scarlet fever	1
Diarrhœa	4
Atrophy	3
Congenital syphilis	1
Cancrum oris	2
Lumbar abscess	1
Scrofulous disease of the vertebræ	1
Fungus hæmatodes of the liver	1
" " " kidney	1

In 14 cases, though there was no sign of inflammation, yet a more or less considerable portion of the lung was collapsed, but restored by inflation to its natural condition, or presented the physical characters of collapsed lung in so marked a degree as to preclude the possibility of error.

The cause of death in these 14 cases was—

Congenital atelektasis	1
Induration of the cellular tissue	1
Convulsions	1
Meningitis of the convexity of the brain	1
Congestion of the brain occurring in the course of hooping-cough	1
Tubercle of the brain	1
Atrophy of one hemisphere of the cerebellum	1
Atrophy	5
Laryngismus stridulus	1
Fungus hæmatodes of the kidney	1

In 47 of the above 79 cases the pulmonary tissue was quite free from tubercle.

In 22 the lungs contained crude tubercle only; chiefly, but not entirely, in an early stage.

In 3, some softened tubercles.

In 7, some tubercular cavities.

In the remaining 87 cases, either the pulmonary substance, the bronchi, or the pleura, shewed signs of recent inflammation.

The pleura was mainly affected in 12 of these cases, its inflammation having been idiopathic only in 4. In 6 of these cases the lung was inflamed; in the other 6 merely compressed.

In 19 cases the inflammation was chiefly or entirely confined to the bronchi, and in 6 of these the inflammation was idiopathic.

In 56 cases pneumonia prevailed, which was idiopathic in 17, and secondary in 45 instances.

In the 59 cases of acute secondary inflammation of the lungs or bronchi, the patients had suffered from the following diseases:—

Acute pleurisy	6
Hooping-cough	16
Chronic bronchitis	1
Coryza	1
Croup	3
—— consequent on measles	2
Measles	5
Scarlatina	3
Anasarca after scarlatina	1
Remittent fever	2
Cancrum oris after remittent fever	1
Diarrhœa	3
Acute rheumatism	1
Phthisis	7
Convulsions	1
Acute meningitis	2
Acute hydrocephalus	3

Of the whole 87 cases—

In 69 the pulmonary tissue was free from tubercle.
In 10 it contained tubercle unsoftened.
" 5 " " softened.
" 3 " tubercular cavities.

We will now pass to the study of the *symptoms of bronchitis*, and will commence with the examination of the most simple form of inflammation of the air-tubes—namely, that which develops itself out of ordinary catarrh. In such a case the child has for some days seemed to suffer from

nothing more serious than a common cold; but, by degrees, instead of the cold and cough subsiding, the heat of skin becomes more considerable, the cough tighter, more frequent, and more painful, the child sometimes crying after each cough: the pulse becomes more rapid, the respiration wheezing, hurried, and often somewhat irregular. These graver symptoms often steal on very gradually, and among the poor it by no means seldom happens that the disease has already attained an advanced stage, and the condition has become one of very considerable peril, before the parents, never very observant of those ailments that are not attended with acute suffering, take the alarm. The flush of the face and the heat of skin become increased, the respiration more laboured, and the cough more troublesome towards evening; and the first hours of the night are usually very restless, but the child then falls asleep, and often dozes tranquilly for some hours; it then generally awakes with its respiration very oppressed, for the secretions have been accumulating in the smaller bronchi, and have now begun to impede the entrance of the air. An attack of cough probably comes on, which very likely ends in vomiting and the rejection of some mucus, and then by degrees the breathing becomes more easy, and the child may for a short time seem comparatively cheerful. The temperature of the surface, though increased, is variable; and, if the disease continue for several days, perspiration will be observed occasionally to break out on the body, while the pulse, though quickened, is not very much accelerated, and the tongue continues moist throughout. The ear detects nothing in the chest besides a mixture of rhonchus, sibilus, and largish crepitation, the dry sounds preponderating at the upper, the moist at the lower part of the chest, and being vastly more abundant behind than in front. Now in the adult a condition such as this would excite but little apprehension, but in the child it must be borne in mind that nothing more is needed than a copious secretion of mucus in the bronchi, or a feeble condition of the vital powers, to prevent the air from freely entering the pulmonary vesicles, and thus to induce the collapse of a large portion of the lung. Thus it is, at least as I apprehend, that we must explain many of the instances in which urgent dyspnœa, and all the symptoms of serious pulmonary disease, have developed themselves in the course of a few hours out of what had seemed to be nothing more than a rather severe cold, or a bronchitis of moderate intensity. This, too, accounts for the occasional sudden supervention of dulness on percussion, and of bronchial respiration in the child, so that you may discover them in the morning in a situation where overnight the percussion was good, and no sound was heard of graver import than large crepitation. This rapid change in the auscultatory phenomena has been noticed by Dr. Stokes as occasionally happening in the pneumonia of the adult.* That distinguished physi-

* On the Diseases of the Chest. 8vo. Dublin, 1837, pp. 311 and 327.

cian offers no explanation of the occurrence; but we can now understand what is its true import, and what the reasons are for its being met with so much oftener in the child than in the adult.

But, notwithstanding this danger, which is great in proportion to the youth of a child, yet most cases of idiopathic bronchitis that come on gradually, developing themselves out of previous catarrhal symptoms, have a favourable termination; and, as a general rule, it may be stated that an attack which is long in arriving at its acme, is seldom very dangerous in its character. Pure idiopathic bronchitis, occurring in an otherwise healthy child, in most cases subsides in the course of a few days, leaving the patient with an increased susceptibility to the influence of those causes which brought on the first attack, and perhaps with a degree of debility, the recovery from which may be protracted for many weeks.

There is, however, a form of acute bronchitis which is often, though not always, idiopathic, that runs its course with much rapidity, and generally tends to a fatal termination. In this, the *suffocative catarrh* of some writers,—the *capillary bronchitis* of others,—the smaller air-tubes throughout the whole or a considerable portion of the lungs are attacked either in connection with the larger bronchi or independently of them; and the inflammation, which is very intense, usually terminates in the abundant secretion of pus, or in the formation of false membrane that nearly obliterates their cavity, or, involving the pulmonary vesicles themselves, it gives rise through a considerable extent of the lungs to those appearances which have been described under the names of vesicular pneumonia and vesicular bronchitis.

Its attack is sometimes sudden, though in the great majority of cases it is preceded for a few days by the ordinary symptoms of catarrh, or it supervenes on that condition of bronchial irritation which accompanies or follows one or other of the eruptive fevers. Under these latter circumstances there is either a progressive though rapid increase in the severity of the bronchitic symptoms, or there is a sudden outbreak of fever and dyspnœa, and the cough becomes all at once frequent, short, and hacking. The disease soon attains a very considerable intensity, the face becomes anxious and oppressed, the eyes heavy, the manner distressed; the respiration very hurried, generally irregular, and interrupted by the cough, which often seems to occasion pain. The restlessness is often extreme, and the position which the child assumes very variable; but, in whatever attitude it may have placed itself, it does not like to be disturbed, and endeavours at once to return to its former posture. If spoken to, the child's answers are hurried, and its manner impatient, as though it were too much taken up with its suffering, or with the business of respiration, to be able to reply to questions. Sometimes it will say that it feels stuffed, or will complain of distress about the sternum, or of pain at the epigastrium; while pressure on the abdomen, by interfering with the free

descent of the diaphragm, always produces much discomfort. There is no appetite; and, though at first the thirst is very considerable, yet the child soon ceases to take much drink, for it wants breath to swallow fluids in any quantity, and therefore does little more than moisten its lips. At the same time, the tongue is moist, and either differs but little from its condition in health, or it has a thin coating of yellowish fur; the bowels are usually constipated, and not only are nausea or vomiting seldom present, but emetic remedies often fail of their ordinary effect when given in the course of this affection. As the disease advances, the cough becomes less hacking, though it continues very frequent: it sometimes puts on a paroxysmal character, and returns in fits somewhat like those of hooping-cough, except that each fit of coughing is shorter, does not terminate with a hoop, and is seldom attended with expectoration. Even if the cough be accompanied with expectoration, it is seldom that any thing is spit up more than a little mucus tinged with blood, or now and then a little pure blood, while in a few instances small shreds of false membrane have been seen intermingled with the mucus. For a time the respiration grows more and more hurried, and paroxysms of dyspnœa continue to occur at irregular intervals almost to the last. In these paroxysms the child's distress and restlessness are extreme, and it sometimes throws itself wildly about the bed. The breathing does not, however, go on increasing in rapidity until the patient's death; but, after the disease has reached its acme, the respiration often grows less frequent, though more irregular and more variable. The face loses its flush, and, instead, acquires a livid hue; the cough becomes smothered, and occurs less often; the pulse grows in frequency and fails in power; and though there is often a diminution of the restlessness, yet, if able to talk, the child will generally say that it is no better. As death approaches, though the respiration grows more laboured and more abdominal, yet the child's suffering generally diminishes, or a state of somnolence gradually steals over it, in which it lies till roused by an attack of cough or by a paroxysm of dyspnœa, and then, after a struggle for breath, it subsides into its former drowsiness. The struggles for breath grow feebler with each returning paroxysm, the drowsiness becomes more profound, and the patient dies.

It may be worth while to fill up what is wanting in this brief sketch of the disease, by the history of a case that displayed many of its most characteristic features.

A little boy, aged 7½ years, after suffering for a few days from general feverishness, with a constipated state of the bowels, was attacked on the 6th of April with incessant short cough and hurried breathing, for which symptoms he was ordered to be bled to six ounces, although only two ounces of blood were obtained. Twelve leeches were applied to his chest, and powders containing two grains of calomel and a quarter of a grain of

antimony were given him every four hours. The leech-bites bled profusely, and afforded some relief to the dyspnœa; but, notwithstanding this, the child passed a very restless night. The next morning he was found lying on his back, with his knees drawn up towards the abdomen, his face anxious, his eyes heavy, his skin dry; breathing at the rate of 78 inspirations in the minute, his respiration being often interrupted by a short hacking cough. His pulse was 138, and sharp. He complained of no pain, except when the abdomen was pressed on, but seemed then to suffer considerable uneasiness about the epigastrium. Percussion of the front of the chest occasioned so much pain that it could not be practised satisfactorily, and behind it did not elicit any difference between the two sides. Throughout the whole of both lungs sub-crepitant râle was heard; it was smallest in the inferior dorsal region, but was nowhere as small as true pneumonic crepitus. He was ordered to be cupped to ʒv. between the shoulders, and tartar emetic was ordered in ¼ gr. doses every ten minutes until free vomiting should be produced, after which the powders were to be resumed. He took gr. ij. of the tartar emetic without the slightest effect being produced; and on the 8th his respiration had risen to 98, and his pulse to 144. On the 9th his respiration had sunk to 72, but the pulse had risen to 156; the cough was usually short and hacking, but attacks of it now came on at intervals which resembled a paroxysm of hooping-cough. The tartar emetic was now given in doses of gr. ss. every two hours, but no effect was produced by it beyond producing a feeling of nausea, and occasioning very slight vomiting twice. For an hour or two early in the morning of the 10th he seemed somewhat better, but this improvement soon passed away, and he began to complain of great pain in the chest, whereas his answer previously to all inquiries had been, "I am so stuffed." His cough was more severe, and the mucus which he now and then expectorated with it was sometimes tinged with blood. He passed another night of distressing restlessness, but on the morning of the 11th grew quieter, and, when not disturbed, lay on his right side dozing. If spoken to, he gave intelligent answers, and said, "I am no better," though, if left alone, he made no complaint. He continued drowsy all through the day. Towards evening he had a few minutes of cheerfulness, and spoke of his own accord to his father. His mother lay down by his side: he slept, and seemed to breathe gently; she slept too, nd when she awoke at 4 A.M. on the 12th her boy was dead: life had fled so quietly, that, though her arm was round him, she had not been disturbed.

I need not detail to you the appearances found on dissection of the body, since they were such as have been mentioned as characteristic of capillary bronchitis, though the air-tubes, notwithstanding their intense injection, contained neither pus nor false membrane, and very little mucus. The

case illustrates the remarks already made on the symptoms of the disease, and illustrates, too, the remarkable results which percussion and auscultation yield in this affection, since sub-crepitant râle continued to be heard to the last, unmixed with bronchial breathing or pneumonic crepitus, while so long as percussion could be practised, it failed to elicit a dull sound anywhere.

Though the indications afforded by auscultation and percussion are often sufficiently characteristic of this disease, yet there are some circumstances which may occasionally render their information doubtful. The child is sometimes so extremely alarmed, and the sensibility of its surface so much increased, that we have much difficulty in percussing the chest; but we shall usually be able to distinguish this from the painfulness of the walls of the thorax which attends pleurisy, by finding that it is not limited to one half of the chest, but that it is felt equally on either side, and as much in front as behind. If we can succeed in percussing the chest, however, it will be found to yield a natural, sometimes even an increased, degree of resonance, while little if any difference can be discovered between the sound afforded by the upper and that given out by the lower part of the chest; or, should such be perceived, it is generally due to pneumonia having supervened. The ear detects a scanty transmission of air, attended at first with rhonchus and sibilus, but soon with a universal sub-crepitant râle, heard most distinctly on the child making a deep inspiration. By the term sub-crepitant râle, it can be hardly necessary for me to say that a sound is meant smaller in character than large mucous râle, but larger than the true small crepitation of pneumonia. As the disease advances, the only change that takes place consists in this sub-crepitant râle being replaced by a larger mucous râle, the result not of any improvement in the child's condition, but of the air scarcely penetrating beyond the larger bronchi; for you will still hear the smaller sound during the deep inspiration that follows an attack of cough.

This form of bronchitis is one not only very dangerous, but likewise very rapid in its course to a fatal issue. I saw one little girl in whom it came on while convalescent from an attack of measles fourteen days before, who died within forty-eight hours; and the boy whose case has been just related died in less than four days from the appearance of any serious symptom. These, however, were instances of a rather unusual rapidity in its course, and from five to eight days, which is the estimate of its duration formed by M. Fauvel, who has written a very valuable essay on the disease, is probably not far from the true average.*

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* Recherches sur la Bronchite Capillaire, etc. 4to. Paris, 1840; republished in a more extended form in Vol. 2 of the "Mémoires de la Société Médicale d'Observation," 8vo. Paris, 1844.

But we may now pass to the *treatment of bronchitis*, in which you will find those general rules applicable that have already been laid down when we were speaking of catarrh; while in exact proportion to the severity of the symptoms will be the care with which you must watch against the supervention either of pneumonia or of that collapse of the lung which forms so grave an occurrence in early childhood. In the ordinary forms of bronchitis, general depletion is neither required nor well borne, and even the local abstraction of blood must not be heedlessly resorted to. Leeches may be applied at the commencement of the attack, if the child be strong, and the febrile disturbance considerable, and they may be employed subsequently, if, while the child's powers are still undiminished, the cough should become shorter and more hacking, and the crepitation either very general and abundant, or smaller in the lower than in the upper lobes. They must not be employed with the view of at once cutting short the attack, nor must we be led by the relief afforded by their first application to repeat them in the hope of subduing the disease by depletory measures. I usually apply about four leeches to a robust child of two years old, and it is very rarely that I repeat their application. The situation in which they are applied is not altogether unimportant. I prefer applying them beneath the scapulæ; partly because there may be some advantage in drawing blood from the neighbourhood of that part of the lungs which is most likely to become congested, but still more because the child is not alarmed as it would be if they were put on the front of the chest, where they are within its sight, and because in this situation it is unable to irritate the bites by picking them, as it is very apt to do when they are beginning to heal.

There is in these cases the less excuse for over depletion, since we are possessed in the tartar emetic of a most powerful means of subduing the disease. In a healthy child suffering from a bronchitis of moderate severity, I sometimes give it in the form of James's powder, combined with a small quantity of calomel and ipecacuanha, every four hours for the first twenty-four or thirty-six hours. This combination usually acts on the bowels slightly, as well as on the skin; and if the child be now relieved, the calomel may be suspended, and small doses of antimonial and ipecacuanha wine may be given instead in a mixture.

A severer attack of the disease would call for the use of antimony in larger doses, so as to obtain its emetic effect at first, and afterwards, by the repetition of the remedy every hour or two hours, to keep the child for one or two days under its influence. Even in cases where the disease is not so severe as to require the energetic employment of antimony, there is generally an exacerbation of fever and dyspnœa towards evening, and this is often much relieved by an emetic of antimony and ipecacuanha, which may also in many cases be repeated with advantage in the morning,

when the child having been asleep for some hours, during which the mucus has been collecting in the bronchi, it breathes with difficulty on awaking, until the air-tubes having been freely emptied by an effort at vomiting, the air is once more enabled freely to permeate the lungs. Even in those cases which at first required the constant use of large doses of antimony, it is a matter of importance to dispense with them as soon as we can with safety, and to substitute the use of emetics at intervals, while we employ some milder expectorant medicine between the doses of the emetic. It can scarcely be necessary to remind you that there are few medicines which exert so depressing an influence on the muscular powers as the tartar emetic. If, therefore, in a child whose air-tubes are already nearly filled with the abundant secretion, you carry the depressing effect of antimony too far, the air will no longer be inspired with force sufficient to make it reach the smaller bronchi, and collapse of the lung will consequently take place. It follows, then, that we must not venture to carry the depressing effects of antimony so far in the child as we may safely do in the adult, but when the medicine has either ceased to vomit, or is merely regurgitated without effort, we must either suspend it altogether or greatly diminish its dose, or give it at distant intervals, so as to obtain its emetic action, while we allow time between the doses sufficient to permit the child perfectly to recover its powers. The effect of vomiting, on the other hand, is useful in two ways, for it not only empties the air-tubes of the mucus that obstructs them, but it also occasions several deep inspirations to be made, by which the air is drawn into the remotest parts of the lungs, and their tendency to collapse is thus prevented.

Your attention has on more than one occasion been called to the remarkable tendency of the nervous system in early life to sympathize in the affections of other parts. This tendency is often very evident in inflammation of the respiratory organs; and, accordingly, you must not always take the degree of dyspnœa in a case of infantile bronchitis as a measure of the affection of the lungs, since it may be only an evidence of the sympathy of the nervous system. If you treat this symptom actively, without having first inquired into its import, you may destroy your patient. When first taken ill, indeed, the child's respiration was hurried and laborious; you applied leeches to the chest and gave tartar emetic freely, and the breathing, which grew less hurried and less oppressed, justified the wisdom of your treatment. But if the respiration again rise in frequency, and you, in order to reduce it, redouble the activity of your treatment, you may be disappointed in the effect that you hoped to attain; the respiration may grow more and more frequent, and the child before long die in convulsions. If in such a case you had examined the patient with due care, you would probably have discovered that the dyspnœa was not associated with increase of the heat of the skin; you would have learned that it had varied much within a few hours, sometimes subsiding and then returning without

adequate cause; you would not have detected any deterioration in the results of auscultation, while you would probably have perceived in the half-closed eyes, or the thumbs drawn into the palms, signs of the disturbance of the nervous system.

This nervous dyspnœa sometimes occurs early in the disease, at a time when active treatment is evidently indicated; and while that plan is continued we shall best meet this symptom by applying a mustard poultice to the chest, and by placing the child as high as the pelvis in a hot-bath. The evening attacks of dyspnœa are often more effectively controlled by this than by any other means. When these symptoms come on at a more advanced period of the disease, or in a child previously debilitated, they indicate that active treatment must no longer be persevered in. The antimony must be discontinued, or its dose greatly reduced, and the vinum ipecacuanhæ, with small doses of nitrous ether and of the compound tincture of camphor, should now be given, or even small doses of the Dover's powder. The general restlessness will be much relieved by immersing the whole body in a warm bath, which should not be employed at so high a temperature as when used for its counter-irritant action. At the same time attention must be paid to support the child's strength, by veal-broth, arrow-root, or other nutritious diet.

After the acute symptoms of bronchitis have been subdued, the subsequent convalescence of the patient is often protracted by the continuance of cough and wheezing respiration; symptoms which on a very slight cause are apt again to put on the more serious characters of the acute disease. In this chronic stage, a general tonic plan of treatment must be adopted, while at the same time much benefit will often be obtained by the employment of a stimulating liniment to the chest. The extract of bark is an extremely useful tonic, especially in cases where there exists any tendency to diarrhœa; while the wheezing is often relieved by the administration of an emetic of ipecacuanha every night. If the secretion in the bronchi be very abundant, the decoction of senega, with ammonia and tincture of squills, is often superior to any other medicine. If the bronchitis have supervened during dentition, you must not be surprised at slight relapses occurring just as each tooth approaches the gum. At other times, however, bronchitic symptoms continue for a long period, the expectoration being copious and puriform, while the child loses flesh, and the relations become not unnaturally apprehensive lest it should be phthisical. Their fears may be well founded, but at the same time that you would recommend change of climate to some warmer country in the winter, or to the sea-coast during the summer, you would, as I shall hereafter point out to you when speaking of phthisis, be warranted in taking a much more favourable view of such cases in a child than in the adult.

The general principles on which you must treat the more grave attacks of capillary bronchitis have been laid down in what has been already said.

A greater degree of activity in your treatment is needed; you may even deplete generally, and follow up this depletion by local bleeding, but the caution already given against the repeated abstraction of blood holds good here. With reference to antimony, too, it is while the emetic action of the remedy continues that you may hope for benefit from its employment; while you must be careful not to persevere in its use when the livid face and faltering pulse show that the aeration of the blood is nowhere duly carried on. A blister to the chest, and the stimulant expectorants, as ammonia and senega, may now be given, while the attempt may be made, by emetics of squills and ipecacuanha, to unload the bronchi at intervals of four or six hours. These are the cases, however, in which if you do not get the better of the disease at first, your subsequent remedies will probably be too tardy to overtake it.

LECTURE XVII.

Pneumonia continued—Symptoms of pneumonia frequently present a mixed character when it supervenes on bronchitis—Idiopathic pneumonia—approach of first stage generally gradual—characteristic peculiarities in mode of sucking and of respiration—attack sometimes sudden. Symptoms of second stage—results of auscultation—reasons for rarity of true pneumonic crepitus. Symptoms of third stage—convulsions often precede death—their import—occasional imperfect recovery—auscultatory phenomena of this stage.

Nature of modifications in symptoms produced by association with bronchitis. Diagnosis from bronchitis—pleurisy—hydrocephalus—remittent fever—intestinal disorder during dentition.

Treatment—Depletion, general and local; rules for each—Tartar emetic—limitations as to its use. Mercury—its importance—danger of salivation very slight. Diet—antiphlogistic in the early stages—caution as to sucking—stimulants often needed in advanced stage. Blisters in general not desirable.

It was stated in the last lecture, that the supervention of inflammation of the substance of the lungs constitutes one of the chief dangers of infantile bronchitis. Pneumonia, however, is not to be regarded as being invariably a secondary affection; for while the disease of the air-tubes is in some cases but trivial, the pulmonary substance is the seat of serious inflammation: and in other instances, the air-tubes are altogether unaffected, or at least are involved only in common with the other constituents of the lung. In either case, there are peculiarities enough, both in the symptoms observed and in the treatment required, to render the separate study of pneumonia indispensable.

When pneumonia supervenes, as it by no means seldom does, on previous catarrhal symptoms, the disease often comes on insidiously, and develops itself so gradually out of the preceding trivial ailments that it is not possible to determine the exact date of its attack. At other times, indeed, there is a sudden and well-marked increase of the fever and dyspnœa, and an aggravation of all the symptoms, sufficient clearly to point out the date of the supervention of the pneumonia. But, even though this should be the case, yet if there were much bronchitis pre-

viously, the affection of the air-tubes will often mask that of the lung to some degree: and the case not presenting the symptoms either of pure bronchitis or of unmixed pneumonia, will assume some of the characters of both, and merit, both by the phenomena attending it during life, as well as by the appearances found after death, the name of *bronchio-pneumonia*. Cases of this mixed character occur most frequently during the period of teething, when the mucous membranes are especially susceptible. We will return to notice some of their peculiarities hereafter; but will first examine the *symptoms* that attend a case of *idiopathic pneumonia*, where the pulmonary substance has been affected from the outset, and has not merely become involved by the extension to it of mischief commencing in the bronchi.

In almost all of these unmixed cases, a condition of general feverishness, exacerbated towards evening, with fretfulness and pain in the head, precede the more marked symptoms. The child is either restless at night, or, if it sleep, its repose is unsound; it talks in its sleep, or wakes in a state of alarm. Sometimes from the very first, at other times soon after the appearance of these febrile symptoms, cough comes on; at first, short and hacking, frequently not causing the child any uneasiness, and so slight as scarcely to excite the notice, and not at all to awaken the anxiety of the parents. Loss of appetite and increase of thirst are early observable; the bowels are usually constipated, and vomiting is not infrequent, especially in infants at the breast. The tongue and lips are at the same time of a florid red; the tongue is less moist than usual, and is generally coated in the middle with a thickish white fur. In these symptoms, indeed, there is but little to mark the real nature of the case, or to point to the organ whose disease has kindled the fever in the system; for the slight cough, if not overlooked, may yet be attributed to irritation of the bronchi, sympathetic with derangement of the stomach or intestines. The respiration, too, is not always much hurried at this early period; while, in the young child, both its frequency and that of the pulse are much modified by position; and the results of auscultation are not uniform, and may sometimes afford no information at all. Even now, however, there are some signs which to the attentive observer will convey much information, and information all the more valuable from our being furnished with it chiefly in those young infants, in whom the diagnosis of this disease is attended with most difficulty. The seat of the mischief is shown to be in the respiratory organs, by the child no longer breathing through the nares, as it does in health, while the tongue is applied to the roof of the mouth; but by its breathing through the open mouth also, whence the tongue early acquires an unusual degree of dryness. This same inability to respire comfortably through the nares causes the child to suck by starts: it seizes the breast eagerly, sucks for a few moments with greediness, then suddenly drops the nipple, and in many

instances begins to cry. As the disease advances, these peculiarities in the mode of sucking and of respiration often become more striking; but it is at its onset that they are most valuable, since then we have fewer indications to lead us right.

It is not, however, thus gradually that pneumonia always comes on, for sometimes a child who had gone to bed well, or merely a little poorly, wakes in the night in a state of alarm, refusing to be pacified, with a flushed face and burning skin, and hurried breathing and short cough. This sudden supervention of pneumonia is not so often met with among infants at the breast as among children from two to four years old. Often, though not always, this severe onset of the disease has appeared to depend on the pneumonia being associated with extensive inflammation of the pleura; but sometimes the symptoms which at first seemed so threatening soon subside, and the affection, in its subsequent stages, presents no peculiarity, and is not by any means remarkable for its severity.

This *first stage* of pneumonia passes, for the most part, by degrees into the *second*, in which the nature of the affection is generally obvious to all. The momentary cheerfulness which before existed has now passed away; infants now no longer wish to be removed from the cradle, or from the recumbent posture in their nurses' arms, and older children have quite lost all interest in their play; they become drowsy, ask to be put to bed, and cry if taken up. The hurry of the respiration is now abundantly evident; the *alæ nasi* are dilated with each inspiration, the abdominal muscles are brought into play to assist in its performance, and any change of posture renders the breathing more laboured and more hurried. The cough has become much more frequent; it is still hard, sometimes is evidently painful, so that the child cries with each cough; at other times it is an almost constant short hack. The bright flush of the face, and the florid tint of the lips, have gone, but the heat of skin continues; for the persistence of an almost unvarying high temperature throughout its course, is, as M. Roger has shown, one of the characteristics of the pneumonia of the child as well as of that of the adult. It is a pungent heat, which becomes more sensible the longer the hand is kept in contact with the surface; and so great is the elevation of temperature that M. Roger found it average almost 104° Fah. in ninety-seven experiments, while in some cases it greatly exceeded this degree. Though so intense, however, this heat is unequal at different parts, the extremities being cool, or even cold, while the body is hot; but there is no moisture on any part of the skin. The face now assumes a puffed, heavy, but anxious appearance, and when the child is very young, or the pneumonia very extensive, the lips put on a livid hue, which is also very evident around the mouth, while the face generally is pale. The thirst usually continues very urgent, but children at the breast still vomit the milk. This is apparently owing to their thirst being so urgent as to lead them to suck too greedily, and thus overload their

stomach, since while they generally vomit almost immediately after leaving the breast, they do not reject small quantities of fluid given them from a cup or spoon. The disease of the lungs now betrays itself most strikingly in children at the breast, for as often as they attempt to suck, the respiration becomes at once greatly hurried; they drop the nipple, panting, from their mouth, or, having seized it, have not breath sufficient to make the vacuum necessary to bring the flow of milk.

The results of auscultation, though variable, are now sufficiently obvious. Crepitation is now heard, often in both lungs, and generally in their lower and posterior parts—seldom, however, the minute crepitus such as we hear in the pneumonia of the adult, but that sound known as the sub-crepitant râle. The comparative rarity of true pneumonic crepitus in the inflammation of the lungs in infancy is a point not to be lost sight of; often, however, if you keep your ear to an infant's chest, and wait till it takes an unusually deep inspiration, you will hear the true crepitus of pneumonia just for a moment when the air enters the pulmonary vesicles, and then again you will lose it when the child breathes as it was doing before, and you will hear only the sub-crepitant râle. If the inflammation have attacked only one lung, you will perhaps be struck by the loud puerile breathing in the healthy organ, which is thus compelled to perform a double function. If both be involved, you may almost overlook the disease, since you have not the aid afforded by contrast, unless, as sometimes happens, the mischief on the one side is so far advanced as to cause bronchial breathing, while on the other side crepitation alone is audible. This bronchial breathing is sometimes heard associated with sub-crepitant râle, or with large crepitation, while at other times the ear detects nothing but the whiff of air through the larger air-tubes; and often this alone is audible on an ordinary inspiration, while on a deep breath being taken, the sub-crepitant râle will be at once perceptible. In the child we lose all the information which, in the adult, is afforded by the different modifications of the voice sound, for the shrill or querulous tone of a suffering child, and the words often uttered in very different keys, yield, even when the child is old enough to talk well, results far too uncertain to be trustworthy.

Percussion sometimes yields a very manifest dulness on the affected side; and this dulness is usually most evident in the infra-scapular region. At other times, however, no such marked results are afforded, but the lower parts of the chest yield a somewhat duller sound than the upper, and the impression communicated to the finger is that of greater solidity below than above the scapula. This last sign is often very valuable, since it may be perceived at a time when the ear cannot clearly detect any actual dulness on percussion.

Death may take place in this, the second stage of pneumonia, if a very extensive portion of lung have been involved in the disease, or if it be associated with much inflammation of the pleura, or if the pneumonia

have been grafted on severe bronchitis. The pneumonia which supervenes on measles, or which comes on in a child debilitated by previous illness, sometimes terminates unexpectedly in this stage, and on an examination of the body after death, the lung is found scarcely to have passed beyond the first stage of pneumonia, except in a few portions of but limited extent; though still larger tracts will probably be found in the state of carnification, and to the sudden supervention of this condition the fatal event is probably in great measure due. It is important, too, to bear in mind that in weakly children a pneumonia of even very small extent will often prove fatal: hence the great importance of watching most sedulously against all those intercurrent affections of the lungs which come on in the course of diarrhœa, measles, remittent fever, &c.

But the pneumonia may be free from any of the above-named complications, and then, if unchecked by treatment, it will pass into the *third stage*. The respiration now becomes more laboured, and though its frequency is sometimes diminished it will be found to have become irregular; several short and hurried inspirations being followed by one or two deeper, and at longer intervals, and these again by hurried breathing. The cough sometimes ceases altogether, or if not, it is less frequent, and looser, since it is now produced by the child's efforts to clear the larger air-tubes from the accumulating secretions. The voice is often lost, the patient speaking only in a hoarse whisper; while children who were just learning to talk, will frequently maintain complete silence, as if conscious that they have no breath to waste in words. The face looks sunken, the extremities are cold, and though the trunk retains its high temperature almost to the last, yet the skin often loses somewhat of its previous dryness, and clammy sweats break out, especially about the head. The pulse is extremely frequent and small, and the beats so run into each other that it is almost impossible to count them. The child is sometimes very restless at intervals, tossing about from side to side as much as its reduced powers will permit; but it usually lies in a state of half consciousness, though sensible when spoken to, and fretful if disturbed. If raised hastily from the recumbent posture, or if put to the breast, the great increase of dyspnœa which is immediately produced, shows how seriously the respiratory organs are affected. In many cases, too, the livid hue of the face and of the nails is a further proof of the great impediment which exists to the decarbonization of the blood; and once I saw purpurous spots appear on the arms and hands thirty-six hours before the death of a previously healthy child of a year old, in whom an attack of idiopathic pneumonia terminated fatally on the seventeenth day. This condition seldom lasts above two or three days; for either life becomes gradually extinct, without the supervention of any new symptom, or convulsions occur, which are followed by fatal coma, or the child recovers from it for a few hours only to suffer a second attack of convulsions, and a return of coma, in which it

dies. It can scarcely be necessary to remind you of what was said some time since with reference to the import of convulsions, and to their being in many cases merely a token of disturbance of the function of the brain, such as delirium is in the adult. The former symptom in the child, and the latter in the adult, betokens in a case of pneumonia that the brain is suffering from the circulation through it of imperfectly aerated blood.

The third stage, however, does not always advance thus uninterruptedly to a fatal issue, but a kind of imperfect recovery sometimes takes place. A diminution is obvious in the more alarming symptoms; the patient begins to express some desire for food as well as for drink, and even has occasional gleams of cheerfulness. The cough, which in many instances had almost or altogether ceased, returns, but is short and hacking, although there is sometimes a good deal of mucus in the larger air-tubes. The dyspnœa is no longer urgent, though the breath is habitually short. The skin is hot, dry, and harsh, and evening exacerbations of fever often occur; the tongue is red, dry, and sometimes chapped, or presents small aphthous ulcers at its edges; diarrhœa is not infrequent; the child wastes daily, and dies in the course of a week or two, worn out and exceedingly emaciated.

The auscultatory signs of this third stage of pneumonia are in the main those of the second stage, except that the bronchial breathing usually becomes both more distinct and more extensive, occupying situations where either the sub-crepitant râle, or even large crepitation, had previously been heard. As it extends, too, it becomes audible in front as well as behind, and both it and dulness on percussion may be perceived in the infra-mammary as well as in the infra-scapular region, to which, at first, they are almost always limited. This bronchial breathing is generally much more extensive on one side than on the other, and sometimes it is heard throughout the whole posterior part of one side of the chest; but I never found bronchial breathing confined to the upper part of one lung, except in cases where there existed previous tubercular disease of the organ, and then the pulmonary tissue may become solidified under the influence of an amount of disease which otherwise would be inadequate to produce this result.

The symptoms that attend the third stage of the disease usually are the result of the lung having passed into the state of suppuration. I say usually, for sometimes recovery eventually takes place even from a condition apparently desperate, and in such cases the degree to which disorganization of the lung had actually advanced must always remain uncertain.

The results of auscultation do not help us, any more than in the adult, to determine with certainty the amount of injury that the lung has received, while we are deprived almost entirely of that information which in the grown person is afforded us by the changes in the appearance of the sputa. In some cases of rapidly fatal pneumonia I have seen a frothy secretion

collect about the mouth, but this was evidently not furnished by the air-tubes, but was merely the saliva which the child was unable either to spit out or to swallow. The cough of pneumonia being generally short and not paroxysmal, we have not so much chance of seeing the sputa as in the case of acute bronchitis, and children even of five or six years old seldom spit out the matters that they may expectorate, but almost always swallow them.

When resolution of a hepatized lung takes place, the changes in the physical signs of the disease are much the same as are perceived in the adult. I have not, however, in any instance detected a return of true pneumonic crepitation, but sub-crepitant râle in most cases became audible, and in a few instances large crepitation. In either case mucous râle was eventually heard, and it often continued for many days after the lung had in other respects recovered its natural condition, apparently much as in the pneumonia of the adult; a prolonged expiration often persists for a long time after all the other signs of disease have disappeared.

At the commencement of this lecture reference was made to cases in which the symptoms of pneumonia are modified by those of the bronchitis with which it is associated. In such cases there is from the very outset a marked degree of dyspnœa and distress, and the face presents from the first a livid hue. The cough is less short than in simple pneumonia, but it comes on in paroxysms which greatly distress the patient; the respiration is more hurried and more irregular, and this irregularity comes on at an earlier stage of the disease. Large crepitation and the sub-crepitant râle are generally heard very extensively in both lungs, but true pneumonic crepitation is unusual. A preponderating affection of the lower lobes is seldom perceptible, and since these cases usually tend to a rapid termination, death sometimes takes place before either dulness on percussion, or bronchial breathing, has become distinctly perceptible.

Such are the characters generally presented by pneumonia in early life, and these are usually so well marked as to render it impossible either to overlook the disease or to mistake its symptoms for those of some other malady. This, however, is not invariably the case even when the inflammation of the lungs occurs as an idiopathic affection, while in those instances in which it comes on in the course of other diseases, it very often remains latent, and much acuteness of perception, as well as much patient observation, are necessary for its detection. We will pass over for the present the consideration of secondary pneumonia, since to understand all the varieties that it presents would require a previous acquaintance with those diseases in the course of which the inflammation of the lungs supervenes. When we come to the study of hooping-cough, croup, measles, remittent fever, &c., I will endeavour to point out the period at which, in each of these maladies, pneumonia is most to be apprehended, and the

symptoms that indicate its attack; but to-day we will confine our notice to those cases in which the inflammation of the respiratory organs occurs as an idiopathic affection.

The points of *difference between pneumonia and bronchitis* have already been dwelt on so fully as to render it unnecessary to recapitulate them. In many cases they are too obvious to admit of your falling into error, but in others they are so shaded off that it is difficult to determine whether the characters of one or of the other predominate, and we are forced to conclude that the two exist together, the one obscuring the otherwise well-marked features of the other.

In the child, as in the adult, some degree of pleurisy exists in a large proportion of cases of pneumonia, though sometimes so slight as to be scarcely noticed, whilst in other cases, though a little friction sound may be heard for a short time, yet it is evident that the danger to life is occasioned by the mischief in the lung, and not by the affection of the pleura. Sometimes, however, inflammation of the pleura is the chief, if not the sole, cause of the patient's danger, and hence it is desirable to know, even at the outset, whether the lung or its investing membrane is the part chiefly affected.

An attack of *pleurisy* is much oftener marked by complaint of severe pain in the chest, than is an attack of pneumonia; or if the child be unable to express its feelings, the seizure is not unfrequently announced by violent and continued screaming. Sympathetic disturbance of the brain is more frequent and more severe at the onset of an attack of pleurisy than of pneumonia, and the attendant restlessness greater. Auscultation, too, fails to discover the crepitant or sub-crepitant râle which characterises pneumonia, but air enters the lung on the affected side much less freely than on the other, and a friction sound may perhaps be distinguished, though this is by no means invariable, and even when present it may easily be mistaken for rhonchus. It may be laid down as a rule, subject to but few exceptions, that whenever a child is suddenly seized with symptoms which, while they indicate some affection of the lungs, are yet unattended with the auscultatory signs of pneumonia, the disease from which it is suffering is pleurisy, and the probability is rendered almost a certainty, if, while the child bears percussion on one side of the chest, it cries and struggles on the slightest attempt at percussion of the opposite side.

The error of taking a case of pneumonia for one of pleurisy, however, or the opposite, is of comparatively little moment; but there are other diseases for which pneumonia may be taken, in which the error of diagnosis will lead to serious, and perhaps fatal, mistakes in treatment.

These mistakes, too, may be made at almost any stage of the disease. At the commencement, pneumonia may be taken for *incipient hydrocephalus*. The vomiting, the pain in the head, the restless nights, with talking in the sleep, which attend the onset of almost all the acute

affections of childhood, the fever, and the constipated state of the bowels common to both diseases, lead to this error. The cough in some cases of pneumonia is so slight as scarcely to be noticed, while even if present it may be taken for that sympathetic cough which is sometimes present in the early stages of hydrocephalus, and the child, if questioned, may complain of his head, and of nothing else. But still there are circumstances which would lead the attentive observer, even independently of auscultation, to detect the real nature of the case. The vomiting that ushers in an attack of pneumonia, though sometimes violent, seldom continues long, and is unattended with that permanent nausea and irritability of the stomach which are so marked in the first stage of hydrocephalus. The evacuations in pneumonia are natural; the tongue is of a much more vivid red than in hydrocephalus; the pulse is much more frequent, the heat of skin far greater, and more remarkable on the trunk than about the head, and the thirst is generally urgent. If these indications, however, be overlooked at the commencement of the attack, and if auscultation, by which the error might still be set right, be neglected, it is probable that each subsequent occurrence will be misinterpreted, and that the real nature of the disease will not be understood until it is revealed by the post-mortem examination. More or less sympathetic affection of the head is seldom wanting in pneumonia to confirm the preconceived, erroneous, notion; while as the child grows worse, the difficulties in the way of making a careful auscultation increase. Convulsions sometimes occur even several days before the patient's death, and the head symptoms may appear, especially to a prejudiced observer, to be much more striking than any which indicate affection of the lungs.

It sometimes happens that the sympathetic *disturbance of the stomach and bowels* is so considerable as to obscure the chest symptoms, and the case is taken for one of enteritis, or perhaps, if the heat of skin and sensorial disturbance be considerable, for one of remittent fever. The vomiting at the outset of the disease, the pain referred to the abdomen, with the evident increase of discomfort on pressure, the red tongue, with its disposition to dryness, and the diarrhœa that exists in these rather exceptional cases of pneumonia, are the circumstances which tend to lead into error, and this error may be confirmed on the practitioner finding that at least temporary relief follows the application of leeches and poultices to the abdomen. With reference to the complaint of pain in the belly which seems often to have a large share in inducing this error, it must be remembered that the statements of children with reference to the seat of pain are very vague, and that they frequently speak of the belly when they mean the chest, while the impediment to the descent of the diaphragm occasioned by pressure on the abdomen, especially if this pressure be either sudden or considerable, will almost always excite expressions of uneasiness when the organs of respiration are in any way affected. It is in careful

auscultation that you will find your chief safeguard against these mistakes; but you will find besides, that, by accustoming yourselves to look not at one or two prominent symptoms only, but at the relation which each bears to the other, many of the chief difficulties in the way of forming a correct diagnosis will disappear.

It may perhaps seem to you that much of this is very dry and rather needless detail, but unfortunately my own case-books would enable me to illustrate each of these errors of diagnosis against which it is my endeavour to guard you. One more caution I would offer you, and that is, not to overlook the *pneumonia* which sometimes comes on *in children while teething*. Unless you be on the watch for it, its early symptoms will probably fail to excite your apprehension, since they will be regarded as the result of that sympathetic irritation of the air-tubes which so often accompanies dentition, and the time for action will thus be allowed to pass unemployed. The disease comes on most frequently in weakly children, is unattended by much constitutional reaction, and often runs a somewhat chronic course, while its nature is further obscured by the tendency to diarrhœa which exists during dentition, and which is now excited by the thoracic affection. The purging often becomes the most striking symptom, and all means are employed to suppress it, and to check the vomiting which generally attends it. These efforts, however, are unavailing; the child wastes daily, and its skin hangs in wrinkles about its attenuated limbs, while the abdomen becomes tumid from the collection of flatus in the large intestines, and tender on pressure, and the tongue grows red, dry, and chapped, or covered with aphthous ulcers. The cough now perhaps attracts notice, but both it and the bronchial breathing in the lungs are probably looked on as indications of phthisis, and the doctor consoles himself with the belief that he has failed to cure the disease because it was irremediable. At last the child is worn out, and dies, and great is the surprise to find no tubercle in any part of the body, no disease in the intestines, but pneumonia, with purulent infiltration in both lungs,—a disease which ought to have been detected, and which probably might have been cured.

We come now, in conclusion, to the consideration of the *treatment* of pneumonia in children. The main principles that guide us are the same as in inflammation of the lungs in the adult, and our chief reliance is placed on the same remedies in both cases—namely, depletion, calomel, and tartar emetic.

You will find that many of the continental writers on the diseases of children are greatly opposed to the abstraction of blood in cases of infantile pneumonia, and that some even assert that it invariably debilitates the system, and accelerates the patient's death. This opinion, however, has been formed by the observation of those secondary pneumonias which are

of such frequent occurrence among the inmates of the Children's Hospital at Paris; and therapeutical conclusions deduced from cases of so peculiar a kind as are there presented cannot be framed into rules for the general guidance of our conduct. But much misapprehension has also arisen from confounding the condition of collapse of the lung with that of its solidification from true inflammatory action, and the mistaken pathology has led to mistaken treatment. In the management of cases of idiopathic pneumonia occurring in previously healthy children, whatever be their age, *depletion* is as important a remedy as in the adult; nor will the most energetic employment of any other antiphlogistic measures enable us safely to dispense with its use. In a healthy child of two years old a vein may be opened in the arm, and ℥iv. of blood may be allowed to flow, provided that faintness be not earlier produced, without there being any reason for us to apprehend that the plan we are adopting is too energetic. It often happens that the child faints before this quantity of blood has been drawn, while in other cases not above one or two ounces of blood can be obtained. Still, whenever the patient is seen at the commencement of the attack, general depletion is desirable, even though it should be necessary to follow it up by local bleeding; for the immediate effect which it produces is greater than that which follows local depletion, and the quantity of blood abstracted by it is definite; while, if both the nurse and the medical attendant understand how to manage children, it may be so conducted as to cause them but little excitement or alarm. If but very little blood can be drawn from the arm, or if, as is not seldom the case with infants under two years of age, it be not possible to find a vein, depletion must be accomplished by means of leeches, which, for reasons already stated, it is desirable to apply beneath the scapulæ. How great soever may have been the relief which followed the first bleeding, it is not always permanent; and hence the child should be seen again in from six to eight hours, and if the symptoms appear to be returning with anything of their former severity, depletion must be repeated; though then local blood-letting is to be preferred to venesection, even in cases in which bleeding from the arm had been resorted to in the first instance. It must never be forgotten, that in the child, as well as in the adult, no subsequent care can make up for the inefficient treatment of the early stage of pneumonia: if the first twenty-four hours be allowed to pass while you are employing inadequate remedies, the lung, which at first was merely congested, will have become solid, and recovery, if it take place eventually, will be tardy, and perhaps imperfect. On the other hand, cases that set in with the greatest severity sometimes appear to be at once cut short by free depletion, the violent symptoms being arrested, and recovery going on uninterruptedly almost without the employment of any other remedy.

In the treatment of the pneumonia of the adult we are accustomed to follow up the advantages gained by depletion by the administration of

tartar emetic, and, under proper restrictions, the remedy is no less valuable in early life. Given in doses of one-eighth of a grain every ten minutes till vomiting is produced in the case of a child of two years old, and continued every hour or two hours afterwards for a period of twenty-four or thirty-six hours, it subdues the fever and abates the dyspnœa in a most remarkable manner, often rendering a repetition of depletion unnecessary, and sometimes speedily removing all signs of the disease. It is not safe, however, in the great majority of cases, to place our dependence entirely on the administration of antimony. In cases of secondary pneumonia, especially if the affection of the parenchyma of the lungs were preceded by well-marked bronchitic symptoms, antimony may sometimes be given at once without having recourse to the abstraction of blood previously, but, in pure idiopathic pneumonia, depletion either general or local ought almost always to precede its use. When antimony does good it generally gives an earnest of that good within a few hours from its first administration, and the production of some sensible effect, such as vomiting or very decided nausea, has appeared to me to be a condition of its utility ; unlike what we observe in the adult, in whom the good results which it produces are sometimes independent of any appreciable influence on the general condition of the patient. When complete tolerance of the medicine has been established, our subsequent conduct must be determined by the results of auscultation. Should that inform us that the physical condition of the lung has greatly improved, as well as the general state of the patient, the use of the remedy may be persevered in at somewhat longer intervals. If the signs of inflammation be advancing, and have become perceptible in portions of lung previously free from disease, mercury must be employed, which may be combined with small doses of antimony, while large doses of that remedy may still be given to combat any sudden increase of fever or dyspnœa that may chance to supervene. If, notwithstanding a manifest diminution of the fever and reduction of the dyspnœa, bronchial breathing should have become distinctly audible, mercurials must at once be substituted for the antimony ; and the existence in any case of extensive or well-marked bronchial respiration should be regarded as of itself contraindicating the antimonial plan of treatment. It is not my intention to say, that after the supervention of bronchial respiration antimony ought never to be given, but only that it should not be employed except in small doses, and in combination with other remedies.

In cases where the symptoms do not set in with such violence as to indicate the necessity for very large doses of antimony, or in which the disease has passed that stage where antimony so given is likely to be beneficial, *mercurials* may be used with great advantage. In cases of the former kind, from two-thirds of a grain to a grain of calomel, combined with gr. ij. or gr. iij. of James's powder, may be given every six hours to a child two years old. If the case be of a graver kind, and bronchial breathing have

become perceptible, notwithstanding depletion and the administration of tartar emetic, the calomel must be given more frequently, as every four or three hours, combined with small doses of Dover's powder and tartar emetic, if the child be not so depressed as to render the use of the latter medicine inexpedient. Sometimes the combination of antimony with the mercurial is at first well borne, but afterwards it becomes desirable to discontinue it on account of the sickness that it produces, or on account of the debility of the patient. The diarrhœa which the calomel excites may usually be checked by increasing the dose of the Dover's powder. There are some troublesome cases, however, in which the stomach or bowels are so irritable that scarcely any medicine can be borne, and in them, as well as in cases of neglected pneumonia in which the proper time for active treatment has been allowed to pass by and the child has become exhausted, while a large extent of lung is impervious to air, much benefit sometimes follows the persevering use of mercurial inunction. In infants and children under five years of age, the gums hardly ever become affected by mercury, even though most energetically employed, and it has never yet occurred to me to meet with an instance of profuse salivation, or dangerous ulceration of the gums. Such accidents, however, do now and then occur, and have been known to terminate in fatal gangrene of the cheek, or necrosis of the jaw. On this account, therefore, you must watch the condition of the gums in infants and children to whom you are administering mercury, just as you would do in the case of the adult, and diminish or discontinue the remedy on the first indication of their being affected.

The *diet* of children in the early stages of pneumonia should be most sparing; and infants not weaned should have some less nutritious food than the mother's milk, which their thirst will otherwise lead them to take more abundantly even than when they are well. If the pneumonia be severe, it is better to give even the mother's milk with a spoon, rather than to allow the infant to suck, since the very act of sucking is injurious, and taxes to the utmost the respiratory function, the organs of which it is desirable to keep in as unexcited a state as possible.

But though the treatment of inflammation of the lungs requires a most strict antiphlogistic regimen in the early stages of the disease, yet in many cases there arrives a period in which a spare diet is no longer suitable,—in which your main efforts must be directed to support the constitutional powers rather than to subdue the local inflammation. If you forget this, it may happen to you to overcome the mischief in the chest, but to lose your patient with head symptoms, brought on by carrying too far, or continuing too long, the very treatment which, within proper limits, was most salutary. No point in the management of the disease is more difficult than the seizing the exact moment when the employment of stimulants becomes necessary; and no general rule can be laid down for regulating their use. If, however, the patient were beginning to be much purged, if

the respiration were growing more laboured and irregular, though diminished in frequency, and if the pulse were becoming more frequent, and above all smaller and smaller, it is high time to resort to their use. Wine is as indispensable in such cases in the pneumonia of the child as in that of the adult; and it may be necessary to give it even to infants at the breast. Ammonia may also be advantageously administered in this stage of the disease, either in a mixture with the decoction of senega, or dissolved in milk, which conceals its disagreeable pungency better than any other vehicle. If diarrhœa do not exist, strong beef-tea or veal-broth is the best form in which nutriment can be given; but if the bowels be relaxed, arrow-root, or the *decoction blanche* of the French hospitals, should be substituted for it.

In conclusion, it may be well to offer a caution with reference to the employment of *blisters*,—a measure to which we often have recourse with advantage during the resolution of pneumonia in the adult, but which, as a general rule, is not advisable in young children whose lungs have been solidified by the disease. Stimulating liniments may be employed with advantage; they produce very evident good, and are unattended by the risk that always accompanies making a breach of the surface in a young child exhausted by previous illness. The risk of such sores taking on an unhealthy character appears to be greater after inflammation of the lungs than after almost any other disease; and it may be added, that the risk is still greater in those cases of secondary pneumonia that supervene on measles.

LECTURE XVIII.

Œdema of the lungs—occasionally comes on in course of scarlatinal dropsy—severity of the symptoms, and their sudden accession—Difference between characters of œdematous and hepatized lung—treatment—importance of venesection—occasional exceptions to its use.

Gangrene of the lung—Case illustrative of the disease—is not the result of mere intensity of inflammation—unattended by any pathognomonic symptom.

Pleurisy—its rarity in childhood as an acute uncomplicated idiopathic affection—its symptoms and morbid appearances similar to those observed in the adult—it occasionally simulates other diseases, as affections of the head, and of the abdomen—Evidences of auscultation less conclusive than in the adult, and why.

Treatment—importance of early adoption of active measures—principles of treatment same as in the adult.

Chronic pleurisy—rarely idiopathic—occurs oftener in connection with dropsy after scarlatina—its symptoms frequently obscure.

Before we proceed to the examination of some other forms of inflammatory disease of the respiratory organs, it may be convenient to notice two conditions of the pulmonary tissue, which, though not the direct results of inflammation, yet are closely connected with it. One of these conditions is *acute œdema of the lung;* the other is *gangrene* of its substance.

It is unnecessary to occupy your time with any detailed account of that anasarcous state of the lungs which is sometimes met with in connection with general dropsy of long standing, or with some old disease of the heart and great vessels. In such cases, which are very rare in childhood, the œdema of the lungs is a secondary affection, which has very little share in producing the patient's death. But it occasionally happens that children are attacked with intense dyspnœa, and other symptoms of disorder of the respiratory organs, which terminate rapidly in death; while it is discovered, on an examination of the body, that the thoracic viscera generally are free from disease, but that the cellular tissue of the lungs is loaded with serous fluid. Laennec* refers to such an

* On the Diseases of the Chest, translated by Dr. Forbes, 4th edit. p. 164. Lond. 1834.

accident as probably accounting for the occasional sudden supervention of extreme dyspnœa in children recovering from measles; but a recent French writer, M. Legendre,* is, to the best of my knowledge, the first person who has clearly proved the connection between the symptoms observed during life, and the state of extreme œdema of the pulmonary tissue found after death.

This *œdema of the lungs*, though it sometimes destroys life very speedily, is seldom, if ever, a purely idiopathic affection, but occurs generally as one of the complications of that acute anasarca which not unfrequently succeeds to scarlatina; and even then it is not of common occurrence. M. Legendre records only four cases, all of which were observed in children who were suffering from anasarca after scarlatina; and three fatal instances of it have come under my own notice, in all of which it supervened during scarlatinal dropsy. In two of these cases it came on while the children were labouring under a great degree of anasarca; on the third occasion the dropsy had greatly abated before the thoracic symptoms appeared. Indications of slight mischief in the chest, such as frequent dry cough, some degree of dyspnœa, with rhonchus and sibilus, or scanty crepitation, preceded the more serious symptoms for two or three days. The patient, in short, had seemed to be suffering from a bronchitis of moderate intensity, when suddenly extreme difficulty of respiration supervened, attended with very hurried breathing, orthopnœa, and most tumultuous and violent action of the heart, though with a feeble pulse. The cough continued, being still short, and quite unaccompanied with expectoration. Auscultation under such circumstances does not seem to give account of mischief sufficiently serious to explain the alarming nature of the symptoms. It may be thought that air enters the lungs less freely than it should do, but the crepitation heard is scanty, and neither bronchial respiration nor diminished resonance on percussion of the chest is perceptible. Nevertheless, if relief be not soon afforded, the child's sufferings in a few hours amount to perfect agony, the difficulty of respiration and the tumultuous action of the heart continuing; the lips and face becoming perfectly livid, but the intellect remaining clear, and the child complaining of great distress referred to the heart or epigastrium; till at length death takes place suddenly, which it sometimes does within twenty-four hours from the appearance of these alarming symptoms. At other times the approach of the disease is more gradual, the dyspnœa being augmented in paroxysms, but on the whole increasing with the increase of the general anasarca, and proving fatal in the course of five or six days.

On examining after death the bodies of children who have died of this acute œdema of the lungs, a little transparent serum is usually found in

* Recherches sur quelques Maladies de l'Enfance, 8vo. p. 324-352. Paris, 1846.

the chest, and a few deposits of lymph on the surface of the lung sometimes betoken the existence of slight inflammation of the pleura. The lungs themselves are of a deep red colour, firm, and destitute of air through a great extent of their substance, not breaking down so easily as lung in a state of true hepatization would do, but giving exit when cut into to a most abundant quantity of reddish serum, mixed with very few air-bubbles. The right auricle and ventricle are enormously distended with coagulated blood, a token of the difficulty with which the heart has discharged the functions to the performance of which it at length became wholly unequal. To this description two important particulars may be added from the account given by M. Legendre; the one, that punctures of the lung will allow the fluid to drain out, and thus restore to the organ much of its previous flaccidity; the other, that by the insufflation of air, the tissue of the lung may be made to resume its natural suppleness and its light colour, and once more to crepitate as in a state of health. From these facts M. Legendre concludes, and his opinion is, I doubt not, quite correct, that the cellular tissue of the lung is in these cases the chief seat of the serous effusion, and that dyspnœa is produced by the consequent compression of the air-cells.

In the treatment of any case in which the symptoms just enumerated come on, free venesection affords most remarkable and almost immediate relief, and, whenever it is practicable, is much to be preferred to the most abundant depletion by means of leeches applied to the neighbourhood of the heart. After depletion, large doses of tartar emetic should be given, since there is no other remedy that so speedily or effectually reduces the urgent dyspnœa. In the subsequent management of the case just such remedies are required as would be best calculated to relieve the general dropsy, and as that decreases, the œdema of the lungs will likewise diminish and disappear.

Sometimes you may meet with cases in which the coldness of the extremities and the great lividity of the surface seem to forbid depletion. Such an instance I once saw:—the patient was a little girl about nine years old, in whom all the symptoms had come on very suddenly a few hours before I saw her, and who appeared almost dying at the time of my visit. I applied a large mustard-poultice over her chest, gave her a draught containing a large dose of nitrous ether, and repeated it every two hours. In the course of eight or ten hours, she was sufficiently rallied to bear venesection, which was followed by a most marked amendment, and in a few days her recovery was complete.

My experience of *gangrene of the lung* in childhood is still more limited than that of the acute œdema of its tissue, for only one case of it has come under my notice. The particulars of it, however, may be worth relating, since they illustrate very well the symptoms which the disease usually presents, and the circumstances under which it generally occurs.

A little girl, three years old, the child of healthy parents, who had previously had good health, with the exception of a severe attack of inflammation of the lungs when two years old, began to droop in health, to cough, and to have shortness of breath, on the 11th of February, 1843. No treatment was adopted until the child was brought to me on the 15th. Her breathing was then more oppressed, her general condition more cast down, and her strength more reduced than is usual in so short a time from the commencement of an attack of pneumonia which had not set in with very severe symptoms. Four leeches were applied beneath the right scapula, and half-grain doses of calomel and Dover's powder were given every three hours. Slight relief succeeded the bleeding, but this was of but short duration; and the child did not seem to be either better or seriously worse until the 19th, when she appeared to be losing strength. The mercury was now discontinued, and ammonia and nourishing diet were freely given. On the 20th, the gums both of the upper and lower jaw began to swell; by the next day they were ulcerated; the breath became very fœtid, and a discoloured, stinking, fluid, ran from the mouth. The thoracic symptoms continued much the same, not at all increasing in intensity, and the cough growing looser than before; but the child became paler and more exsanguine, and continued to lose power. The ulceration of the gums extended to the fold of the lower lip, and three of the incisor teeth fell out before the disease was finally checked, on Feb. 26th, by the application of the pure nitric acid. The child did not appear to suffer pain, but was very restless, and continually harassed by efforts to vomit, during which she rejected nothing but an offensive mucus. She was extremely indisposed to take either wine or any nourishment for four days before her death, which took place, apparently from exhaustion, on the 1st of March, nineteen days after the commencement of her illness.

On an examination of the body after death, the left lung was found perfectly healthy, with the exception of some emphysema of its upper, and considerable congestion of its lower lobe.

The right lung, which consisted of only two lobes, was universally solid and non-crepitant, with the exception of about a fourth of the upper and inner edge of the upper lobe, which was emphysematous. The two lobes were connected together by a layer of yellow lymph. The exterior of the lung generally was of a dark greyish red colour, with irregular patches of yellow deposit beneath the pleura, some of which were nearly half an inch in length and a quarter in breadth; besides which many small purulent deposits were contained within the pulmonary vesicles, as in vesicular bronchitis. The upper part of the upper lobe, and a small portion near the diaphragmatic surface of the lower lobe, felt soft and boggy to the touch. On cutting into the upper lobe, a cavity was opened as large as a hen's egg, very irregular in form, intersected in various directions by the tubes and vessels that crossed it; from which, as well as from the walls

of the cavity, portions of lung hung in shreds. The cavity contained a small quantity of dirty, greyish yellow, putrilage, which exhaled a most fœtid odour. The substance of the lung in the immediate neighbourhood was in a far advanced stage of purulent infiltration, and other parts of the lobe were in an earlier stage of the same condition; besides which, small collections of puriform fluid, not bigger than a split-pea, were found in various parts of its substance. The state of the lower lobe on the whole resembled that of the upper, but the cavity in its lower part was not larger than a marble, and contained a small quantity of yellow pus, of a less fœtid character than that in the upper lobe. The bronchial glands were swollen, soft, of a homogeneous aspect and a grey colour; but neither in them, nor in either lung, nor in any organ of the body, was there the least trace of tubercular deposit.

Although there was in this instance a larger amount of inflammatory disorganization of the lung than is usually met with in connection with gangrene of its substance, yet the symptoms noticed during the patient's life-time were precisely such as are generally observed in cases of this description. The child was attacked with symptoms of pneumonia, which, however, were far from being severe; but nevertheless, by the fifth day from their commencement, the greater part of the right lung had become impervious to air, and percussion over the right side of the chest, on the 15th of February, yielded an almost universally dull sound. Even then the child's strength seemed much reduced, and in the course of a few days more she sank into a state of great weakness. Throughout the whole course of the disease, there was the same absence of striking indications of the extent to which the respiratory organs had suffered, and this even after a large portion of the lung was completely disorganized. The most remarkable phenomena were those which betokened the general loss of power in the system, while the appearance of gangrenous ulceration about the gums tended to prove the correctness of the opinion which refers the disease to some peculiar alteration of the circulating fluid, rather than to the violence of the inflammatory action. Another circumstance which tends to support this opinion is, that gangrene of the lung much more frequently supervenes on the pneumonia that comes on in the course of the exanthematous fevers, than on idiopathic inflammation of the lungs. The disease, too, occurs far more rarely in children who are well fed, and who live in pure air, than in those who are surrounded by unfavourable hygienic conditions. Hence it results that this, as well as other forms of gangrene, are met with in the Children's Hospital at Paris with far greater frequency than elsewhere, and that they sometimes show a tendency to become epidemic in that institution.

There is no one symptom that can be mentioned as of constant occurrence in gangrene of the lung in children, and as pathognomonic of the disease. That peculiar fœtor of the breath, on which so much reliance is

placed in cases of gangrene of the lung in the adult, sometimes loses its value in the child, as it did in the case just related, by the coexistence with it of gangrene of the mouth. It happens, too, not unfrequently, that the characteristic odour of the breath is altogether absent in cases of gangrene of the lung,—a circumstance for which it is not easy to account, though of the fact there can be no doubt, since it rests on the authority of MM. Rilliet and Barthez.

Should you meet with any case in which you apprehend that this condition of the lung is present, you would adopt a tonic and stimulant plan of treatment, as affording the only chance, and that a very slender one, of saving the patient's life. Dr. Stokes's suggestion, too, for the administration of chlorine, should not be forgotten, since, if the remedy did nothing else, it might diminish that fœtor of the breath which, when it exists, is a source of very great suffering to the patient.

We pass now from the examination of the inflammatory affections of the substance of the lung to the study of those to which its investing membrane is liable. It will not, however, be necessary to occupy very much of your time with the subject of *pleurisy* in childhood, since, though it is a very important disease, yet neither its symptoms, course, nor treatment, undergo such modifications from the early age of the patient as we have observed in some other of those affections which we have already passed in review. Some writers on the diseases of children, indeed, have left pleurisy altogether unnoticed, on account of its supposed extreme rarity in early life; but this opinion is certainly erroneous so far as regards that secondary pleurisy which comes on in the course of pneumonia, and which is almost, if not quite, as frequent in childhood as in adult age. Acute idiopathic pleurisy, unconnected with pneumonia, or in which the inflammation of the lung bears but a very small proportion to that of the pleura, is certainly an uncommon affection during the first years of childhood, and as a cause of death its rarity is extreme. It appears from the Fifth Report of the Registrar-General, that, of 75 fatal cases of pleurisy that occurred in London in the year 1841, only 3, or 4 per cent., took place in children under five years old; while you will not have forgotten that 68 per cent. of all fatal cases of pneumonia are alleged on the same authority to have befallen children aged less than five years. Acute idiopathic pleurisy has run a fatal course in children under five years of age only on four occasions which I have had the opportunity of observing,—a result that has seemed to be due at least as much to the rarity of the disease as to its being seldom fatal. After five years of age, however, the frequency of pleurisy manifestly increases, and during the later years of childhood it is little, if at all, less frequent than in the adult.

In fatal cases of pleurisy in childhood, the *appearances found after death* are precisely the same as are met with in the adult. Adhesions between the costal and pulmonary pleura, and between the different lobes of one or

other lung, associated sometimes with very intense redness of parts of the membrane, are hardly ever wanting, and in connection with them a small quantity of transparent serum, often of a reddish tint, is sometimes effused into the cavity of the chest. In other cases the effused matters are entirely solid, and both the surface of the lung and the interior of the thorax are coated with a distinct investment of lymph; or, in addition to the deposit of lymph on the lung, fluid is poured out into the chest,—no longer transparent serum, but either a sero-purulent fluid in which flakes of lymph are floating, or, more rarely, healthy pus. The most frequent complication of pleurisy is with inflammation of the lungs; besides which it occasionally happens, when the left pleura has been the seat of inflammation, that the disease extends from it to the pericardium, which on two such occasions I have found lined with lymph, partially adherent to the heart, and containing a sero-purulent fluid.

The main *symptoms* that attend the disease, as well as the *physical signs* of its existence, are the same at all ages. There are, however, some circumstances peculiar to early life, which, unless you are on your guard, may serve to obscure the real nature of the affection. The history of a case of acute pleurisy in childhood is generally something to this effect:—A child previously in perfect health is suddenly attacked with pain referred to the chest or upper part of the abdomen, so severe as to occasion it to cry aloud; perhaps attended at first with vomiting of a greenish fluid, accompanied with fever, a rapid pulse, and hurried respiration, interrupted by frequent short cough, which evidently occasions pain, and which the child labours, though in vain, to suppress. After a few hours the severity of the pain subsides; but the fever, hurried respiration, and cough, continue, and the child, though usually it looks heavy and seems drowsy, yet becomes extremely restless at intervals,—cries and struggles, as if in pain, and violently resists any attempt to alter its position, since every movement brings on an exacerbation of its sufferings. The posture which it selects varies much: sometimes its breath seems disturbed in any other than an upright position; at other times it lies on its back, or on one side; but, whatever be the posture, any alteration of it appears to cause much distress, and is sure to be resisted by the patient.

The probabilities are, that, if you auscultate the chest of a child in whom these symptoms exist, you will hear good breathing through the whole of one lung. On the other side, the air will be most likely found to enter less freely, though unaccompanied by any moist sound, perhaps unattended with any morbid sound at all; or, a rough sound like a rhonchus may be audible on this side, and for this you may very likely at first take it, though with more attention it will be discovered to be a friction sound. A day or two later you will probably detect a sound like that of bronchial breathing, as you pass your ear from above downwards along the posterior part of the chest, while the friction sound will have disappeared; and still

lower there will be an utter absence of all sound. The walls of this side of the chest, if their tenderness do not prevent your trying percussion, will yield a much less resonant sound than usual; while, at the same time, a distinct sense of solidity will be communicated to the finger.

I need hardly pursue the detail of other symptoms which are the necessary result of pleurisy whatever be the age of the person in whom it occurs. The diminished mobility of the affected side, the displacement of the heart, the bulging of the intercostal spaces, and the enlargement of the chest on the diseased side, are phenomena that take place under the influence of the same causes at every age, though their occurrence is less frequent in childhood than in adult age, since the effusion of fluid is usually more scanty. The course of the disease, whether towards recovery or to a fatal issue, presents nothing remarkable in childhood; but it is chiefly at the commencement of the disease that you are likely to mistake its nature.

The symptoms by which an attack of pleurisy is ushered in, point sometimes rather to the head than to the chest. The child is seized with vomiting, attended with fever and intense headache: it either cries aloud, or is delirious at night, or screams much in its sleep, and, when morning comes, complains much of its head, but denies having any pain whatever in its chest, while the short cough and the hurried breathing may be thought to be merely the result of the cerebral disturbance. The diagnosis of cases of this kind is sometimes very difficult, since auscultation does not always afford the information that you might expect. It often happens that no friction sound is perceptible, and that you have no other indication to guide you aright besides the feebleness of the respiratory murmur on the affected side. The child, too, fearful to take a deep inspiration, fills neither lung completely, so that to a great degree you lose the information gained by the comparison of the breathing in one lung with that in the other. Still, the history of the case will do much towards preserving you from error. The onset of the illness has been far too acute, attended with far too much febrile disturbance, for a case of tubercular hydrocephalus, while many of the signs of cerebral mischief which might be expected in a case of simple encephalitis have not presented themselves. The heat of head is not greater than that of the rest of the surface; the cries with which the disease set in have not ended in coma. It happens but seldom that convulsions mark the commencement of the disease; but, if they had occurred at the onset, they have not since returned; neither twitching of the muscles, nor strabismus, nor retraction of the head, is present; and, though the child may cry (as children when ill and fretful often do) at the curtain being undrawn and the candle brought nearit, yet there is no real intolerance of light. The dyspnœa, also, is too permanent, and the short hacking cough too frequent, for either to be sympathetic of cerebral disorder.

The pain with which pleurisy sets in is sometimes referred not to the chest, but to the abdomen; and its commencement may be attended with vomiting and purging. Pressure on the abdomen, too, often causes a considerable increase of suffering; and you may thus be led to regard the case not as pleurisy, but as intestinal disorder, with fever. In any such doubtful case it is well to bear in mind that children, long after they can talk, describe the nature and seat of their sufferings very inaccurately; and if, as often happens in these cases, they refer the pain to the right hypochondrium, you should not forget that pain in that situation is at all ages much oftener connected with inflammation of the pleura than of the peritoneum; and, lastly, that the increase of discomfort produced by pressure on the abdomen, may be due to the additional impediment thereby offered to the already labouring respiration.

In most cases of pleurisy in childhood, careful auscultation will preserve us from error. Still the information that it yields is more limited in the child than in adult age. The evidence afforded by the various modifications of the voice sound are much less marked, owing to the feebleness of the voice in early life, while we cannot induce the child to speak several sentences, or utter several words in the same pitch of voice, in order that we may try how far the sound is altered. For the same reason, too, we cannot test the difference between the two lungs by the vibration of the voice perceived on applying the hands to either side of the chest—a means by which, in the adult, we are often assisted in determining between a solidification of the lung from pneumonia, and the dulness consequent on pleurisy with effusion. Another circumstance which, in the child, increases the difficulty of distinguishing between pleurisy and pneumonia, is, that, in the latter, children sometimes inspire so slightly as not to produce any crepitation; so that in both cases we may have impaired resonance on percussion, with scanty admission of air, and a bronchial character in the respiration, but without any other morbid sound. In the child, too, we lose the very valuable information which the presence of the expectoration in the pneumonia of grown persons affords, when contrasted with the absence of all expectoration as an attendant on the dry cough of pleurisy. With the advance of the disease, doubt as to its nature is removed; it is at its commencement only that mistake is possible. But even then, and in spite of all the circumstances which have been enumerated as tending to mislead, you will seldom be wrong if you regard as an instance of pleurisy any case in which symptoms like those of pneumonia having set in suddenly and severely, auscultation fails to detect the crepitus of pneumonia, and discovers only feebleness of the respiratory murmur on one side, with or without a more or less marked bronchial character in the breathing.

But we may pass now to the consideration of the *treatment* of acute pleurisy in childhood, a subject which need not detain us long, since the

age of the patient in no respect alters the principles that must guide our conduct. If seen sufficiently early, and treated with due activity, cases of acute pleurisy in infancy and childhood nearly always have a favourable termination, and in almost every instance that has come under my observation in which the issue of the disease was unfortunate, either all treatment had been neglected till the children were past hope, or the nature of the complaint had been mistaken, or the treatment followed had not been sufficiently active. This last error it is of great moment to avoid, for acute inflammation of the pleura in childhood runs its course with greater rapidity to a fatal issue than in the adult. Of seven fatal cases of acute pleurisy in childhood, of which I have preserved a record, three ended in death on the 6th day, one on the 9th, one within a fortnight; while one of the remaining two terminated in thirty days, and the life of the child in the seventh case was prolonged for several months.

In almost every case, provided the symptoms be at all urgent, and the child's previous health have been good, general depletion should be resorted to, and you need not be afraid of carrying this first bleeding to syncope, since children generally faint after the abstraction of a comparatively small quantity of blood from the arm. It will be almost always necessary to follow this up by local bleeding, but it is desirable to wait for three or four hours in order that you may be enabled to estimate the effect produced by the previous venesection. A second bleeding from the arm is seldom needed, and may almost always be avoided if local depletion be not too timorously practised. In the acute stage of pleurisy, it is better to draw the blood by leeches than by cupping, since the side is often so tender that the pressure of cupping glasses would be unbearable. After depletion our chief reliance is to be placed on calomel, which should be freely given in combination with opium or Dover's powder. Antimony, which often renders us such good service in pneumonia, is here of little use; and though it may somewhat diminish the frequency of the breathing, it exerts little or no influence upon the local mischief. A pleurisy treated thus actively is sometimes overcome in the course of 24 or 48 hours, so that nothing remains of symptoms which had appeared so formidable. Often, however, after the acute symptoms have subsided, the affected side remains dull, and the respiration scanty for several weeks together; and now is the time when the use of blisters, associated with the exhibition of small doses of calomel, will be of most essential service, and will generally effect the complete absorption of the fluid, and the restoration of the patient to perfect health.

This, however, is not always the case, but sometimes in spite of remedies perseveringly employed, one side of the chest continues full of fluid; and the question then comes before us, whether it will not be expedient to let out that fluid by mechanical means. Many most important considerations are, as you know, involved in the question of performing paracentesis of

the chest; but the indications for its performance are the same in the child as in the adult: while my own experience would lead me to conclude that cases in which the operation is necessary are of very rare occurrence in early life.

Pleurisy does not always present itself as an idiopathic affection. It supervenes, as we have already noticed, in the course of pneumonia, increasing the suffering of the patient, and, if severe, adding much to his danger. It comes on, sometimes during acute rheumatism, either with or without pericarditis, and on two occasions I have observed pleurisy, with effusion into one side of the chest, succeed to an an attack of peritonitis. But besides these cases in which the affection of the pleura retains an acute character, the disease is likewise met with in a chronic form, and manifesting its existence by comparatively few symptoms. Attacks of *chronic pleurisy* are sometimes idiopathic; and it is not always possible to trace them back to their commencement in an acute seizure. The cough and dyspnœa in such cases are troublesome rather than distressing, and nothing but examination of the chest would lead to a suspicion of the serious nature of the affection. Cases of this description usually do well under the employment of local counter-irritation and the administration of mercury and diuretics, though the absorption of the fluid is in general effected very gradually. Chronic pleurisy, however, is a very rare occurrence as a purely idiopathic affection in early life, but it is one of the most important, and far from being one of the least common complications of the dropsy which often succeeds to scarlatina. Under these circumstances, too, it often needs much attention to detect it, since it may for a long time give rise to but few symptoms that might betray its existence. Some cough and some dyspnœa almost invariably attend the anasarca that succeeds scarlatina, and often there is no complaint of pain, nor increase of the cough, nor exaggeration of the dyspnœa, to betoken the onset of this new and formidable disease. At length, perhaps, the anasarca disappears, and now when we notice the emaciated condition of the child we observe for the first time that one half of the chest is much larger than the other, that it remains immoveable during respiration, and we discover that it is full of fluid. Or, our attention may be suddenly called to the mischief that has been going on by the child becoming unable to breathe except in one posture, and even then with extreme difficulty: the fluid has been poured out so abundantly as at length almost to prevent respiration, and when we find out the evil it is almost too late to effect its cure.

It is by the adoption of a vigorous antiphlogistic treatment in the dropsy that follows scarlatina, that you will be most likely to prevent the supervention of this serious malady: it is only by the most attentive daily auscultation that you will in many cases get notice of its approach.

LECTURE XIX.

Croup.—Reasons for not studying it earlier in the course—discrepancy of opinion with reference to it, owing to modifications of its character by external circumstances.

Causes of the disease—its frequency in childhood, in the male subject, in northern climates, in rural districts—its occasional epidemic prevalence.

Post-mortem appearances—variations in the extent of false membrane in the air-passages—changes associated with it—affection of the fauces and soft palate.

Symptoms—occasional sudden onset—catarrhal stage, general course of a fatal case—occasional delusive appearances of amendment.—Evidences of auscultation—changes in tracheal sound.

Duration. Prognosis.

Treatment—importance of abstraction of blood—directions for its performance, and for the administration of tartar-emetic—when and how mercurials are to be employed.

In strict propriety the very important disease which we are about to investigate to-day ought to have engaged our attention immediately after we had completed our study of infantile bronchitis. Two reasons, however, independent of mere convenience, have led me to postpone till now the consideration of the subject of *croup*. One of these reasons is, that its gravity is often greatly increased by the association with it of inflammation of the lungs,—a complication the importance of which it was essential that you should thoroughly understand; the other is, that croup, though an inflammatory disease, is not without a very evident spasmodic element in many cases; so that it may very appropriately form a sort of transition between the inflammatory and the spasmodic diseases of the respiratory organs.

It can scarcely be necessary to tell any of you that croup is the English name for the disease designated by scientific writers *cynanche trachealis*, or *cynanche laryngea*. It consists in inflammation, generally of a highly acute character, of the larynx or trachea, or of both, which terminates in the majority of cases in the exudation of false membrane more or less abundantly upon the affected surface.

The formidable nature of the symptoms by which it is attended, and the rapidity with which it tends to a fatal issue, have led many of the

ablest physicians to devote much time and attention to the study of croup. It might therefore be anticipated that our knowledge of a disease which betrays itself by very manifest and highly characteristic symptoms, and which gives rise, when fatal, to changes easily appreciable after death, should, by this time, be very definite and settled. With reference to many of the more important points in the history of the malady, writers are now, indeed, pretty well agreed; but croup, like many other diseases that depend to a great degree on atmospheric and telluric causes, is modified in many of its symptoms by peculiarities of air, water, and situation. The affection assumes one character among the poor of a crowded city, and another among the children of the labourer in some rural district.*

If, therefore, you find that my account of the disease varies in any respect from the description given by some other writers, or from the results of your own observation hereafter, do not too hastily assume either that your teacher has been mistaken, or that your own observation has been incorrect. The difference may be nothing more than a fresh exemplification of the old story of the shield, silver on the one side and golden on the other, about which the knights in the fable quarrelled.

Croup, in all the forms which it assumes in this country, is essentially *a disease of early life*, for it appears from the Fifth Report of the

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* I have preserved a record of 22 cases of croup that came under my notice at the Royal Infirmary for Children between May 1839 and October 1847. Of these 22 cases, 10 were idiopathic, 12 secondary: five of the former and two of the latter recovered. In two of the idiopathic cases that recovered, a scanty formation of false membrane was observed upon the velum and tonsils, but no such appearance existed in the other idiopathic cases. Two of the five fatal idiopathic cases were examined after death: in both the false membrane was confined to the larynx; and there was but little injection of the trachea or bronchi. Of the twelve secondary cases, one supervened in the course of pneumonia; in the other eleven, croup appeared as the sequela or concomitant of measles, and ten of the twelve terminated fatally. In the cases which recovered, and in three of those which terminated fatally, there was no false membrane on the velum or fauces, but in the other seven, false membrane was present in those situations as well as in the larynx, and twice this false membrane extended into the œsophagus. Six of the fatal cases were examined after death; in one there was no false membrane anywhere, but intense redness of the larynx, trachea, and bronchi, with an uneven granular appearance of the larynx, and ulceration about the epiglottis. In the other five cases the larynx contained more or less false membrane, and its surface was ulcerated; and in four of the cases the palate and tonsils were inflamed and coated with false membrane. In all these five cases pneumonia existed in both lungs, and four times it was found to have reached in some parts the stage of purulent infiltration.

These results, which differ in so many respects from the conclusions of many most excellent observers in this country, approach much more nearly to those obtained in the Hôpital des Enfans Malades at Paris. The district in which my observations were made is low, with defective sewerage, open drains running close to many of the houses; and most of the patients were the children of poor parents, who occupied only one room, and who consequently were placed in most unfavourable hygienic conditions.

Registrar-General, that, while 1022 out of 98,391 deaths in the metropolis, and twenty-four town districts, took place from croup, 1013, or 99·9 per cent. of those deaths occurred before the age of fifteen; and 879, or 87·9 per cent. before the age of five years. Of twenty-three cases of croup of which I have preserved a record, all occurred in children under five years of age, and twelve before the age of two. It has been attempted to explain the great frequency of croup in early life by the imperfect development of the organ of the voice before puberty. This, however, can scarcely be admitted as a valid explanation, since it does not at all account for the extreme rarity af the disease after five years of age. The preponderance of male over female children, among those who are attacked by croup, is another fact which, though confirmed by the experience of all observers, has never received any adequate explanation.*

Croup appears to be *influenced by peculiarities of climate and locality* much more than most diseases of the respiratory organs. Though not entirely confined to northern climates, it prevails but seldom in the southern parts of Europe, and is even less frequent in the southern than in the northern counties of England. In Kent, Surrey, and Sussex, the deaths from croup are to the deaths from all causes in the proportion of 9 per cent., while in the four northern counties, Durham, Northumberland, Cumberland, and Westmoreland, which contain an equal population, the deaths from this cause are in the proportion of 1·6 per cent. It is endemic in particular localities; and residence near the sea, proximity to the mouths of large rivers, a moist soil and a damp atmosphere, have been enumerated as greatly predisposing to the disease. The influence of these local peculiarities has probably, in some instances, been overrated, but still it cannot be denied, for a most striking illustration of it is afforded by the comparative rarity of croup in towns, and its frequency in rural districts. In the county of Surrey, exclusive of the metropolitan districts, the mortality, from all causes under five years of age, is little more than a third of the mortality in Liverpool, and little more than half the mortality in London. But the total mortality, under five years of age, from croup in the county of Surrey is to that in Liverpool nearly as 3 to 2, and to that in London as 2 to 1, so that out of 100 children dying under five years of age from all causes, more than four times as many will have died from croup in Surrey as in Liverpool, and exactly four times as many as in London.

Like other diseases that are much influenced by local and atmospheric peculiarities, croup has its periods of *epidemic prevalence*. The most

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* From the Fifth Report of the Registrar-General it appears that, while the deaths of males under 15 from all causes, are to the deaths of females from all causes as 11 to 10, the deaths from croup are as 15 to 10. Of 249 cases that came under Gölis' observation at Vienna, 144 occurred in males, 105 in females; and at Geneva, under Jurine's observation, 54 males and 37 females died of croup, between the years 1791 and 1808.

remarkable epidemic of croup occurred in the years 1805, 6, and 7, when it extended over the greater part of central Europe. The death of Napoleon's nephew, the Crown Prince of Holland, at this time, gave occasion to the offer of a prize by the Emperor for the best essay on this disease ; to which we are indebted for many most valuable works on croup. Since then a sudden increase in its prevalence has been noticed from time to time in certain towns or districts, sufficient to show that the disease depends much on variations in the atmosphere, though it has never again become so widely diffused over large tracts of country as in the year 1807. In Paris, during the year 1840, twice as many deaths occurred from croup as had taken place in 1838 : and there was a similar epidemic prevalence of the disease in London during the years 1841 and 1842.

Variations in the condition of the atmosphere, and peculiarities of situation, not only influence the frequency of the occurrence of croup, but they likewise greatly modify its character, and determine to a considerable extent the nature of the lesions which it produces. The chief *morbid appearances*, however, are always discovered in the larynx, trachea, and air-tubes. They consist of redness of the mucous membrane, which is often thickened, sometimes abraded or ulcerated, and very generally covered with a more or less abundant exudation of false membrane. This exudation, however, though so generally met with as to have suggested to medical writers the terms angina polyposa, angina membranacea, as appropriate designations of croup, is neither invariable in its occurrence, nor of an uniform extent in all cases. It is found in the larynx oftener than in the trachea, and in both more frequently than in the bronchi. There are, nevertheless, many instances on record in which the secretion of false membrane was so extensive that it not only lined the larynx and trachea, but reached into the minuter air-tubes, forming a complete cast of many of their ramifications. There appears to be some connection between the circumstances under which children become attacked by croup, and the extent of false membrane in the air-passages, which a post-mortem examination reveals. In rural districts, where the disease wears throughout a sthenic character, false membrane is deposited in greater abundance, and over a greater extent of surface, than is usually observed in the case of the poor in this metropolis : while, on the other hand, we find in London a condition of unhealthy ulceration about the larynx ; ulceration, and the deposit of false membrane about the tonsils and palate, in many instances : appearances which are seldom met with in children placed under circumstances more favourable to health.

In cases of croup that have come under my own observation, the formation of false membrane in the larynx has seemed almost invariably to precede its deposit in the trachea ; and not infrequently it has been found constituting a tough, continuous, membrane, in the former situation, but growing less tenacious in the upper part of the trachea, and passing

gradually into a thick, puriform, mucus, interspersed with shreds of lymph. I have usually observed the false membrane lining the whole of the larynx, and reaching down to the lower edge of the thyroid cartilage, while the trachea contained nothing else than a puriform matter, or glairy mucus, sometimes of a reddish colour. In some instances the false membrane has been confined to the upper part of the larynx, lining the lower surface of the epiglottis, blocking up the opening of the sacculus laryngis, and covering the cordæ vocales, but not extending any further. When first secreted, the false membrane is firmly adherent to the mucous lining of the air-passages, but after a time a secretion of a puriform character is generally poured out, which detaches the membrane from its connexions: and it is after this occurrence has taken place that tubular pieces of false membrane have sometimes been expectorated. This detachment of the false membrane from the subjacent surface takes place more frequently and more completely from the interior of the trachea than from that of the larynx. On removing the false membrane from the trachea, the lining of the tube is seldom found to present any change other than an increase of its vascularity, which, though sometimes very considerable, does not bear any certain relation to the amount of false membrane present. The greater difficulty in removing the false membrane from the larynx depends upon the more extensive alterations which the lining of that part of the air-tube is usually found to have undergone. It is generally red and swollen, especially about the edges of the rima glottidis and the arytenoid cartilages, and the openings of the sacculus laryngis. Small aphthous ulcerations are also frequent in the two former situations; and occasionally, the ulceration being more extensive, the whole of the larynx, on detaching the false membrane that lined it, presents a worm-eaten appearance.

It seldom happens that the bronchi are perfectly free from disease, but, even though the trachea contain no false membrane, and present but few signs of inflammation, they are almost always much congested, and contain a muco-purulent or purulent secretion; though false membrane is seldom found in them, except when it is continuous with a similar adventitious structure in the trachea.

Pneumonia, in all its stages, is far from being unusual, and is a complication especially to be feared in those cases where croup occurs as a secondary affection in the course of measles.

The cavity of the mouth, and the fauces, do not present any invariable alteration in cases of croup. Congestion about the fauces and soft palate is of frequent occurrence, sometimes coupled with a scanty deposit of false membrane in those situations, or the tonsils are found in a state of sloughing ulceration. In that form of croup which succeeds to measles, there is moreover in many instances a conditon of unhealthy inflammation, and aphthous ulceration of the mouth and gums: a slight speck of ash-coloured false membrane covering each little ulcer. In many of these

cases, I apprehend that the laryngeal affection does not come on in consequence of extension to the air-passages of disease beginning in the mouth, but that the disease is the same in both situations; though the accident of the locality renders that a serious disorder, when seated in the larynx, which is but a trivial ailment when affecting the mouth. Cases of this last kind have been called cases of ulcerative laryngitis: they have always come under my notice associated with the effusion of false membrane, and between them and croup I can discover no essential difference.

Whatever be the circumstances under which croup comes on, the *symptoms* resulting from disease obstructing the channel of the larynx and trachea by false membrane, or inducing a spasmodic closure of their aperture, must be to a great extent the same. The mode of onset of the disease, however, is very variable. Sometimes, especially in those forms of croup that prevail among healthy children living in the country, the disease is announced by few, if any, premonitory symptoms; but the affection of the larynx is apparent from the very outset, and attains in the course of a few hours a high degree of intensity. Some years since I saw a little boy, about seven years old, living at some distance from London. He had overheated himself at play during the afternoon of a hot day in August, but went to bed apparently well at 8 o'clock, and soon fell asleep. At 10, he began to breathe with the peculiar noise characteristic of croup, and presented all the symptoms of the disease before midnight.

In his treatise on croup, Professor Gölis, of Vienna,* relates the case of a little boy four years old, previously in perfect health, who having gone out of an overheated room into the open air, during an extremely cold winter's day, was seized while walking with all the symptoms of most violent croup, which proved fatal in fourteen hours.

This sudden onset and rapid course of the disease, however, are of rare occurrence, and croup generally comes on gradually, attended in *its first stage* with but few symptoms that could distinguish it from ordinary catarrh. Slight fever, drowsiness, suffusion of the eyes, and defluxion from the nares, attend it. The respiration is not perceptibly disturbed, and the cough, though frequent, presents no peculiar character. There is besides occasional complaint of slight sore-throat, or of uneasy sensation about the larynx, but so slight as scarcely to attract attention, and not to cause any alarm.

The duration of this stage is very variable: nor is there any regularity in the mode of its transition into *the second stage*. In the majority of cases, indeed, the transition takes place gradually; but thirty-six hours seldom pass without the supervention of some symptom which, to the well-schooled observer, would betray the nature of the coming danger. Most symptoms may continue unchanged, perhaps scarcely aggravated,

* De rite cognescendâ et sanandâ Anginâ Membranaceâ, 8vo. Viennæ. Observ. iv. p. 141.

but a slight modification takes place in the character of the cough, which now becomes attended with a peculiar ringing sound, difficult to describe, but when once heard not easily forgotten. This peculiarity in the cough very often precedes any change in the respiration, and may sometimes be so slight as scarcely to attract the parents' notice at the time, and to be remembered only when the full development of the disease leads to inquiries as to how the attack came on. Soon after the modification of the cough has become perceptible, or even simultaneously with it, the respiration undergoes a change no less remarkable. The act of inspiration becomes prolonged, and attended with a stridor as difficult to describe, but as characteristic of the disease, as the tone of the cough. It often happens that these two pathognomonic symptoms first come on, or at least first excite attention, in the night, and that a child who at bed-time was supposed to ail nothing, or at most to have a slight cold, awakes suddenly with ringing cough and stridulous breathing, frequently in a state of alarm and with marked dyspnœa. Through the whole course of the disease, indeed, an obvious tendency exists to nocturnal exacerbations, and to remissions as the morning approaches. In whatever manner the symptoms may have come on, they will not continue for many hours without being attended by increase of fever, by acceleration, and soon by difficulty of respiration. The skin becomes hot and dry, the face flushed, the breathing hurried, the cough frequent, the pulse full and quick, the child dull, fretful, and passionate. For a few minutes, indeed, it may appear cheerful, may turn to its playthings, and breathe more naturally, though the peculiar respiratory sound never ceases altogether. Soon, however, the dyspnœa returns with increased intensity; the whole chest heaves with the inspiratory effort, which is more prolonged and attended with greater stridor. During it, perspiration breaks out at every pore, and the veins of the neck and face become greatly distended. Short and forcible expiration follows, and after this state of dyspnœa has lasted for some minutes, an interval of comparative ease succeeds. The child now often falls asleep exhausted; but during sleep, the sound attending respiration is heard in an exaggerated degree. Though the drowsiness is great, sleep is uneasy, and frequently interrupted by violent startings, in spite of which the child may still sleep on. After some minutes he awakes in a state of terror, to pass through another paroxysm similar to the preceding one, though more severe. The cough does not increase in severity in proportion as the disease advances; it is unattended by expectoration, or at most a little mucus is spit up, but without any relief. Although the paroxysms of dyspnœa are not dependent on the cough, they are sometimes provoked by it, and the two or three inspirations next following the effort of coughing, are often attended with increased stridor. From the first appearance of the more marked symptoms, the voice is hoarse, cracked, and whispering, or in young children is either totally suppressed,

or if their voice be not actually extinct, at least their disinclination to speak is so great, that they will reply to questions by signs, and cannot be induced by any persuasion to utter a word.

There is almost always much eagerness for drink, and deglutition is generally well performed. The fauces are often red, though their redness bears no direct proportion to the intensity of the croupal symptoms; and there is frequently considerable tenderness of the larynx. The tongue is red at the tip and edges, but coated in the centre and at the back with thick white fur: the bowels are rather constipated, and the appetite for food is entirely lost.

As the disease advances, the paroxysms become less marked, or rather, the intermissions grow less distinct, and the child is constantly engaged with the effort to respire. The cough now sometimes ceases altogether, and the breathing frequently becomes sibilant rather than stridulous. The child throws its head back as far as possible, in order to increase the capacity of the trachea, the chest is heaved violently at each effort to inspire, and the larynx is depressed forcibly towards the sternum, while the abdominal muscles co-operate energetically in expiration. The face is heavy and anxious, the eyes are dull, the lips livid, the skin dry, and the extremities cold, or clammy sweats bedew the surface. The respiration is hurried, unequal and irregular, and the pulse is very frequent and very feeble. Though no remissions now occur, there are frequent exacerbations, in which the child throws itself about, and puts its hand to its throat, as though to tear away some obstacle to the admission of air, while helpless, hopeless, agony is depicted on its countenance. In the midst of these sufferings the patient dies, or coma or convulsions come on, and close the scene.

It is not always, however, that *the last stage* of croup is attended by such distressing symptoms. The treatment employed may seem to have mitigated the severity of the disease; the restlessness may give place to ease, the burning skin may grow moist, the respiration may become tranquil, the cough loose with but little clangor; expectoration may be easy, and a wheezing, attended with very slight croupy sound, may be the only indication of the dangerous disease under which the patient is suffering. This apparent amendment may continue for a few hours, and then be succeeded, without any assignable cause, by the return of all the former symptoms, and soon be followed by death; or the mitigation of the disease may be accompanied with great drowsiness, which, however, does not excite alarm, since it is very naturally attributed to the exhaustion produced partly by the disease, partly by the remedies. During sleep, the respiration is deep and tranquil, like that of a person in a sound slumber; it is, indeed, attended by a kind of wheeze, but presents little of the croupy stridor; and when awake the child is quite sensible, and even cheerful. After a time, however, it becomes difficult thoroughly to rouse

him ; his pulse grows more rapid, the moisture on his skin changes almost imperceptibly to a cold clammy sweat, and convulsive twitchings of the angles of the mouth occasionally disturb the repose of his features. Silently, but surely, the exudation has been making progress, and when the alarm is taken, it is too late ; the stupor deepens, and the child dies comatose, or rouses only to spend its last hours in the vain struggle for breath, and embittered by all the painful circumstances which ordinarily attend the suffocative stage of croup.

Auscultation yields us information in cases of croup with reference to two important points ; namely, the amount of obstruction to the entrance of air into the lungs, and the extent of disease of the air-tubes or substance of the lungs which accompanies it. At first, air is heard entering the chest freely, and unattended by any morbid sound other than that stridor which is produced in the larynx. If the lungs should continue unaffected no other morbid sound will be heard ; but, as the disease advances, the same negative results will be obtained from auscultation as are yielded by it in cases of emphysema—a feeble respiratory murmur belying the loud resonance on percussion. Often, however, respiration is attended from the commencement with the sonorous rhonchus of the first stage of bronchitis, though masked to some extent by the croupy noise in the trachea. Even in cases where the disease is originally confined to the larynx or trachea, inflammation almost always extends to the bronchi ; often also to the substance of the lungs, so that mucous or sub-crepitant râle generally becomes perceptible during its course, often attended by impaired resonance on percussion over the lower part of the chest. Air, however, may enter so imperfectly as not to fill the smaller bronchi ; and these sounds may be quite unperceived, unless the auscultator listen at the moment when the child makes an unusually deep inspiration, such as often follows a fit of coughing. The pneumonia, too, in all cases that I have observed, was double, and the resonance consequently nearly equally diminished on both sides of the chest. Hence the importance of comparing the sound elicited by percussion of the upper with that given out by the lower part of the chest,—a point to which you will remember that your attention has already been called on several occasions.

The changes in the tracheal sound which attend the progress of the disease, may be traced with great distinctness by applying a stethoscope to the larynx. Some writers have thought that they recognised in its variations the indications of the formation of false membrane, and that they also afford a means whereby to judge of its extent. I believe that usually when false membrane has been extensively formed in the larynx, the tracheal sound becomes less stridulous and more sibilant ; but I noticed on one occasion those changes in the tracheal sound which are supposed to indicate the presence of a very extensive deposit of false membrane, although no false membrane was either expectorated during the

the patient's lifetime, or discovered in the inflamed larynx and trachea after her death. We must conclude, therefore, that the changes in the tracheal sound do not afford absolutely certain evidence of the existence of false membrane, and that still less can they be regarded as safe criterions of its extent.

It is difficult to state with precision the *duration* of a disease such as croup, since its premonitory symptoms vary greatly, and its fatal termination is often in great measure due to the concomitant or consecutive bronchitis or pneumonia. When the laryngeal affection goes on to destroy life, it is seldom that more than forty-eight, or at the most seventy-two, hours elapse from the full development of the croupy symptoms to the fatal event; and, allowing the ordinary duration of the premonitory stage to be about thirty-six hours, the disease will be found to run its course in from four to six days. Treatment sometimes partially subdues it; but it returns, and the relapse, in the course of a few hours, proves fatal. Now and then the acute symptoms subside, and the disease assumes a chronic character; but this has only once come under my notice in idiopathic croup, though it is more common in that form of the disease which we shall have hereafter to notice as constituting a serious complication of measles.

The *prognosis* of croup must always be guarded, and is generally unfavourable, since the disease is unquestionably one of the most dangerous to which childhood is liable. Much depends upon the patient being seen at an early stage of the disease; and the prospect of recovery is generally very small if no treatment should have been adopted until after the full development of the symptoms. The presence of bronchitis, and, still more, of pneumonia, adds greatly to the dangers of the affection, and would induce us to form a very unfavourable opinion of the chances of recovery. A second attack of croup is generally less serious than the first; and cases in which catarrhal symptoms have preceded the seizure for several days are more amenable to treatmen than those in which the premonitory stage has been short, or altogether absent. Diminution of the dyspnœa in the intervals of the cough,—a louder and looser cough, attended with expectoration or vomiting of muco-purulent matter, intermingled with shreds of false membrane,—a less suppressed voice, less anxiety, and less restlessness,—all indicate that the disease is abating. Much caution, however, must be exercised in drawing a favourable conclusion from a diminution of the severity of the symptoms until such improvement has continued for twenty-four hours at least. In all but the most acute cases of croup the remittent character of the disease is very apparent; and it is well to bear in mind that the fatal termination usually takes place with extreme rapidity, when an exacerbation of the symptoms follows soon after a manifest remission of their intensity.* It can scarcely be

* Mox post symptomatum remissionem recidivantes, brevi ac certa morte demuntur." Gölis, lib. cit. p. 164.

necessary to remind you that extinction of the voice, suppression of the cough, the change from stridulous to sibilant breathing, and increased difficulty of respiration, all shew death to be surely and speedily approaching.

In no disease is the prompt employment of appropriate *treatment* more important than in croup, since in none does the use of remedies sooner become unavailing. Even in cases where the attack is merely apprehended, but where catarrh exists, attended with a slight ringing cough, such as often indicates the commencement of croup, the patient should be watched most sedulously, and visited not merely by day-time, but also late in the evening, and attention should be particularly directed to the character of the respiration during sleep as well as in the waking state. The child should be confined to the bed-room, be placed on a spare diet, and should take an emetic of ipecacuanha and antimony, to be followed by some mild diaphoretic medicine containing small doses of antimonial wine. By these precautions, which should be observed with especial care if the premonitory symptoms of croup appear in a child who has previously suffered from the disease, or in whose family a liability to it exists, you may often succeed in warding off the attack.

A far more energetic plan must be resorted to if the disease set in with violence, or if the indications of its approach having been either overlooked or unchecked, the symptoms should have attained their full development before the patient came under your notice. The abstraction of blood, and the administration of tartar emetic, are the two measures on which your main reliance must be placed; and you must bleed largely, and give tartar emetic freely, remembering that if relief do not come soon it will not come at all,—that there is not danger only, but death, in delay. I have never met with an exception to the rule which prescribes the free abstraction of blood in every case of severe idiopathic croup, when seen at an early period, and before the purple lips and livid countenance, and failing pulse, announce the long continuance of a serious obstacle to the free admission of air into the lungs. Even in very young children local depletion forms in these cases but a poor substitute for general bleeding, for it is not merely the abstraction of a certain quantity of blood that is needed, but its removal in such a manner as most speedily to produce an effect on the system. Bleeding from the jugular vein is preferable under these circumstances to venesection in the arm, since the latter often fails in children under three years old; and the blood never flows so freely as when taken from the jugular vein. It is not easy to state in figures the exact quantity to be abstracted, since the child's previous health, the intensity of the symptoms, and the effect produced by the flow of the blood, must all be taken into account in determining when to stop. Dr. Cheyne says, "The removal of three ounces of blood from a child between one and two years of age, or of six ounces from a child from eight till ten, generally appears to make a

sufficient impression on the disease ;" and this is a sufficiently near approach to a correct estimate of what is usually needed. The effect of free venesection is often very striking, and as the blood flows, the respiration may be seen to become notably easier. But though the relief thus afforded is very great, it proves but temporary; and unless followed by other remedies, the symptoms will often regain their former intensity in the course of four or six hours. I have not seen any instance in which the repetition of general bleeding appeared indicated, but many of you will probably meet with such cases in the country. Local depletion I have occasionally employed with advantage a few hours after the general bleeding; but if you follow up the first loss of blood by the free employment of tartar emetic, you will often be spared the necessity of further depletion. It has been recommended that leeches should be applied to the top of the sternum rather than to the windpipe, since difficulty may be experienced in arresting their bleeding if applied in the latter situation, as children are very intolerant of pressure in that neighbourhood. The caution is worth bearing in mind, but if you superintend the application of the leeches yourselves, which in such a case you certainly ought to do, the advantage of drawing the blood as nearly as possible from the affected part will more than make up for the risk of some slight difficulty in stopping its flow.

To accomplish any real good by means of the tartar emetic, it must be given in doses of an eighth, a quarter, or half a grain every ten minutes until vomiting is produced, and the same doses should afterwards be continued every half hour, until decided and permanent relief has been afforded. The dose that at first caused vomiting, may, after it has been repeated a few times, cease to excite it, in which case we must increase it, and not rest satisfied with tolerance of the medicine having been established, since its utility appears to be closely connected with its emetic power. Nauseating doses of antimony have not seemed to me to check the disease so surely, while they cause a greater depression of the system, and thus mask the approach of the fatal event. A striking illustration of the superiority of emetic over nauseating doses of medicine is given by M. Valleix,* who states that in thirty-one out of fifty-three cases of true croup, ipecacuanha and antimony were employed in full doses as emetics, and of these thirty-one cases fifteen recovered; while of the twenty-two cases in which their use was but sparingly resorted to, only one recovered.

If after antimony has been thus administered for four or six hours, no satisfactory measure of improvement should have yet appeared, local depletion may be resorted to, or possibly a repetition of general bleeding may in some cases be ventured on. If the croupal symptoms, on the

* Bulletin Générale de Thérapeutique, Oct. 1843, p. 246.

other hand, should have begun to abate, the antimony may be given at longer intervals; but you cannot be too much on your guard against being misled by temporary improvement, and abandoning the medicine too soon. Its use likewise is not to be relinquished by gradually diminishing the dose and substituting a quantity sufficient only to induce nausea for that which caused vomiting, but a full dose should be given every hour or two hours, instead of every half hour, and if amendment continue, the interval may be prolonged to three, four, or six hours. It is now, after the severity of the disease has been subdued by antimony, that the time has come for the administration of calomel. From the very commencement of the attack, mercurial inunction may be had recourse to every two or three hours; but the action of mercurials is far too slow to overtake a disease which tends so rapidly to a fatal issue. At this period, however, calomel seems to have a two-fold utility; it counteracts the tendency to the formation of false membrane in the air-passages, and prevents or subdues that inflammation of the lungs which is so frequent and so fatal a complication of the disease. I usually employ it in doses of half a grain or a grain in children from two to five years old, every hour or two hours, in combination with minute doses of ipecacuanha, but interrupting its use at intervals in order to give an antimonial emetic. The appearance of any exacerbation of the croupal symptoms, however, would lead me at once to discontinue the calomel, and to return to the energetic employment of antimony.

The administration of calomel is not necessary in every case of croup, for when seen early and treated with due activity, its symptoms are sometimes completely removed in the course of a few hours. But though we may sometimes be warranted in suspending all active treatment for a season, yet we must watch our patient with most untiring care for some days after the decline of the acute croupal symptoms, and at each visit our attention must be directed to the condition of the lungs, in order that we may at once put a stop at its very commencement to that inflammation of the smaller bronchi and of the pulmonary substance which so often disappoints the fairest prospects of recovery. Its treatment does not differ from that of ordinary bronchitis or pneumonia, except that depletion is not generally indicated, and that it not unfrequently becomes necessary to support the patient's strength, even from a very early period.

It still remains for us to inquire into the treatment of cases in which we have not the good fortune to encounter the disease at its outset, but in which we have to combat it when it has already reached the second stage.

This subject, however, must be reserved for our next lecture.

LECTURE XX.

Croup continued.—Treatment of the more advanced stages of the disease—tracheotomy—the difference between the results obtained by it in England and in France, and its probable cause.

Croup, with affection of the fauces, or diphtheritis—less frequent and less marked in this country than in France—its symptoms when it occurs alone—oftener follows some other disease, especially measles—its symptoms—treatment of both forms.

Croup, with predominance of spasmodic symptoms, or laryngitis stridula—not a distinct disease, but results from constitutional peculiarity—illustrative case.

Instances of spasmodic cough and affection of larynx, from irritation in lungs—intestines—brain.

In the last lecture we were occupied with the consideration of the management of those cases of croup in which the patient is seen early, and in which his condition warrants the employment of powerful antiphlogistic measures. He may, however, be seen too late for such means to be allowable, or they may have been tried in vain. If antimony cease to vomit, or if it be rejected immediately, and without effort, the fluid thrown up being unmixed with phlegm or false membrane, while the temperature sinks, the lips grow more livid, the pulse more frequent and feeble, and the paroxysms of dyspnœa are undiminished in severity; or if the respiration, though less laborious, be attended with a sibilant instead of a stridulous sound, it is evident that by continuing the medicine we may destroy the patient, but shall fail to cure the disease. A totally different plan of *treatment* must at once be adopted, though with but slender hope of success.

An attempt must be made to arouse the child from the state of collapse into which it is sinking, by placing it for a few minutes in a hot mustard bath, and emetics of the sulphate of copper should at once be administered. The sulphate of copper has been considered by some writers to be possessed of a specific influence over croup. I cannot, however, take this view of its action. It has seemed to me to be nothing more than an emetic of great power, and therefore especially applicable in cases where considerable depression exists, and where the stomach has consequently

lost much of its irritability.* I am accustomed to give it dissolved in water in quarter or half grain doses every quarter of an hour till free vomiting has been produced, but have never trusted to it alone, in the same way as in an earlier stage of the disease I am used to rely on tartar emetic. I employ it with a two-fold purpose; first, to obtain the stimulant action of an emetic; second, to prevent if possible the accumulation of false membrane in the larynx. Hence, if the child seem again sinking into a state of collapse, or if coma appear coming on, or if the dyspnœa become much aggravated, the sulphate of copper may again be employed to induce vomiting. Your main object, however, must now be to bring the system as speedily as possible under the influence of mercury, though the attempt will very likely fail; and the most complete success by no means implies the recovery of your patient. With this view a grain of calomel may be given every hour to a child from two to three years old, unless the existence of profuse diarrhœa should contra-indicate its use; while, at the same time, a drachm of strong mercurial ointment may be rubbed into the thighs every two hours. If diarrhœa be present the calomel must be given more sparingly, or even be altogether omitted; but the inunction may be used even more frequently.

In this stage of croup the decoction of senega is a medicine of great value, and may be given in combination with the carbonate of ammonia, and tincture of squills, every two hours. The pungency of the ammonia is best concealed by sweetening the medicine with treacle or coarse sugar, and mixing it with about a third of milk; and in this form children will seldom refuse it. No other remedy or combination of remedies has appeared to me to be so useful as a stimulant expectorant in the advanced stages of croup or bronchitis. The patient's strength must be supported by beef-tea, and a generally nutritious diet, and even wine may be indicated; though small, indeed, are the hopes that remain when the vital powers have sunk so low as to require its employment.

Much difference of opinion prevails among writers of high repute as to the proper time for employing counter-irritation in cases of croup, and still more as to the part to which this counter-irritation should be applied. I believe that when the disease has been checked by antiphlogistic measures, and the symptoms have lost something of their severity, much good is done by the application of blisters to the upper part of the sternum. But, on the other hand, if croup have reached an advanced stage, unchecked by previous remedies, blisters to the sternum have seemed to me nearly, if not altogether, useless, while, from the application of a large blister to the throat, covering the larynx and reaching down nearly to the sternum, I have often observed the paroxysms of dyspnœa to be much alleviated, the

* As illustrative of the utility of emetics as stimulants in some cases of great exhaustion, the reader may consult some cases by Mr. Higginbottom, in chap. xxviii. of Dr. M. Hall's Practical Observations and Suggestions in Medicine, 2d series, 8vo. Lond. 1846.

respiration rendered far more easy, and expectoration for the first time accompany the cough. In any case, if very manifest relief were not observed within six hours after the abstraction of blood and the administration of antimony, while further depletion did not appear justifiable, I should apply a blister to the throat.*

It was to be expected that the probable utility of *bronchotomy* in cases of croup should suggest itself to the earliest observers of the disease. For many years, however, after it was first advocated on theoretical grounds by Dr. Home, the value of the operation was not put to the test, and even for a long time after it had been tried, but one instance was recorded of any other than an unsuccessful result.† In the year 1825, M. Bretonneau, of Tours, saved the life of a little girl when in the last stage of croup, by performing tracheotomy, and the operation has since then been performed more than 150 times, and rather more than a fourth of the patients who underwent it recovered. By far the greater number of these successful cases occurred in France, while in England the result of almost every instance of the performance of tracheotomy in cases of croup has been so unfavourable that the operation is scarcely looked on as a justifiable proceeding. The great discrepancy of opinion between French and English practitioners, with reference to the value of tracheotomy in croup, can be explained only by the very different character which the disease presents in the two countries. In France, croupal symptoms are induced in the majority of cases by the extension to the larynx of false membrane originally deposited on the fauces and soft palate, while the windpipe itself is comparatively seldom in a state of active inflammation, often altogether unaffected; and the bronchitis and pneumonia, which in this country so often and so seriously complicate the disease, are there of less common occurrence. In estimating the results of tracheotomy in France, it must likewise be borne in mind that in many instances the operation was performed on patients whose disease would probably have been amenable to other treatment, and that in some cases the trachea was opened without the previous adoption of any treatment whatever, and quite in the early stage of the affection.‡ But though we cannot infer that all the patients

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* This opinion being opposed to that of men such as Dr. Stokes and Mr. Porter, I feel it necessary to appeal in support of it to the authority of Gölis, lib. cit. p. 118, and Albers, De Tracheitide Infantum, p. 127; and not to rest it solely on the results of my own experience.

† In this case, the operation was performed in the year 1782 by the late Mr. André, of London, on a little girl five years old. The particulars are related in a dissertation, published at Leyden in 1786, by Dr. T. White, whence they are extracted by Dr. Farre, and appended as a note to a paper of his on Croup, at page 338 of vol. iii. of the Medico-Chirurgical Transactions.

‡ In illustration of this fact two cases may be noticed, recorded in the Journal de la Société Médicale d'Inde et Loire, extracted and commented on in the Bull. Gén. de Thérapeutique, October 1842.

on whom tracheotomy was performed would have died if the operation had not been resorted to, these cases of premature tracheotomy at least prove the operation to be of itself unattended with very serious danger; while it is quite conceivable that the relief afforded by it to that spasmodic action of the muscles of the glottis, which endangers the patient's life more than the mere extent of false membrane in the air-passages, may contribute, in a most important degree, to arrest the advances of the disease. But whatever might be the result of the very early performance of tracheotomy, such a proceeding would be practicable only in a hospital; and we must base our conclusions, with reference to the operation, on a due consideration of the circumstances under which alone we are likely to have the opportunity of performing it. "There is," as Dr. Stokes* has truly observed, "always that kind of feeling connected with a surgical operation in acute diseases, which prevents its being proposed, assented to, or performed, unless under nearly desperate circumstances, and when all other means have failed. In the case before us, the operation is performed at a time when the situation of the patient is the worst possible for success; when the nervous system has been profoundly injured, and the lungs, even though no primary complication may have existed, have become extensively congested." Among my patients at the Children's Dispensary, I have never had recourse to the operation; partly for the reasons stated by Dr. Stokes, partly because it would have been impossible in the houses of the poor to command that constant attention and minute care which are absolutely essential to the success of tracheotomy, even when every thing in the patient's condition concurs to warrant its performance. Recently, Mr. Arnott performed tracheotomy, at my request, on a boy, aged twenty-one months, who was admitted into the Middlesex Hospital in the last stage of croup, which had succeeded to measles, and which had been allowed to advance without any remedy being employed to check it. In this instance life was prolonged for forty hours after the operation, and the ingress and egress of air through the canula continued free to the last; but the child's pulse began to grow more frequent and feeble after the lapse of little more than twelve hours, and his respiration became at the same time hurried and laborious, and continued increasingly so until death took place. This being the only instance in which I have had the windpipe opened for the relief of the symptoms of croup, it is not in my power to lay down any definite rules with reference to the time or manner of performing the operation. You will find the arguments against tracheotomy in croup most forcibly stated by Mr. Porter, in his work on the Surgical Pathology of the Larynx and Trachea, while an opposite opinion is very ably supported by a man of equal eminence, M. Trousseau, in a paper

* On Diseases of the Chest, 8vo. p. 220. Dublin, 1837.

which is published in the first volume of MM. Rilliet and Barthez' work on the Diseases of Children.*

I have endeavoured hitherto to direct your attention more especially to that form of croup which is of most frequent occurrence in this country, and in which the affection of the air-tubes is a primary idiopathic disease, calling for active antiphlogistic treatment. There is, however, another form of the disease, in which the laryngeal affection is connected with inflammation of the tonsils, soft palate, and fauces, and the deposit of false membrane upon them; and in many of these cases the affection of the air-passages is evidently a secondary occurrence. The symptoms attending this *variety of croup* generally present more or less of an asthenic character; and corresponding modifications must be made in the treatment. In England this form of croup is comparatively rare; when it does occur, it is in crowded cities much oftener than in the country. The influence of unfavourable hygienic conditions in predisposing to it is well illustrated by the statement of M. Guersent, that the number of croup cases in the Hôpital des Enfans Malades has become greatly diminished since the wards have been less crowded with patients, and since other means have been adopted calculated to promote the health of the inmates. Another strong proof of the influence of causes unfavourable to health in

* Although, for the reasons above stated, I have had almost no experience of tracheotomy in croup, yet it is quite impossible to have closely watched many cases of that disease without thinking much and anxiously upon the question of performing an operation for its relief. Among the arguments against the operation, too much importance appears to me to have been attached to the statement of Dr. Cheyne, that three-eighths of the aperture of the larynx have been found free in fatal cases of croup, and that, consequently, there must have existed during life room enough for the entrance of air. I apprehend that bronchotomy is not performed on the crass, mechanical, principle, of removing from the windpipe a quantity of matter which prevents the entrance of air into the lungs, but that it is done rather to obviate the dangers of that spasm of the glottis which the inflammation occasions, and which will not cease until either the inflammation is subdued, or the spasm relaxes with the approach of death. Even the narrow opening made into the trachea—often much narrower than the aperture of the larynx, though diminished by swelling or encroached on by false membrane—suffices to admit all the air which the patient needs, and for a time, at least, the dyspnœa is relieved. But the delicate mucous membrane of the bronchi is, in the vast majority of cases, exposed to immediate contact with the cold air of the ward of a hospital, or of a large chamber: bronchitis is thus excited or aggravated, and this secondary affection proves almost invariably fatal. It appears to me to be worth consideration, how far the careful regulation of the temperature of the apartment, and of the condition as to heat and moisture of the air respired by the patient after the operation, might diminish the hazard from this source; and, secondly, it may merit inquiry whether there be any difference to be expected between the results of tracheotomy in cases of sthenic croup, such as formed the basis of Dr. Cheyne's observations, in which false membrane was very extensively deposited,—and in cases of a more asthenic character, such as the chief of those were that came under my notice among the poor in London, in which the deposit of false membrane was very limited, and the larynx was the chief, sometimes the exclusive, seat of the disease.

inducing some varieties of croup, is afforded by a further statement of the same writer, that the greater number of cases of croup in the Parisian hospitals have supervened in patients who were already in those institutions for the cure of other diseases.

In country districts, unfavourable influences of a different kind seem to predispose to its occurrence. It is in those regions of France which are damp and ill-drained that it presents itself in its most aggravated forms, and there, has not unfrequently assumed an epidemic character, and proved extremely fatal. In several instances such epidemics have broken out on the subsidence of an inundation; but at other times it has not been possible to assign any reason for the sudden appearance of the disease in an epidemic form in neighbourhoods where for many years it had been unknown.

In this country it seldom, if ever, assumes those formidable characters which have often marked it on the continent, where the inflammation of the tonsils and pharynx have been very severe, and the formation of false membrane has not been limited to the fauces, but has occupied a great part of the mouth, and reached far down into the pharynx, as well as extending upwards into the nostrils. I cannot at all account for this difference between the disease in the two countries; but the mere extent of the false membrane does not seem to me to furnish any ground for supposing there to be an essential difference between the affection described under the name of *diphtheritis* by M. Bretonneau, and other French writers, and that in which, with a much more limited deposit of false membrane, there has yet seemed to be the same connection between the disease of the throat and of the air-passages.

This form of croup has come under my notice under two different conditions—either as an idiopathic affection, or as a complication of some other malady; the latter much more frequently than the former. In those cases where it has appeared as an *idiopathic affection*, slight febrile disturbance, and general disorder of the health, have usually preceded the local symptoms for some days. By degrees, slight cough comes on, often associated with catarrhal symptoms, and attended with considerable drowsiness and heaviness of the head, and sometimes with slight difficulty of deglutition. The cough next assumes the loud clangose character of croup, and stridor becomes perceptible with the respiration. If the throat be examined, the fauces, soft palate, and tonsils, will usually be found either universally red, or streaked and spotted of a dark red colour. This condition is generally best marked on the tonsils, the under part of the velum, and the uvula, and is in most instances attended with but little tumefaction. Specks of false membrane, of a dead white or greyish-white colour, next appear on the inflamed surfaces. I have seldom seen these deposits of false membrane become confluent, and never found them extend up into the mouth, even though the life of the patient had been

seriously endangered by their extension to the larynx, while in many instances the affection of the throat may be altogether overlooked if care be not taken to depress the root of the tongue sufficiently to obtain a thoroughly good view of the fauces. When once the larynx has become affected, the symptoms are in the main the same as attend on the other form of croup, but there is less of that constitutional reaction which we observe in acute inflammation of important organs. The fever generally presents throughout much of an adynamic character; the drowsiness is often very considerable; and, if the case be neglected, the fatal termination may come on very speedily, without being ushered in by that urgent dyspnœa and those violent efforts to obtain air which attend most cases of cynanche trachealis. On the other hand, these cases occasionally run a somewhat chronic course. The employment of emetics having detached the false membrane, and the local application of caustics having for a time prevented their reproduction, the croupal symptoms diminish or altogether disappear; but a premature suspension of the treatment is soon succeeded by a return of the dangerous symptoms of the disease: and hence in this, not less than in the other form of croup, it behoves us to be most sedulously on the watch for any indications of returning mischief.

It is not as an idiopathic affection that this form of croup has come most frequently under my notice, but as a most *dangerous complication of some other disease, almost always of measles.* Under these circumstances it frequently disappoints the most well-founded hopes of our patient's recovery, sometimes running its course very rapidly: at other times so insidiously that nothing but the greatest care will secure us against overlooking this most fatal malady.

This variety of croup seldom begins until the eruption of measles is on the decline, or the process of desquamation has commenced. Its occurrence is most frequent from the third to the sixth day from the appearance of the eruption, but it oftener occurs at a later than at an earlier period. It is sometimes attended with well-marked symptoms from the very first, but it often happens that the character of the disease is masked, and its course insidious, and that the degree of suffering during life affords no correct index to the amount of mischief which may be revealed by a dissection after death. Of itself it is highly dangerous, and its hazard is increased by the frequent co-existence with it of inflammation of the lungs, which serves moreover to throw the symptoms of croup into the shade. When the laryngeal affection comes on three or four days after the appearance of measles, its presence is usually betokened by much more obvious symptoms than when it occurs after the lapse of a longer period from the febrile attack. Sometimes, however, it develops itself unnoticed, simultaneously with the measles, and causes a fatal issue when the medical attendant is least prepared to expect it. The child in such cases is evidently more seriously ill than can be accounted for by the mere

existence of measles, but he makes no definite complaint, neither are there any obvious indications of the special suffering of any particular organ. There are considerable drowsiness, disinclination to swallow, and reluctance to speak; but the cough may be very slight, and the respiration free from distinct croupy stridor, while the child speaks in so low a tone that it is almost impossible to appreciate any alteration of the voice. Under such circumstances, the most careful observation is needed to avoid error. The loss of voice should of itself direct attention to the state of the larynx; the cry should be listened to attentively; pressure should be made on the larynx, to ascertain whether much tenderness exists, and examination of the fauces should never be neglected.

But little less obscure, and of much more frequent occurrence, are those instances in which the laryngeal affection attends the process of desquamation. Recovery up to a certain point had probably gone on well, when, sometimes with, sometimes without, an increase of the cough, and morbillous catarrh, the febrile symptoms become exacerbated, and the child droops again, apparently without any adequate cause. Sometimes a loud sonorous cough, succeeded or accompanied by alteration of the respiratory sounds, betrays the nature of the disease; but at other times there are no symptoms besides unusual drowsiness, reluctance to speak, or alteration in the tone of the voice, with disinclination to swallow, or difficulty in the act of deglutition. In many instances deglutition is scarcely at all impeded; and I remember only one case in which the difficulty of swallowing was so great that fluids returned by the nose. But even though these symptoms be but slight, it will usually be observed, on examining the mouth, that the gums have a spongy appearance, or are actually ulcerated; that the tongue is preternaturally red and raw, and that small aphthous ulcers have formed upon its edges and on the lining membrane of the mouth. The soft palate will usually be seen to be red and swollen, and specks of false membrane will be observed on the velum or tonsils. In such a case, if it terminate fatally, the duration of life is very variable; though the disease, for the most part, runs a somewhat chronic course. The child's strength declines daily, and emaciation makes rapid progress, yet no acute symptoms appear. There is great restlessness, and no posture seems easy to the child; or else it sits constantly upright in bed, distress and dyspnœa following any attempt to place it in the recumbent position. The alteration of the voice is succeeded by complete aphonia, the frequent hacking cough which had previously caused much annoyance ceases altogether; and although evidently thirsty, the child often refuses drink, or swallows with difficulty. Diarrhœa, or pneumonia, usually supervenes, and hastens death, though in some instances exacerbation of the croupal symptoms, coupled with the increasing weakness of the child, are the only causes of the fatal termination.

On examining after death the bodies of children who have died of this

affection, not only is the mucous membrane of the mouth found inflamed and ulcerated, but the soft palate, fauces, epiglottis, and the upper part of the pharynx, are seen to be more or less intensely congested, and coated more or less extensively with false membrane. Once I observed false membrane to have reached from the pharynx for a short distance into the œsophagus; and on another occasion I found the œsophagus lined by a complete tube of false membrane, which had extended to within an inch of the cardiac orifice of the stomach: but I have never seen the interior of that viscus occupied by a similar production, though that would seem, according to the experience of French writers, not to be a very unusual occurrence. The epiglottis is often ulcerated on both its surfaces, and partially coated with false membrane; and the mucous membrane of the larynx is generally eroded by numerous small ulcerations, as well as covered with a similar deposit. I have in no instance observed false membrane extending below the larynx; and although the trachea is usually congested, sometimes intensely so, yet this is by no means of invariable occurrence. Bronchitis and pneumonia, especially the latter, are frequent complications of this affection.

Under whatever circumstances this form of croup may occur, whether as an idiopathic malady, or as a sequela of measles or of some other disease, it is generally attended with so great a depression of the vital powers as to contraindicate the employment of active antiphlogistic *treatment*. When it occurs as an idiopathic affection, I have occasionally applied leeches to the throat if there were much tenderness about the larynx, or if the croupy symptoms had early acquired considerable intensity. The two means, however, on which I place my chief reliance are the careful and repeated cauterization of the fauces, and the employment of emetics. In most instances a solution of a scruple of nitrate of silver in an ounce of distilled water, applied by means of a sponge, or a piece of soft rag fastened on a small portion of whalebone, answers every purpose. If the deposit of false membrane be extensive, or the ulcerations about the tonsils present anything of a sloughy character, the strong hydrochloric acid, diluted with twice or thrice the quantity of honey, is a better application. At the same time that I adopt these local measures I employ the tartar emetic in the same manner as in cases of simple cynanche trachealis, except that it is not always desirable to give it in such frequently repeated doses as in the other more active malady. If relief be not speedily obtained, a mustard poultice, or a blister, should be applied to the throat. In any case where the vital depression is very considerable, the mustard poultice only should be employed, since, under such circumstances, a vesicated surface in the child often does not heal favourably. The slower course which these cases often run affords more time for the action of calomel than we generally have in pure cynanche trachealis; and unless the presence of diarrhœa contraindicate its employment, the remedy is one not to be omitted. It should be given

in doses of one grain every hour to a child of three or four years old, combined with a quarter of a grain of ipecacuanha ;—but if the symptoms be at all urgent, the emetic should be repeated every four or six hours, to detach any false membranes that may have been deposited on the fauces ; and cauterization should be practised again, to prevent their renewal. As improvement advances these remedies may be repeated at longer intervals, while expectoration may be promoted by the employment of the decoction of senega, with squills and ammonia, as has been already recommended. Care must be taken throughout not to depress the child too much by over active treatment ; nourishment must be given from an early period, and even before it is safe to discontinue the cauterization of the throat and the occasional employment of emetics, the extract of bark in combination with its tincture, or some other form of direct tonic, may be needed.

When consequent on measles, the same general plan of treatment must be adopted, though with far slenderer prospects of cure. The cauterization of the throat is in such cases especially necessary ; and the ulcerated condition of the mouth is often much benefited by the frequent application to it of a solution of two scruples of borax in an ounce of water. The tendency to diarrhœa often prevents the employment of calomel ; while, owing to the weakened state of the system, we cannot always venture on the use of antimony. In such a case, we may still have recourse to mercurial inunction ; and while the local cauterization is most sedulously attended to, emetics of ipecacuanha may be given two or three times a day, or the sulphate of copper may be substituted for it, if it cause purging, or fail to vomit. Here, however, more than in the idiopathic form of the affection, we find in many instances a most urgent necessity for supporting the child's strength, even from the very first. The occurrence of pneumonia is the accident most to be dreaded in the progress of the case, and may require a modification of the treatment, though, in its management, the asthenic character of the affection must always be borne in mind. Recovery is generally very slow, even in cases that terminate favourably ; and it often happens that, after all alarming symptoms have been removed, the voice is long in regaining its proper character.

The peculiar sound that characterises the cough of croup, the stridor of the respiration, and the urgent dyspnœa, which attend the progress of the disease, result, as I scarcely need remind you, almost entirely from the spasmodic action of the muscles of the larynx, and not from the mechanical obstacle which the presence of false membrane may offer to the free admission or exit of air. We have seen that these symptoms are, on the whole, less marked in cases where croup appears as a secondary affection, and the larynx becomes involved by the extension to it of disease beginning in the throat, than in those where the air-passages themselves are primarily affected. Still, they vary much both in the period of their

occurrence, and the degree of their severity, even in those cases that most resemble each other, and they bear no certain relation to the intensity of the inflammation any more than to the amount of the deposit of false membrane. The diversities in this respect depend on constitutional peculiarity rather than on any essential difference in the nature of the disease.

This view, indeed, is not taken by all writers, but some observers of deservedly high repute, such, for instance, as M. Guersent,* have conceived that there are differences sufficient to warrant our placing in a separate category those cases of croup which are marked by the predominance of spasmodic symptoms. They have proposed to designate this form of the disease by the name of *laryngitis stridula*, to distinguish it from ordinary croup, the laryngitis pseudomembranacea. It was doubtless the observation of some cases of this kind, that led Dr. Millar,† nearly eighty years ago, to describe under the name of the acute asthma, a disease resembling croup in many respects, but presenting a mixture of spasmodic and inflammatory symptoms; the former predominating at the commencement of the disease, the latter towards its close. Dr. Millar appears, indeed, in some measure to have confounded two very different affections,—the true spasmodic croup, or laryngismus stridulus, with the inflammatory croup, or cynanche trachealis, under the idea that they constituted the two stages of one disease. But, nevertheless, cases are sometimes observed that bear a very close resemblance to Millar's description, though no advantage seems to me likely to arise from constituting a new species of croup out of a modification in its symptoms produced by the idiosyncrasy of the patient.

In some children there is a greater tendency to spasmodic affections than in others: in such the laryngeal nerves will take the alarm at the very outset of the disease, and the paroxysms of dyspnœa will consequently commence at an early stage, and will soon attain great intensity, but may become masked by the permanent distress of breathing to which the disease in its progress gives rise. In other instances, the symptoms of inflammatory disease, and those of spasmodic disturbance, may be so commingled, or may so alternate with each other, as to render it hard to tell from which the child suffers most. This was the case with a little boy ten months old, who some years since came under my care, suffering from what seemed at first to be ordinary inflammatory croup. The symptoms, though not very urgent, were plainly marked, and the active employment of antimony soon dissipated them. During the whole course of the disease, however, the child, who seemed highly nervous and excitable, suffered

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* In the article Croup, in vol. ix. of the 2d edition of the Dictionnaire de Médecine, &c. Paris, 1835.

† Observations on the Asthma, and on the Hooping-Cough, 8vo. London, 1769.

from attacks of dyspnœa far more severe than could have been anticipated from the general mildness of the attack, or than would have been supposed to exist by any one who had seen the child only in the intervals of the paroxysms. The cough and respiration had for forty-eight hours entirely lost all croupy character, and nothing but catarrh seemed left behind, when the child was suddenly seized with extreme difficulty of breathing, attended with slight croupy noise, and lay stiff in his nurse's arms with his thumbs drawn into the palms of his hands, and his great toe separated from the others. Four-and-twenty hours had elapsed from the supervention of these new symptoms before I was able to visit the child. He was then extremely restless; his face was flushed, his thumbs were drawn into the palms of his hands, and his feet were forcibly extended; his breathing was laboured, and attended with a hoarse croupy sound, which became still more distinct whenever the child coughed. The bowels had not acted for a couple of days, but an hour after my visit, some purgative medicine, of which large doses had been given during the previous six or eight hours, began to act, and produced three very copious evacuations, with perfect relief to all his symptoms. The carpopedal contractions disappeared, the respiration became easy, and the face ceased to be flushed or anxious. The child slept well through the night, was cheerful on the following day, and slight hoarseness attending his occasional cough was the only remaining symptom. In a day or two that also disappeared, and the child perfectly recovered.

The influence of that spasmodic element which enters so largely into the production of the symptoms of cynanche trachealis, is seen in many cases in the long persistence of a croupy sound with the cough, and in its subsequent recurrence, when a patient who has once had croup, catches cold. In these cases the nerves have doubtless not thoroughly recovered from the effects of the previous inflammation.

The spasmodic character of many of the symptoms of croup will become still more evident when we observe, as we shall do in the next lecture, the resemblance which they bear to those phenomena that attend some of the more purely nervous affections of the respiratory organs.

Even before closing this lecture, one or two illustrations may be adduced of *spasmodic affection of the larynx* in connection with disease seated elsewhere.

MM. Rilliet and Barthez have described a spasmodic cough that returns in paroxysms, is loud, attended with an imperfect hoop, and may be easily taken for hooping-cough by the inattentive observer. It is, however, a symptom of bronchial phthisis, due to the extension to the larynx of irritation seated in a distant part of the respiratory organs.

Intestinal irritation is a frequent cause of nervous cough in childhood. It is sometimes a loud, solitary, ringing cough—the tussis ovilla, tussis

ferina of medical writers; at other times it is a short dry cough, attended with no particular inconvenience, but teazing from its frequency. Both of these forms appear to result in many instances from the presence of worms, and speedily cease under the judicious employment of purgative medicines.

Lastly, I may once more remind you of the cough which is occasionally heard in the early stage of inflammatory affections of the brain. It is a very short, hoarse cough, which sometimes continues for a few minutes almost incessantly, then ceases for a time, and then, after a pause, returns again. The disturbance of the brain is sympathized in by the larynx, and the depletion which relieves the former organ, removes the irritation of the latter.

LECTURE XXI.

Spasm of the glottis.—Its symptoms—description of the carpopedal contractions that accompany it—impairment of general health—ways in which it proves fatal.—Mode of its production—its various exciting causes, dentition, gastric disorder, local irritation from enlarged glands—supposed to depend sometimes on enlargement of the thymus gland—case in illustration.—Treatment—rules for diet and for the regulation of the bowels—caution with respect to lancing the gums—occasional necessity for free depletion—case in illustration.—Suggestions as to general management, and the avoidance of circumstances likely to produce an attack.

We have often had occasion to notice the tendency to disorder of the nervous system that characterizes early life, and have just now seen to how great a degree the dangers of croup and the sufferings that attend it are aggravated by the sympathetic disturbance of the nervous system with which it is almost always associated. We have observed, too, that the spasmodic symptoms of this disease are sometimes quite out of proportion to the severity of the local mischief; and that in many cases, long after the inflammation has subsided, slight stridor with the respiration, and a degree of clangor with the cough, render it probable that the laryngeal nerves have not yet regained their accustomed tone.

Spasm of the glottis, however, is not always the result of inflammation of the larynx, and a mere aggravation of danger that would even without it be considerable. It sometimes constitutes an independent disease, and one that may prove suddenly fatal, even though the larynx be perfectly healthy, and though no other organ present changes adequate to account for the patient's death. For a time it was confounded with cynanche trachealis, but the points of difference between the two affections are now clearly recognized, and the terms spasm of the glottis, cerebral croup, spasmodic croup, by which it is designated, are more or less apt expressions of its connection with disorder of the nervous system.

Spasm of the glottis,—which term I select as the simplest among many appellations that the disorder has received,—usually comes on by degrees,

and it is but seldom that its early *symptoms* are such as to excite the alarm of non-professional persons. It does not often occur in perfectly healthy children, but an infant who is attacked by it has usually been observed to be drooping for some time previously, to have lost its appetite, to have become fretful by day and restless at night, and to present many of those ill-defined ailments which are popularly ascribed to teething. At length, after these symptoms have continued for a few days or weeks, a slight crowing sound is occasionally heard with the child's respiration. The sound is something between the hoop of hooping-cough and the stridor of true croup; it must be heard to be known, but when once heard will easily be recognized. Usually it is first noticed on the child awaking out of sleep, but sometimes it is perceived during a fit of crying, or comes on while the infant is sucking. Now and then the first crow is very loud, and by its resemblance to the sound of croup, at once alarms the family, but this is not generally the case; and its loudness increases in proportion as its return becomes more frequent. The spasm may have been excited by some temporary cause, and the sound which is its token may in that case not be heard again, but generally it returns after the lapse of a few hours, or of a day or two. It will soon be found, as its return becomes more frequent, that certain conditions favour its occurrence; that the child wakes suddenly from sleep with an attack of it, that excitement induces it, or deglutition, or the effort of sucking, so that the child will suddenly drop the nipple, make a croupy sound with its breathing, and then return to the breast again. Throughout the whole course of the affection, its attacks will be found to be more frequent by night than by day; and to occur mostly either soon after the child has lain down to sleep, or towards midnight, when the first sound sleep is drawing to a close.

At first the child seems, during the intervals of the attack, in as good health as before, except perhaps that it is rather more pettish and wilful; but it is not long before graver symptoms than the occasional occurrence of an unusual sound with inspiration excite attention, and give rise to alarm. Fits of difficult breathing occasionally come on, in which the child throws its head back, while its face and lips become livid, or an ashy paleness surrounds the mouth, slight convulsive movements pass over the muscles of the face, the chest is motionless, and suffocation seems impending. But in a few seconds the spasm yields, expiration is effected, and a long, loud, crowing inspiration succeeds, or the child begins to cry. Breathing now goes on naturally; the crowing is not repeated, or the crying ceases; a look of apprehension dwells for a moment on the infant's features, but then passes away; it turns once more to its playthings, or begins sucking again as if nothing were the matter. A few hours, or even a few days, may pass before this alarming occurrence is again observed, but it does recur, and another symptom of the disturbance of the nervous system

is soon superadded, if it have not, as is sometimes the case, existed from the very beginning. This consists in a peculiar contraction of the hands and feet; a state which is likewise not unfrequently observed, during infancy, without any spasmodic affection of the respiratory organs. It differs much in degree; sometimes the thumb is drawn into the palm by the action of its adductor muscles, while the fingers are unaffected; at other times the fingers are closed more or less firmly, and the thumb is shut into the palm; or, coupled with this, the hand itself is forcibly flexed on the wrist. In the slightest degree of affection of the foot, the great toe is drawn a little away from the other toes; in severer degrees of the affection this abduction of the great toe is very considerable, and the whole foot is forcibly bent upon the ankle, and its sole directed a little inwards. Affection of the hand generally precedes the affection of the foot, and may even exist without it, but I have never seen spasmodic contraction of the feet when the hands were unaffected. At first this state is temporary, but it does not come on and cease simultaneously with the attacks of crowing inspiration, though generally much aggravated during its paroxysms. Sometimes a child in whom the crowing inspiration has been heard, will awake in the morning with the hands and feet firmly flexed, although he may not have had any attack of difficult breathing during the night. At other times, though but seldom, this state will subside during sleep, while very often it is impossible to assign any reason for its cessation or return. The hands may often be unflexed by bending the fingers, but they will resume their former position on the withdrawal of the force, and such attempts are painful to the child. When the contraction is but slight, children still use their hands, but when considerable they cannot employ them, and they sometimes cry, as if the contraction of the muscles were attended with pain. Coupled with these carpopedal contractions, the back of the hand and the instep are sometimes swollen, tense and livid, and occasionally there is slight puffiness about the face. This condition is sometimes more general, and on two successive years the same child was brought to me, in whom these attacks of crowing inspiration were accompanied with a state of tense anasarca of the whole body.*

When the disease has reached this degree of intensity, a slight crowing sound often attends each inspiration, and the paroxysms of difficult breathing are much more severe; they last longer, and sometimes terminate in general convulsions. The breathing now does not return at once to its natural frequency, but continues hurried for a few minutes after the occurrence of each fit of dyspnœa; and it is sometimes attended with a little wheezing, from the accumulation of mucus in the trachea and larger bronchi during the paroxysm. When this wheezing is permanent, I do not apprehend that it constitutes any essential part of the disease, but

* This case presented a remarkable similarity to one described by Dr. M. Hall, at p. 185 of his work on the Diseases and Derangements of the Nervous System, 8vo. Lond. 1841.

regard it either as due to an accidental complication with catarrh, which is so frequent during the period of dentition, or as the result of the affection being associated with tubercle in the lungs or bronchial glands. The slightest cause is now sufficient to bring on an attack of difficult breathing; it may be produced by a current of air, by a sudden change of temperature, by slight pressure on the larynx, by the act of deglutition, or by momentary excitement. The state of sleep seems particularly favourable to its occurrence, and the short fitful dozes are interrupted by the return of impending suffocation.

The general condition of the child varies much during the existence of these symptoms, but is always widely removed from a state of health. The bowels are almost invariably disordered, constipation being more frequent than diarrhœa. The mouth is sometimes hot, and the gums are swollen,—the child evidently suffering from the process of teething; and this is the state with which spasm of the glottis is perhaps most frequently associated. Sometimes there is evident congestion of the brain, and the face is flushed, the head hot, and the pulse frequent; but these flushes of the face are usually temporary, and the skin is generally pallid. When the affection has continued for some weeks, the countenance often assumes a haggard, miserable aspect; and though it may come on in children apparently in good health, I have never known the health continue good, after the disease, even in a mild form, has lasted for any time.

Death sometimes takes place during one of the paroxysms of dyspnœa, the child being suffocated by the long continuance of the spasm, or at other times the often repeated difficulty of breathing induces a state of permanent cerebral congestion; general convulsions occur, and the child dies convulsed or comatose, serous effusion having taken place into the ventricles of the brain. Should the child escape both these dangers, and should no tubercular disease of the lungs or bronchial glands exist, recovery is almost sure eventually to take place, though the convalescence is often very protracted, and the attack is apt to return under the influence of the same causes as originally excited it.

Now, though for convenience sake I have spoken of this spasm of the glottis as if it were an independent disease, yet the crowing inspiration, and all the other phenomena that attend it, are merely a collection of symptoms betokening disturbance of the nervous system in general, and of the respiratory nerves in particular. The causes that may produce such disturbance are very various, and according to them must our treatment be diversified. Many writers have overlooked this fact, and fixing their attention on some one cause, have given a defective, if not an erroneous explanation of the nature of the affection. But this is not the case with Dr. Marshall Hall, whose application of the discovery of the reflex function of some of the spinal nerves, receives some of its most beautiful illustrations from this affection.

"It is," says this distinguished physiologist,* "an excitation of the true spinal or excito-motory system. It *originates* in—

I. 1. The *trifacial*, in teething.

2. The *pneumogastric*, in over- or improperly- fed infants.

3. The *spinal nerves*, in constipation, intestinal disorder, or catharsis.

These act through the medium of—

II. The *spinal marrow*, and

III. 1. The *inferior* or *recurrent laryngeal*, the constrictor of the larynx.

2. The *intercostals* and *diaphragmatic*, the motors of respiration."

If now we bear in mind this theory of the disorder, the various *circumstances under which it is met with* will no longer be to us a source of difficulty. The great share which dental irritation has in its production is shewn by the age at which it generally occurs. Of 27 cases of which I have preserved some record, 21 occurred in children between the age of six months and two years, or just at that period when the process of dentition is proceeding most actively, and its attendant diseases are most rife. I apprehend, however, that we should err if we attributed this affection, or any of the other convulsive disorders that occur at this time, entirely to the mechanical irritation of the teeth, pressing on, and cutting through, the gums. The period of teething, like that of puberty, constitutes one of the great epochs of life: it is a time when general changes are going on in the whole organism,—when, the animal machine being in a state of increased activity, its parts are more than usually apt to get out of order. New diseases appear, or such as were before of rare occurrence become frequent; catarrhal affections and disorders of the intestinal mucous membrane are extremely prevalent, and the brain grows more than ever liable to congestion of its vessels. Under these circumstances, spasm of the glottis often occurs as the secondary rather than the primary result of dentition. The child has cut some of its teeth without any symptom of disorder of the nervous system making its appearance, but at length it suffers an attack of diarrhœa, or the bowels are allowed to become constipated, or signs of cerebral congestion show themselves. The crowing sound now becomes audible with the inspiration, and it is not long before the whole train of symptoms make their appearance which it has been my object to describe. It may be that the gums were not swollen, nor any tooth near the surface just at the moment when the signs of disturbance of the nervous system made their appearance; but their connection with the process of dentition is not the less undeniable. In many instances, too, though these symptoms may subside as the health improves, yet they will return when the child cuts another tooth, and this even without a recurrence of that impairment of the general health which attended them on the former occasion.

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* Lib. cit. p. 71.

The various sources of irritation that give rise to this affection, however, are not limited to the period of teething; and hence, it may be met with before the commencement of that process, as well as after its termination. I have seen it in a child ten weeks old, as a consequence of improper feeding; in another, aged nineteen months, it followed the sudden suppression of long-continued diarrhœa; in a third, aged two years and a half, it appeared to depend on a state of cerebral congestion which succeeded to habitual constipation; in a fourth, nine months old, it supervened in the course of chronic hydrocephalus; and in a fifth child, who died when two months old, it appeared as a transitory symptom during a series of convulsive attacks, for which no cause could be assigned during life, and which left no traces of disease that could be detected after death.

But besides those cases in which spasm of the glottis is induced by irritation set up in some distant part, there are others in which the exciting cause of the affection is situated near to the larynx. The late Dr. Hugh Ley observed several instances of this kind, in which the attack appeared to be due to the presence of enlarged and tuberculous cervical and bronchial glands, and similar cases have come under my own notice. Dr. Ley, indeed, based upon his dissections a theory of the disease which is now known to be erroneous; but it will not excite your surprise that a mass of bronchial glands, compressing and flattening the pneumo-gastric and recurrent nerves (as you see represented in these plates*), should in many instances excite irritation of those nerves, and give rise to spasm in the parts to which they are distributed.

Symptoms of a kind closely resembling those which we have been studying, are now and then observed in infants, in connection with a hypertrophied state of the thymus gland; and the affection has, in such cases, received the name of *thymic asthma*.

The only instance of the kind that has come under my own notice occurred in a little boy, who was brought to me at the age of six months, suffering from symptoms which his mother said had existed, though in a less aggravated degree, almost from the time of his birth; but which had not much alarmed her until they were followed by an attack of general convulsions a day or two before I saw the child. These symptoms consisted in the occasional occurrence of great difficulty in breathing, attended with considerable livor of the surface, continuing for a very short time, and returning every two or three weeks without any assignable cause. From the sixth month the child seemed very liable to catch cold, and had frequent cough and wheezing; but a little rhonchus was all that was ever perceptible in the lungs; and febrile symptoms were at no time apparent. The attacks of difficult breathing often occurred at night, the child waking from sleep with them, or they were sometimes produced by deglutition,

* Ley on the Laryngismus Stridulus, 8vo. Plates 1 and 2. London, 1836.

which process always seemed to be attended with slight difficulty whenever the child attempted, as it grew older, to swallow semi-solid substances. It was remarkable that no distinct crowing sound ever attended the inspiration; but that the child having turned extremely livid during the paroxysm of dyspnœa, gradually recovered its breath, and the livor and anxiety of the countenance disappeared by degrees. Profuse perspiration about the head generally followed these seizures; and sometimes the child would pass into a state of general convulsions, in which, however, it did not struggle much, but continued to breathe hurriedly for some time after they had passed off. From about the ninth month, slight cough was almost constantly present, though still unattended with any febrile disturbance: the head was sometimes very hot, and the difficulty of deglutition, the dyspnœa, and the convulsions, increased both in severity and in the frequency of their recurrence. The child now cut the two lower incisors, but without any change taking place in his general condition. Two or three weeks before his death, which took place when just a twelvemonth old, he had an attack of coryza, with abundant puriform discharge, which, by its hardening, blocked up the nostrils, and caused a good deal of distress in breathing, though unattended with any really grave symptom. He was recovering from this, when, one morning early, a paroxysm of dyspnœa came on, which was followed by a slight fit that left him pale and exhausted. About two hours afterwards, his breathing not having become as quiet and natural as before the first paroxysm, another attack came on, in which he died.

On examining the body after death, the lividity of all the depending parts was very remarkable.

The pericranium stripped off very easily from the bones of the skull, which were exceedingly vascular. There was considerable vascularity of the dura mater, the sinuses of which and the cerebral veins generally, were gorged with fluid blood. There was no injection of the pia mater; sections of the brain presented a rather greater number of bloody points than natural, but its substance was firm, and the lateral ventricles contained but little fluid.

The first object seen on opening the chest was the thymus gland, which occupied the whole of the anterior mediastinum, and nearly concealed the heart. Its structure was apparently natural, its length was $3\frac{3}{4}$ inches, and it weighed $328\frac{1}{2}$ grains.

The heart was extremely large, as large as the heart of a child of three years old. Its auricles and the veins, both the cavæ and the pulmonary veins, were full of fluid blood. The organ was not well contracted; its structure was perfectly healthy, and the fœtal openings were closed.

There was a good deal of thick mucus in the trachea and bronchi, but they were perfectly healthy; and the rest of the body presented no remark-

able appearance except that a considerable extent of both lungs was in a state of carnification.

Now notwithstanding some points of difference between this case, and those in which spasm of the glottis has been induced by a different cause, yet we recognise in it the grand symptoms of the affection. The enlargement of the thymus appears to have induced permanent irritation about the wind-pipe, which betrayed itself by the frequent cough, and the constant wheezing. To the same cause, too, must be referred the difficult deglutition, while the convulsions were probably much favoured by the enlarged gland pressing upon the superior cava and right auricle,* and thus impeding the return of blood from the head: nor must we forget, among the probable causes of the child's sudden death, the remarkable degree of cardiac hypertrophy. The fatal event, however, might possibly not have occurred but for the attack of coryza, and the consequent impairment of the respiratory function, which naturally tended to increase the congestion of the brain.

The *treatment* of spasm of the glottis must be regulated by the nature of its exciting cause; and this, as you have already seen, varies much in different cases. In infants before the period of dentition, it is usually induced by over-feeding, or by food of an improper kind. Our inquiries, therefore, must at once be directed to ascertain how the infant is fed; and supposing it to be still suckled, it will be wise to interdict any other food than the mother's milk,—or, at most, to allow only a little barley-water. Spasm of the glottis, however, occurs much oftener in infants who are brought up by hand, or in those who have been weaned, than in children still at the breast. In such cases, much pains are sometimes necessary in order to ascertain precisely the kind of food that best suits the infant. Two parts of milk, and one of barley-water, sweetened with a little loaf sugar, or equal parts of milk, and of a solution of isinglass, made of the thickness of barley-water, generally agree very well; but much caution must be used in the introduction of farinaceous articles into the child's diet. Asses' milk, which forms the nearest approach to its natural food, must sometimes be given till the child has decidedly improved; while if it be puny, and do not appear to thrive, and the crowing inspiration continue undiminished, it may become absolutely necessary to restore it to the breast.

The state of the bowels requires no less attention, than the regulation of the diet. The tendency to constipation must be combated not by drastic purgatives, but by mild aperients. Castor oil often answers the purpose very well, but sometimes each dose of it nauseates a child for several hours,

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* Hasse suggests (in his Specielle pathologische Anatomie, p. 519, Leip. 1841) that this circumstance contributes to the production of the sudden death in thymic asthma,—a supposition which the case recorded above certainly tends to bear out.

and then it is not desirable to employ it if a daily aperient should be needed. Both senna and manna are apt to gripe, and if they be found on trial to produce this effect, their use must not be persevered in. Few medicines act more mildly or more certainly in children than aloes; and the bitter of the compound decoction may be much concealed by extract of liquorice. The bulk of a medicine, however, often opposes a great difficulty to its employment in infancy, and if that be the case, the powder may be substituted for the decoction. If slightly moistened, mixed with a little coarse sugar, and placed on the tongue, it will often be swallowed very readily. The habitual use of mercurials to overcome the constipation is not desirable: their employment is better limited to those cases in which the bowels are not only sluggish, but the evacuations unnatural in character.

The action of the bowels may be encouraged by rubbing the abdomen twice a day with a liniment composed of equal parts of soap liniment and tincture of aloes; or the bowels may sometimes be induced to act regularly in young infants, by the daily employment of a small soap suppository. Enemata, consisting either of warm water, or gruel, may also be given for the same purpose.

Sedulous attention to the diet and the state of the bowels will sometimes effect a cure, but in many instances tonics may be employed with advantage, and probably none with such decided benefit as the preparations of iron. Removal to the pure air, however, or to the sea-coast, is often a tonic of greater power in these cases than all the contents of the laboratory, and one which you will find in some instances to be absolutely indispensable to the child's cure.

All these cares are not less needed in children in whom the process of dentition has already commenced. In them, however, the irritation of teething is often the exciting cause of the affection, and lancing the gums is frequently needed in addition to the other treatment. The relief thus afforded is sometimes very striking, and the frequent repetition of the process may be necessary to diminish the swelling and tension, and to ease the pain of the congested gum. It is not, however, a proceeding to be adopted, irrespective of all other considerations, simply because the child had begun to cut its teeth when the attack of spasm of the glottis came on. Dentition does not go on continuously from the time when the first tooth is cut until the completion of the whole set, but there are regular pauses in the process, during which its advance is suspended for several weeks together. Thus, for instance, after the appearance of the incisors, there is a pause of several weeks or months before the first molar teeth appear, and then there is another cessation in the process before the child begins to cut its canine teeth. The spasm of the glottis, therefore, may come on during one of these pauses, and be excited by some cause quite unconnected with dentition. Lancing the gums, too, is not well borne in every case, even when it may have appeared to be indicated, and I have more than once

been compelled to discontinue it, on account of the pain and alarm which it excited bringing on a violent spasmodic seizure, whenever I attempted to practise it.

In some instances the spasm of the glottis is associated with manifest uneasiness in the head. It has been suggested, that in some of these cases the brain is kept in a state of constant irritation, owing to the deficiently ossified skull being too thin to defend it from injury, while at the same time it affords no adequate counter-pressure to check the over-distention of the cerebral vessels. I have seen one case that seemed to lend decided support to this opinion, and many others have come under my notice, in which the recommendation that a horse-hair cushion should be made for the head to rest on, having a hole in its centre, so as to relieve the occiput from all pressure, has been acted on with manifest advantage. The supervention of attacks of spasm of the glottis, in a case of well-marked chronic hydrocephalus, would call for little change in the treatment, though it must evidently add much to the danger of the patient.

Symptoms of cerebral congestion are sometimes associated with this condition. They are seldom such as to call for active interference; but the tepid bath, and neutral salines, with small doses of hyoscyamus, are often of much service in quieting the general excitement of the circulation, while the occasional application of a leech to the head may be beneficial, especially if general convulsions are beginning to supervene on the attacks of dyspnœa.

It is possible that you may meet with a case in which active depletion is indicated, and you must not allow the consciousness, that, as a general rule, it is inappropriate, to prevent you from having recourse to it in such exceptional instances as the following. In this case, indeed, it was found necessary to carry depletion beyond that point which is in general expedient in so young a child.

Some years since I saw a little boy 2½ years old who had already suffered from several attacks of spasm of the glottis. A return of the affection had taken place about seven weeks before, though not attended with any very alarming symptoms until after the lapse of a month, when a general convulsive seizure occurred. From this he recovered, and he had for some days appeared to be convalescent from the spasmodic seizures, when his bowels became disordered, and a good deal purged, and after they had been so for two or three days his mother noticed one afternoon that his thumbs were forcibly drawn into the palm of his hands. With the exception of this contraction of his thumbs, however, he seemed as well as usual, and had a tolerably good night, but immediately on awaking at six o'clock on the following morning he had a paroxysm of stridulous breathing in which he crowed so loudly as to be heard over the whole house. His face at the same time became greatly flushed, and his hands and feet contracted as they were when I visited him three hours afterwards. His face

was then much flushed, his head hot, his pupils rather dilated, his pulse full and bounding; his thumbs were drawn across the palm, the fingers were not closed, but the hands were forcibly flexed on the wrist; the great toe was drawn far apart from the other toes, which were flexed, and the whole foot was stiffly bent on the ankle. The child was then breathing quietly, and seemed drowsy, but he screamed out the moment he was touched as if the least disturbance of his limbs gave him pain.

Eight leeches were applied to his temples, and drew much blood, but without producing any amelioration of his condition. A croupy sound continued to attend his respiration, and he had a fit of urgent dyspnœa, with loud stridulous breathing, between my first visit at 9 in the morning, and my second at 5 the same evening. I now bled him from the arm to ℥vj. which subdued the fulness of the pulse, blanched his lips, and diminished the flush of his face, though it did not cause actual fainting. I ordered cold to be applied to the head, and saw him again at 7½ P.M., when I found that he had been lying quiet ever since I left him, and had had some tranquil sleep without any crowing sound attending the breathing. His pulse was less full, the flush of his face diminished, the heat of the head was gone, and the contractions of the hands and feet were both less, and less firm.

A powder with gr. j. of calomel and gr. viij. of rhubarb, which had been given in the morning, and had produced one evacuation, was now repeated.

The child had some sleep in the night, and no access of dyspnœa recurred, nor did the croupy sound again accompany the inspiration. In the course of the day the spasmodic contractions of the hands and feet greatly diminished, and the child became cheerful. In five days from this formidable attack he was quite well, and continued so for a year, when a slight return of spasm of the glottis took place, in the course of a severe impetiginous eruption on the scalp.

Before concluding this lecture, I will suggest a few cautions, applicable alike to all cases of spasm of the glottis. Sudden excitement, and especially a fit of crying, are likely to bring on the attack, and since there is a possibility of any one of these attacks proving fatal, the greatest care must be taken in the management of the child to avoid all unnecessary occasions of annoyance or distress.

Although the benefit that accrues from fresh air, or from a change of air, is often very great, yet it is very important that the child should not be exposed to the cold or wind, for I have seen such exposure followed by a severe attack of dyspnœa, or by the occurrence of general convulsions. The hazard of such an occurrence is greater in proportion to the severity and long continuance of the affection; and, in such cases, the excitability of the spinal cord, and the irritability of the surface, seem sometimes to become as great as they may be observed to be in frogs when narcotized,

whom you may then throw into convulsions, by merely shaking the table on which they are placed. It is possible that this condition in the infant may be due to a cause not unlike that which produces it in the lower animal. In the latter, it is manifestly due to the influence on the nervous system, of blood impregnated with opium ; in the former, a similar influence may be exerted by blood the proper depuration of which has been prevented, by the frequent recurrence of spasm of the glottis.

There is also another reason for caution in exposing the child to cold or wind, namely, that the occurrence of catarrh is almost sure to be followed by an aggravation of the spasmodic affection. On more than one occasion I have seen the supervention of catarrh convert a very mild into a very serious attack ; and once, the exacerbation of the symptoms thus produced, was the cause of the infant's death.

The parents should in every instance be made fully aware of the uncertainty that attends this affection,—of the possibility of death taking place very suddenly and unexpectedly.

In the paroxysm itself but little can be done. Cold water may be dashed on the face, and the fauces may be irritated, or the finger passed down into the pharynx, so as to bring on if possible the effort to vomit, while at the same time the legs and lower part of the body may be placed in a hot bath.

Lastly, I will observe that a plan of treatment different from that just laid down has been suggested as applicable to those cases in which spasm of the glottis is excited by hypertrophy of the thymus gland.* A spare diet, the continued administration of small doses of calomel, and the keeping a small blister open on the sternum for months together, have been advised as means of promoting the absorption of the gland. I cannot speak of the merits of this practice from experience, but it is liable to the great objection that we have no means of distinguishing with certainty between cases of spasm of the glottis that depend on hypertrophy of the thymus, and those much more numerous instances of the affection in which the gland retains its natural size.

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* Dr. J. H. Kopp, Denkwürdigkeiten in der ärztlichen Praxis, 8vo. vol. i. pp. 77-107. Frankfort, 1830.

LECTURE XXII.

Hooping-Cough.—Course of the disease in its simplest form—subject to great variations in its mode of onset and degree of severity.—Signification of the hoop.—Course of the disease when declining—Its danger depends on its complications—Complication with bronchitis—at its outset, or when it has continued for some time—Complication with disorder of the nervous system—sometimes exists from the first, and causes death even before characters of disease are fully developed—but may come on at any period—various forms assumed by disorder of nervous system—great danger when paroxysms of cough terminate in convulsions—caution as to nervous character of dyspnœa in many cases, and as to danger of overtreating it.—True hydrocephalus rare as a complication.

We pass to-day from the study of a rare affection, to that of one of the most common disorders of childhood. Few persons attain to adult age without having experienced an attack of hooping-cough, and still fewer of those who escape it when children suffer from it in after life.

Hooping-cough, then, claims our notice as being essentially a disease of early life; but as it is one which almost every old woman professes to cure, we might fairly expect not to be detained long with its study. We find, however, that in this metropolis it ranks fourth among the causes of death under five years of age; inflammation of the lungs, convulsions, and hydrocephalus, being the only more fatal ailments. A cursory inquiry will not suffice to make us thoroughly acquainted with all points of importance in the history of a disease that has so many victims.

The affection in its simplest form consists of a cough of spasmodic character, that usually succeeds to catarrhal symptoms, and having recurred at intervals for a few weeks, ceases without having occasioned any serious disturbance of the general health, or required any active medical treatment. In its graver forms it is one of the most fearful diseases that we ever have to encounter, often keeping the life of the patient for days or weeks together in almost constant jeopardy, liable to be exaggerated by the most trivial cause, or rendered fatal by the slightest error in treatment; while the highest effort of our art is limited to mitigating the severity and warding off the urgent danger of symptoms which we are unable wholly

to subdue, and which we must trust to time and nature thoroughly to cure.

Such great differences in the course of the disease in different cases have given rise to many ingenious theories as to its nature and seat, framed with the view of explaining that which cannot but strike all observers as so enigmatical in its character. None of these speculations, however, have led to any useful practical result, and we shall be better employed than in their study, if we confine ourselves to the simple observation of *the phenomena of the disease.* In doing this, we will begin with those cases in which it is most simple and least perilous, and will then examine in succession the different modes in which its course becomes complicated and dangerous.

An attack of hooping-cough usually begins with catarrh, and presents at first little or nothing to distinguish it from a common cold, except that sometimes the cough is attended almost from the outset with a peculiar ringing sound. By degrees the catarrhal symptoms abate, and the slight disturbance of the child's health altogether ceases, but nevertheless the cough continues; it grows louder, and lasts longer than before, and assumes something of a suffocative character, in all of which respects a tendency to exacerbation towards night becomes early apparent. As the cough grows severer, its peculiarities become more and more manifest; during each paroxysm the child turns red in the face, and its whole frame is shaken with the violence of the cough. Each fit of coughing is now made up of a number of short, hurried, expirations, so forcible, and succeeding each other with such rapidity, that the lungs are emptied to a great degree of air, and the child is brought by their continuance into a condition of impending suffocation At length, the child draws breath with a long, loud, sonorous inspiration,—the *hoop* from which the disease derives its name,—and the attack sometimes terminates. More often, however, the hoop is followed by but a momentary pause, and the hurried expiratory efforts begin again, and are again arrested by the loud inspiration; perhaps only to recommence, until, after the abundant expectoration of glairy mucus, or retching, or actual vomiting, free inspiration takes place, and quiet breathing by degrees returns. If you listen to the chest during a fit of hooping-cough, you will hear no sound whatever in the lungs; but when the hoop occurs, you will once more perceive air entering, though not penetrating into the minuter bronchi. It is not till the fit is over, and respiration once more goes on quietly, that the air reaches the pulmonary cells again; but then you will hear vesicular murmur as clear as if nothing ailed the child, or at most interrupted only by a little rhonchus, or slight mucous râle. If the cough be severe, quiet breathing does not return, nor the vesicular breathing become audible, till some time after the paroxysm is over; and occasionally, short and laborious breathing ushers in each fit of coughing. The child then seems to have a presenti-

ment of the coming seizure, its face grows anxious, it looks up at its mother, and clings more closely to her; or if old enough to run about, you may observe it, even before its breathing has become manifestly affected, throw down its playthings, and hasten to seize hold of a chair, or of some article of furniture, for support during the approaching fit of coughing.

If the case be uncomplicated, even though the attack be severe, the child's health continues good, and little or nothing ails it during the intervals of the cough. Its appetite is not impaired, but after throwing up the contents of the stomach in a fit of coughing, it asks for food almost immediately. It sleeps soundly, except when roused by the cough; the bowels act regularly, or are perhaps a little constipated, and slight complaint of headache or languor, with loss of the usual cheerfulness, are often all the permanent ill effects to be discerned between the seizures.

After the hoop has been heard, the disease goes on for about a week to increase in severity, the cough becoming more frequent, its paroxysms severer and more suffocating, and attended with more frequent hoop. After remaining stationary for ten days or a fortnight, it begins to decline; and one of the first indications of this is usually afforded by a diminution in the severity of the nocturnal exacerbations. We next find either that the fits of coughing are less frequent; or, though they should occur as often as before, yet they are less severe, and sometimes cease without the occurrence of a hoop. When on the decline, however, exposure to the cold, neglect of the state of the bowels, or mental excitement, will suffice in many cases to bring back the hoop, and to increase the previously diminished severity of the attack. For the most part, the cough loses its spasmodic character for many days before it ceases altogether; and you may even find a child, otherwise in good health, who some six weeks after an attack of hooping-cough, still has occasional returns of cough which a slight cause would once more convert into an ailment with all the characters of fully developed pertussis.

Such is the ordinary course of the disease in those cases in which it is unattended by any complication, and does not give rise to any formidable symptom, but issues in the complete recovery of the patient. But even in favourable cases its course is often variously modified, while these modifications derive additional importance from frequently betokening or accompanying some of those serious complications, to which the danger of the disease is almost exclusively due.

The average *duration of the catarrhal stage* of hooping-cough, as deduced from a comparison of fifty-five cases, in which the date of the occurrence of the first distinct hoop was ascertained, was 12·7 days. In nineteen of these cases the first hoop was heard within seven days from the commencement of the catarrhal symptoms, and in nineteen more cases during the succeeding seven days; but the extreme limits of the duration

of the premonitory stage are very wide apart, since on one occasion it lasted only two days, and on another thirty-five days.

But there are many other respects in which the mode of onset of hooping-cough varies, as is clearly shown by the following facts :—

In fifty-five cases the average duration of the catarrhal stage was 12·7 days; the extremes being 2 and 35 days. In eighteen cases the catarrhal stage lasted on the average only 8·6 days, when the cough assumed a distinctly paroxysmal character; but no hoop occurred till the fifteenth day. In four cases, after the catarrhal stage had lasted on the average 11·5 days, the cough became paroxysmal, but no hoop occurred during the whole course of the affection. In one case the cough had a distinctly paroxysmal character from the first, but no hoop occurred during the whole course of the affection. In six cases the cough was paroxysmal from the outset, and continued so on the average 9·3 days, at the end of which time distinct hoop accompanied it. In three cases a distinct hoop attended the cough from the very commencement.

Some of these may be merely accidental differences, but I believe that most of them are by no means unimportant, and that they depend on causes with which a little observation will make you acquainted. My excuse, indeed, for bringing before you such dry detail with reference to hooping-cough, is, that there is scarcely any other disease of early life concerning which we are so much in want of definite facts. Its general features are so obvious, that persons have not so carefully observed those less striking characters which yet are of much moment, as affording sure grounds for prognosis, and trustworthy indications for the guidance of treatment.

Unusual protraction of the catarrhal stage of hooping-cough is, I believe, usually met with either at the commencement of an epidemic of the disease, or towards its close. Epidemic hooping-cough very frequently succeeds to epidemic catarrh; the former disease becoming gradually developed out of the latter, and the persistence of cough in several cases long after the decline of all other indications of catarrh, is often one of the first signs of the commencement of an epidemic of hooping-cough. The characters of hooping-cough, like those of other epidemic diseases, often become less marked towards the decline of its prevalence, and we then meet with cases in which catarrhal symptoms continue long, while the paroxysms of cough are slight, and the hoop occurs very seldom and not severely. It may be laid down as a general rule, that those cases in which the catarrhal stage is of long continuance, seldom become severe during their subsequent progress, and the same holds good with reference to the majority of those cases in which the hoop does not come on until after the cough has for some time assumed a paroxysmal character. There are, however, some instances, which we shall hereafter have to notice, where the long duration of the paroxysmal and suffocative character of the

cough, unattended by any hoop, is a sign of the peculiar intensity of the disease, rather than of its mildness: on the other hand, the preternatural shortness of the catarrhal stage, or its total absence, is not of itself any proof that the disease will be more than usually severe. It is usually observed in very young children, who, as I have already told you, are but little liable to catarrhal affections, and who are not so often attacked by hooping-cough as older children. Sometimes, however, when other children in the same family are suffering from it, they contract the disease apparently by contagion, and in that case it frequently happens that no purely catarrhal symptoms precede it, but that the cough from the first presents a paroxysmal character, and that it very soon becomes attended with a distinct hoop.

Instead of coming on with catarrh of moderate intensity, hooping-cough sometimes sets in with great fever, dyspnœa, and many symptoms of severe bronchitis; though the results of auscultation do not indicate such serious disease, as, judging from the amount of constitutional disturbance, we should expect to discover. In such cases, it is only on the subsidence of the acute symptoms, which usually give way speedily under treatment, that the real nature of the disease becomes apparent. We then observe, however, that while the child in all other respects improves, the cough continues unabated, that it soon grows more severe, returning in paroxysms, and being attended before long by the characteristic hoop. Besides these cases, there are others, though much less common, in which, though the catarrhal symptoms are not unusually severe, the child yet has paroxysms of dyspnœa, which generally come on at night, and may excite much apprehension on the part of the parents. The attacks do not appear to be induced by any previous fit of coughing, and after lasting from half an hour to an hour, they pass off of their own accord, leaving the child free for many hours together, and probably not returning until the following night. While the child continues subject to them, auscultation discovers no sign of serious mischief in the lungs; but in proportion as the paroxysms of the cough increase in distinctness, and the hoop becomes established, the fits of dyspnœa diminish, and in the course of a few days entirely disappear.

Some days usually elapse after the general characters of the disease have become well marked, before it reaches its *acme*, and during this time its nocturnal paroxysms generally increase in a greater ratio, both as to frequency and severity, than those which occur by day. Such, at least, was the course of the disease in thirty-eight out of forty-seven cases in which this point was specially noticed. The nocturnal exacerbation is sometimes so marked, that the fits of coughing are not only severer, but are actually more numerous by night-time than by day. In very mild cases of hooping-cough there is but little difference between the frequency and severity of the paroxysms at night-time and by day; and in other instances, while

the child rests quietly through the greater part of the night, there is yet a marked aggravation of the cough on first lying down at night and on first waking in the morning. When the exacerbations occur at these two periods, the evening exacerbation is often induced by the child being removed to a bed-room less warm than the apartment in which it spends the day, while the morning attack results from the accumulation of mucus in the bronchi during the hours of sleep.

Neither of these causes, however, is the sole occasion of the increased severity of the disease at night, nor is the occurrence peculiar to hooping-cough, but is observed also in asthma, and in many other affections of the respiratory organs in adults. The severity of the nocturnal paroxysms is often a very good criterion of the general severity of the disease; and any exacerbation of the disease is usually attended with special exacerbation of the nocturnal paroxysms, and not merely by more frequent coughing and hooping, but likewise by a marked increase of dyspnœa. On the other hand, a diminution of the nocturnal exacerbations is one of the most frequent indications that the disease has begun to lose something of its previous severity, and the cough often ceases entirely at night for some time before it disappears completely during the day-time.

Cough, preceded by catarrhal symptoms, aggravated in paroxysms, assuming a suffocative character, and attended with a peculiar sonorous inspiration called a hoop, were said to be the characteristics of this disease. The last two of these phenomena are the special results of the nervous element which goes to make up the very compound character of hooping-cough. Hence, in those cases which are very mild, there is so little spasm of the glottis, that air enters freely when the child draws breath after a fit of coughing, and the hoop is occasional and faint, while it is still more seldom that the cough displays that suffocative character which, when severe, constitutes one of its most formidable peculiarities.

None of the phenomena of this disease call for such close observation as *the hoop* from which it derives its name. Its occurrence indicates on the one hand the existence of spasm of the glottis; and hence in those cases which are very slight it takes place but seldom, while it hardly ever comes on until the disease has lasted a certain time, and acquired a certain degree of intensity. It shows, however, on the other hand, that air does enter, when the child endeavours to inspire, and, therefore, in cases of severe hooping-cough, a loud, long-drawn, sonorous hoop, instead of adding to our apprehension, tends rather to quiet it, for it assures us that the spasm does not amount to actual closure of the glottis, and that, for this time at least, the child will not choak in the fit of coughing. I have already mentioned to you that the nocturnal dyspnœa which excites anxiety in some cases while hooping-cough is coming on, may disappear altogether when the disease has assumed its regular type, and the hoop has become loud and distinct. Just in the same way, the violent, suffocative, character

of the paroxysm often abates, the fits of coughing become fewer, and the dyspnœa grows less urgent after the hoop has become developed.

But, if the disease should increase in severity, cough comes on more frequently, and the paroxysms are of longer continuance, so that the face grows quite livid before they pass away. The pauses in the fit are now no longer marked by the sonorous hoop, but, after a momentary cessation, the cough recommences, and though when at length the attack passes off a hoop is heard, it is more stridulous than it used to be, though not so loud. Each paroxysm of cough is now preceded and followed by marked dyspnœa and the child has scarcely recovered from one attack before another comes on. The hoop now sometimes disappears altogether, or is very occasional, very short, and suppressed; and then the cough itself loses its former character; the child dreads its approach much, and tries to suppress it, but in vain; the whole frame labours with the convulsive efforts, but no sound is produced: the larynx is now completely closed; violent, but fruitless, expiratory efforts are made as in some of the worst cases of spasmodic croup, till general convulsions come on; or at length the spasmodic constriction yields, and the effort at expiration is successful. The spasm over, the child once more draws breath, but it seems quite exhausted by the violence of the struggle; while sometimes, before it has recovered from this seizure, another, and then another, succeeds, till one at length proves fatal.

When the disease has approached to this degree of intensity, we should rejoice to hear the loud, long, hoop again, which would be a sure token of some diminution in the suffocative character of the cough. We should next find that as the hoop regained its former character, those more numerous but less distinct efforts, which the child had made before, would be merged in the single prolonged inspiration. The dyspnœa would next diminish, and then the severity of each paroxysm would grow less; and then they would not recur so often, and the hoop would be less loud, and the night attacks less frequent. If amendment were to continue, the attacks would become more brief, and they would sometimes pass off without any hoop, while the mucous expectoration would become more copious; next the hoop would altogether cease, but the cough would continue to recur in paroxysms, and to present something of its old suffocative character; and then this too would cease, though cough might still continue for a time longer.

The variations in the course of hooping-cough which I have now described, depend for the most part either on the greater or less intensity of the disease, or on some idiosyncrasy of the patient, or on some peculiarity in the epidemic constitution of the year. There are, however, other, and some of them much more important changes in its symptoms and its course, which result from hooping-cough becoming complicated with another disease. Of these *complications*, by far the most frequent and most perilous are those which it presents with bronchitis and pneumonia, on the one

hand; and with convulsions, congestion of the brain, or hydrocephalus, on the other. Their importance, too, is greatly increased by there being no period of the disease to which we can look as bringing with it any immunity from either; but from the commencement of the cough to its complete disappearance, we are at any moment exposed to the risk of disease, either of the lungs or of the brain, converting a trivial into a most formidable affection.*

The circumstances under which *hooping-cough becomes associated with other affections of the respiratory organs* are very various. Sometimes, as I have already mentioned, rather severe bronchitic symptoms, frequent, short cough, and considerable dyspnœa, precede the full development of the disease. This occurrence is oftenest met with at the commencement of epidemics of hooping-cough, or in children the mucous membrane of whose air-tubes may be supposed to have acquired a peculiar susceptibility from many previous bronchitic seizures. On the whole, however, these are not the cases which need excite our greatest solicitude, for the constitutional symptoms, which are generally out of all proportion to the amount of the local mischief, usually subside in the course of a few days, just as we often observe to be the case with epidemic influenza in the adult; and as the characteristic cough and hoop come on, all cause for anxiety disappears.

Those cases are in general much more serious in which the symptoms of bronchitis or pneumonia come on after the cough has assumed the characters of hooping-cough. This complication sometimes occurs very early in the course of the disease, and then the bronchitis and hooping-cough appear to be developed almost simultaneously. For a day or two, perhaps, a hoop has been heard accompanying the cough at intervals, and nothing

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* Of 27 children who died of hooping-cough under my care, 13 perished in consequence of the supervention of bronchitis or pneumonia; 14 from congestion of the brain, from convulsions coming on in a fit of coughing, or from hydrocephalus.

Reckoning the commencement of the disease from the first distinct hoop, or first appearance of well-marked paroxysmal character of the cough, it appears that of 24 cases in which this point was noted—

Dying through the lungs.	Dying through the brain.	Total.	Dying within
0	1	1	7 days.
2	3	5	14 days.
1	2	3	21 days.
0	1	1	28 days.
1	1	2	5 weeks.
1	0	1	6 weeks.
2	2	4	7 weeks.
1	1	2	8 weeks.
4	1	5	from 8 weeks to 3 months.
12	12	24	

has appeared to indicate that the attack will be unusually severe, when all the symptoms suddenly become very much aggravated; the skin grows hot; the respiration and pulse become very much hurried, and this increase in their frequency is permanent, though much greater at one time than at another. The cough at the same time becomes more frequent and more severe, and the hoop is more violent; but the cough is almost entirely unattended with expectoration, or if a little mucus be spit up it is almost always streaked with blood. Though very violent, the fits of coughing are not very long, and they seldom or never end with vomiting. The ear detects mucous râle through nearly the whole of both lungs: on a deep inspiration, still smaller sounds are heard, for inflammation has attacked the minuter air-tubes; and the case is one of hooping-cough complicated with capillary bronchitis.

Supposing the disease to continue, the cough will often in a day or two lose its characteristic hoop, an occurrence which you will likewise observe in the course of many other intercurrent febrile or inflammatory affections which may supervene during an attack of hooping-cough. The cough, too, may become less frequent, or may lose its paroxysmal character, though it will still appear to cause much suffering. The respiration will increase in frequency, the child constantly labouring for breath, and being distressed by the slightest movement, since that adds to its dyspnœa. In one little child two years old, the inspirations two days before her death were 130 in the minute, and then on the following day they sank to 80; but her feet were now cold, her face was livid, and her pulse very feeble. It was she, of whose lung I showed the drawing some days since illustrative of vesicular bronchitis; and her case might be taken as a type of those in which acute bronchitis comes on at an early stage of hooping-cough.

Death takes place more speedily in cases of this kind than under any other form of affection of the lungs which comes on in the course of hooping-cough. I have seen a child die on the sixth day from the first appearance of any indication that the disease was other than a very mild attack of hooping-cough. It will not surprise you that the fatal event should take place so speedily, if you bear in mind, that after death we discover either intense injection, even of the smaller bronchi, with copious effusion of pus into their cavities, or very extensive vesicular bronchitis, or both conditions together.

But it is not only at the outset of an attack of hooping-cough that we encounter the danger of its becoming complicated with other disease of the lungs. Exposure to cold, or damp, may at almost any period induce an exacerbation of the cough, or a distinct attack of bronchitis. If, however, the disease have already lasted for some ten days or a fortnight, without having presented any grave features, such intercurrent bronchitic seizures are usually very tractable.

As a general rule, those cases have appeared to me to be far more

serious in which bronchitic symptoms become developed of their own accord out of severe hooping-cough. In such cases there has usually been a gradual increase in the child's sufferings; the cough growing more frequent, and, though not more violent, yet evidently occasioning the child greater suffering: while the hoop is unchanged in its character. At the same time the child seems overwelmed by the disease; its face is anxious and puffed, the eyes are much suffused, the skin usually dry and hot; dyspnœa is no longer confined to the periods just before and just after a fit of coughing, but the respiration is habitually wheezing, hurried, and rather irregular. The ear, at the same time, detects mucous or subcrepitant râle through the whole of both lungs. Such cases are seldom very rapid in their course. The symptoms, after exciting our solicitude for a week, ten days, or a fortnight, may gradually abate in severity, and the disease may run the remainder of its course slowly, but safely. If the case should have an unfavourable issue, this sometimes takes place speedily, owing to the supervention of cerebral symptoms, and the child then dies during a paroxysm of coughing. Or the minute bronchi may become involved in the inflammatory mischief, the case may assume the characters of pneumonia, and bronchial breathing and dulness on percussion may reveal during the patient's lifetime the nature of the mischief which will be disclosed on an examination after death.

In a still more numerous class of cases, the disease retains its chronic character to the last, and presents little or no variation from day to day. The violence of the cough, and the frequency of its return, sometimes continue unabated, though often they undergo a marked diminution. The respiration grows more hurried than before, the fever becomes exacerbated, and the emaciation extreme; while the child's strength is still more enfeebled by the supervention of a troublesome diarrhœa, which no remedies are adequate to restrain. Death at length takes place, sometimes from pure exhaustion, and the transition from sleep to death is so gentle as to be almost imperceptible; at other times an increase of the symptoms of bronchitis or pneumonia becomes apparent for two or three days previously; or in other cases the child dies exhausted in a fit of coughing, or convulsions take place a few hours before death, and the patient dies convulsed, or comatose.

The *complication of hooping-cough with serious disorder of the nervous system* is almost as frequent as its association with grave mischief in the lungs and air-tubes, and even more dangerous and perplexing. Hazard from this source attends alike the onset of the disease, its acme, and decline; and the mode in which the danger presents itself is no less variable than are the seasons of its occurrence. The nervous system sometimes suffers so severely from the very first, that death takes place almost before the disease has had time to assume its usual characters. At other times hooping-cough comes on naturally; its two elements, the

bronchitic and the nervous (if I may be allowed the expression), increase daily in intensity, till all at once the symptoms of the former recede, and are almost lost in those of the latter, which in a day or two bring on the fatal termination of the case. Or lastly, no symptoms referrible to the nervous system call for our solicitude until after the hooping-cough has continued many weeks; but then the long continuance of the disease seems to excite mischief in the brain, and death overtakes the patient when we had already begun to hope that nothing more than time was needed to perfect his cure.

Danger from this cause sometimes assumes the form of simple congestion of the brain; drowsiness is followed by convulsions, and these are succeeded by fatal coma. In other instances the spinal system of nerves becomes excited to more tumultuous reaction; and carpopedal contractions, and attacks of spasm of the glottis, become superadded to frequently recurring general convulsions; while in some cases the long continuance of hooping-cough gives rise to the development of acute hydrocephalus. The time will not be lost which we may spend in the examination of each of these various modes in which hooping-cough becomes complicated with disorder of the nervous system.

In very young children, and in those in whom the process of dentition is still going on at the time of their becoming affected with hooping-cough, the symptoms of disturbance of the nervous system are sometimes formidable even from the outset. In such cases the preliminary catarrh is usually of short duration, and the cough, though not very frequent, yet assumes a paroxysmal character almost from the first. Each fit of coughing is extremely violent and suffocative; it lasts for several minutes, is not attended by any distinct hoop, nor followed by vomiting, but ceases apparently from the child being too exhausted to make any further effort. In the intervals of the cough the face is flushed, the eyes are suffused, and the child is very drowsy and averse to being disturbed—a condition which is manifestly increased by each paroxysm of coughing. When the cough comes on, the flush of the face deepens to a livid hue, the pupils become dilated, convulsions seem impending and at length come on, and though but of short continuance, yet they often leave the child in a state of profound stupor. This state seldom lasts long: sometimes the effort at coughing brings on a fatal convulsive seizure, at other times the cough does not return, but convulsions recur independently of it, and in twenty-four or thirty-six hours from their first occurrence the child dies.

No cases of hooping-cough run so surely or so speedily as these to a fatal termination, which even the most judicious treatment will often fail to prevent. I have seen death take place in less than a week from the commencement of the cough, and have known several instances of its occurrence long before the lapse of a fortnight.

The circumstance of the cough having run its course naturally, up to a

certain point, affords, however, no guarantee against the supervention of a danger similar to that which we have just been contemplating. It is, indeed, but seldom that any case which, for the first ten days or fortnight, has been mild in character, afterwards presents these alarming symptoms of cerebral disturbance; for in most instances the cough will have been severe from the commencement, the paroxysms frequent and of long continuance, the hoop loud, each attack terminating with vomiting, and the return of each being much dreaded by the child. In all this, however, there is nothing to direct special attention to the head, and the approach of the new danger is not always very obvious. Sometimes the first indication that the head suffers is afforded by the increased irritability of the stomach, which becomes almost unable to retain food or drink. And here let me urge upon you the importance of duly estimating the signification of this symptom. Vomiting, independent of the fits of coughing, if it persist for above twenty-four hours, and be not referrible to the remedies you are employing, nor connected with obvious gastric disorder, should always excite your solicitude, and direct your attention most anxiously to the head.

At other times, either in connection with this irritability of the stomach, or even independently of it, the child is observed to become daily more heavy and drowsy, and averse to movement; complaining of headache if able to talk, and appearing overwhelmed by the disease to a greater degree than can be accounted for either by the severity of the paroxysms or the frequency of their recurrence. This condition is generally succeeded by aggravation of the dyspnœa both before and after each fit of coughing, the respiration sometimes not regaining its proper frequency during the interval between their return, though auscultation fails to detect any adequate cause for this hurried breathing. In some instances the hoop still continues as loud as before; but if that be the case, the cough grows harder, and hardly any mucus is expectorated; while streaks of blood are seen in the matters rejected by vomiting. It happens more frequently, however, that these symptoms are associated with a more or less complete suppression of the hoop; the cough losing something of its distinctly paroxysmal character, but becoming more suffocative; the child, on each occasion of its return, vainly striving to suppress it. A convulsive seizure now, in some cases, supervenes on an effort to cough, and in this the child expires; or the fatal convulsion may come on to all appearance causelessly; or, more frequently, the first convulsion does not occasion death, but it leaves the child in a comatose condition, which is interrupted by the frequent return of convulsions, one of which at length proves fatal.

It happens sometimes that children who are labouring under severe hooping-cough are suddenly seized, during a paroxysm of coughing, with a fit of convulsions; and they may die in this fit, even though they had not previously seemed to suffer from any serious disorder of the nervous

system. Death in such cases takes place as the result of spasmodic closure of the larynx, and consequent congestion of the brain: you watch for a few moments the fruitless expiratory efforts of the child, and then all is over, just as in many fatal cases of spasmodic croup. The relation between hooping-cough and spasmodic croup, indeed, is sometimes very apparent; and you may observe, after some unusually violent fit of coughing, the thumbs drawn into the palms, the hand flexed upon the wrist, or the great toe drawn apart from the others. At first, probably, the symptoms will be slight, and will soon pass away; but their import is most serious. You will expect soon to see other and more serious indications of the disturbance of the nervous system; if, indeed, they be not already present. It is especially in cases of this sort that you will observe a degree of dyspnœa which you cannot explain; and that the child will seem to make the most violent efforts to suppress the cough, efforts which are really involuntary, and are the result of the spasmodic closure of the glottis, which is sure, if complete and long continued, to be followed by an attack of convulsions. If treatment fail, the carpopedal contractions will become permanent, the eyes will close but partially, the breathing will grow extremely unequal and irregular, as well as hurried, the hoop will no longer be heard, and the cough itself will yield only a kind of smothered sound. The surface will grow quite livid, in consequence of the extremely imperfect performance of the respiratory function; the child will sink into a state of stupor, in which it will lie with dilated pupils and constant twitching of the muscles of its face, till a great effort to cough comes on, and passes almost at once into a convulsive paroxysm. The fits at length come on independent of any attempt at coughing, and once I saw a considerable degree of stiffness of the whole spinal column precede for twelve hours the death of a little boy, who fell a victim to hooping-cough thus sadly complicated with disorder of the nervous system.

It would be only by the recital of cases that I could bring before your notice each minute variation in the characters of these formidable complications of hooping-cough; and for such details there remains no time to-day. There are two points, however, bearing on this subject, which I am most anxious to impress on your memory. One is, that the supervention of dyspnœa, or the sudden aggravation of difficulty of breathing which had existed previously, is often one of the earliest indications of serious affection of the nervous system. The other point, on which I shall have to dwell at our next lecture, is, that if, mistaking the import of this nervous dyspnœa, you direct your treatment to some imagined mischief in the chest, and make free use of antimony and other depressing medicines, you will aggravate, instead of relieving, the difficulty of breathing; and,—the irritability of the nervous system increasing in proportion as the respiration becomes impaired,—you will hasten the occurrence of convulsions,

and of that formidable train of symptoms which we have just been contemplating.

I mentioned that *true tubercular hydrocephalus* is now and then met with as a complication of hooping-cough. Fortunately it is not of frequent occurrence, though the danger of its supervention should never be forgotten in the case of weakly children who have long suffered from severe hooping-cough. Two instances of it have come under my observation; but in one of these cases the cerebral disease was associated with such a large amount of mischief in the chest as would of itself have sufficed to destroy the child. The other case was of much importance, as shewing the insidious manner in which fatal disease may steal on, presenting little to excite serious apprehension till long after the possibility of doing good has passed away. The patient, a boy five years old, of a phthisical family on his mother's side, was attacked by hooping-cough, from which he suffered severely. The disease was attended with great dyspnœa, with general œdema, and great lividity of the surface. No auscultatory signs of serious mischief in the lungs existed at any time; but the oppression of breathing was so considerable, and the child seemed so completely overwhelmed by the disorder, that I feared he would not recover. After he had suffered from the cough for about five weeks, and three weeks before his death, matters seemed to take a more favourable turn; his cough diminished greatly both in frequency and severity, and his strength returned under a tonic plan of treatment. He still, however, continued low-spirited and very much disposed to sleep, and this condition of depression progressively increased, until, about a week before his death, he sank into a state of complete stupor; but no convulsions occurred either as precursors of the stupor or during its continuance. He lay on his back, either sleeping, or in a state of stupor, from which, however, he could be partially roused, when his pupils, before contracted, would become suddenly dilated to the full, and he would stare wildly about for a few moments: the pupils would then oscillate for a short time between dilatation and contraction, but soon revert to their former contracted condition. The bowels were not constipated at any time, neither did vomiting occur, and the pulse continued frequent till within a day or two of his death. Strabismus came on a day or two before he died, and two days before his death deglutition became difficult, and he began to make slight automatic movements with his hands and arms. Paroxysms of cough continued to recur to the very last: they were suffocative in character, but unattended by hoop. At the end of the eighth week from the commencement of his cough, the child, who was extremely emaciated, died quietly.

After death, the membranes of the brain were found much congested; there was a large quantity of fluid in the ventricles; the central parts of the brain were diffluent, and its lower parts were likewise considerably

softened. The membranes at the base of the brain presented an opalescent appearance, and were bestudded with numerous minute granules, while about the optic nerves they were greatly thickened and infiltrated with that hyaline matter to which I have often called your attention.

There was much congestion of the bronchi and pulmonary substance. The lungs contained a good deal of tubercle mostly in the state of grey granulations, and a small cavity occupied the lower part of the left upper lobe.

Many points of importance connected with the history of hooping-cough remain for our examination before we can proceed to consider its treatment; but all of these must be reserved till our next meeting.

LECTURE XXIII.

Hooping-Cough, continued.—Complications with diarrhœa and intestinal disorder—with great irritability of the stomach—with measles and varicella.—Duration of the disease.—Relapses.—Influence of age, sex, season, &c. in its production.—Post-mortem appearances.

Treatment—no real specific for hooping-cough.—Treatment of first and second stages—utility of hydrocyanic acid—of counter-irritation—of attention to temperature—danger of over-treating the bronchitis of hooping-cough.—Treatment of third stage of disease.

It is a peculiarity of the affection which we are now studying, that much of the suffering, and almost all the danger that attend it, are the result, not of the disorder itself, but of some complication that supervenes during its course. We have already examined the two most frequent and most formidable sources of danger to patients labouring under hooping-cough, but others remain, against which it behoves us to be no less sedulously on our guard.

Some days ago I mentioned to you that a state of extreme irritability of the lining of the air-tubes is one of the characteristics of early childhood. To this are due the attacks of catarrh which children often experience while teething, and the cough which, wholly independent of exposure to cold, comes on as the result of sympathy with irritation in some distant viscus, This high degree of susceptibility, however, is not confined to the bronchi, but is possessed in the young subject by the whole tract of mucous membrane; diarrhœa often accompanies catarrh, or alternates with it, and in the course of inflammation of the lungs the patient's life is sometimes jeopardied, or his death hastened, by the supervention of an intractable looseness of the bowels.

Diarrhœa, though comparatively seldom fatal, is frequently a very troublesome complication of hooping-cough, and if it continue, it greatly reduces the strength of a child, and interferes with the employment of some of those means to which otherwise we might have recourse. It sometimes sets in with the preliminary catarrh, and abates as that subsides, but in other cases it harasses the patient at intervals during the whole course of the affection. It is, however, when it supervenes in the course of an

attack of hooping-cough, which has already attained considerable severity, that it should excite our chief solicitude. It does not, indeed, in the majority of instances, betoken the supervention of disease in the intestines, but is one of the forms of constitutional disturbance that attend upon a congested state of the brain, or it indicates the advance of serious mischief in the lungs. I have, indeed, seen diarrhœa become the most prominent symptom in a case of severe hooping-cough, the bowels being for days so irritable, that their action was excited by the slightest article of food or drink, while the abdomen was exquisitely tender; and yet when death at length took place, unusual redness and prominence of the Peyerian glands were the only morbid appearances in the intestines, while the signs of intense bronchitis, and inflammation, which in some parts had advanced to suppuration, were discovered in the lungs.

An *irritable state of the stomach*, with occasional *vomiting*, are symptoms almost constantly observed at some period or other in the course of hooping-cough. In cases of a mild character, they usually occur only when the cough has reached its acme, and vomiting succeeds to none but the severest fits of coughing, while it is one of the earliest symptoms to cease as the severity of the disease declines. Sometimes, however, very distressing nausea harasses the patient, and efforts to vomit not only follow the paroxysms of coughing, but are excited by food or by the blandest fluid. I have already warned you of the serious import of this symptom in many instances, and have called your attention to it as being frequently one of the earliest indications of cerebral mischief. In some few instances I have observed it come on very early in the disease, and subside by degrees as the cough assumed a distinctly paroxysmal character; just as is the case sometimes with that nervous dyspnœa of which I spoke in my last lecture. Sometimes it continues to be a troublesome though almost a solitary symptom of disturbance of the nervous system, the cough not being severe, nor the child's health at all seriously impaired; and in two instances that I met with it appeared to be the result of a state of extreme irritability about the fauces, so that the cough, which hardly ever occurred at other times, was immediately excited by any attempt at deglutition, and the effort to cough terminated almost directly in vomiting. Nausea and vomiting are sometimes associated with general intestinal disorder and diarrhœa; at other times there is equal evidence of disorder of the digestive organs in a constipated state of the bowels, a red tongue, with perhaps numerous small aphthous ulcers about the mouth, or in the large quantity of frothy mucus rejected by the stomach at each effort to vomit.

Before leaving the subject of the complications of hooping-cough, I must notice the relation that appears to exist between it and two of the *eruptive fevers;* namely, *measles and chicken-pox.* It has been thought, indeed, by some writers, that there is no connection between these diseases

other than that of their accidental association; but my own experience would lead me to incline to an opposite opinion, which is likewise entertained by several high authorities. I am not, indeed, able at this moment to adduce a number of observations bearing on this point sufficient to establish the fact beyond doubt; but my belief is, that the occurrence of any one of these diseases during the epidemic prevalence of another, increases the liability of the child to become affected by that which is epidemic; and that an exacerbation of the fever of hooping-cough, and the appearance of more serious illness than the local symptoms account for, is very likely to be due to the approach either of measles or varicella. Like other intercurrent febrile and inflammatory affections, both measles and chicken-pox often produce a temporary abatement of the paroxysms of hooping-cough, and sometimes cure the disease altogether. In this, however, there is nothing constant, for hooping-cough often appears not to be in the least modified in its character by the supervention of the other malady; while in some cases the complication adds to the mischief in the chest, and increases the patient's suffering and danger.

Although there are many important points of analogy between hooping-cough and some of the exanthemata, yet in nothing is the difference between these affections more apparent than in the uncertain duration of the former, in the exacerbations which take place during its course, either causelessly or from very slight occasions, and in the actual relapses that sometimes occur after apparent cure. It is a matter of considerable difficulty, in the case of a disease so protracted in its course as hooping-cough, to make even an approximation to a correct estimate of its *duration*. In twenty-five cases, however, I had the opportunity of watching the patients from the time when the cough first assumed a paroxysmal character, or the hoop first became audible, until the final cessation of all cough. From this small number of observations I should be disposed to estimate the average duration of hooping-cough at ten weeks; of which period nearly two weeks* would be occupied by the preliminary catarrh, for four weeks the cough would present the characteristic hoop, and the cough would continue for about the same period to occur occasionally, gradually losing its paroxysmal character; though exposure to cold, or any trivial cause, would suffice to bring back the hoop, and to restore to the paroxysms of the cough all their former intensity. So long as any cough continues, even though very occasional in its occurrence, and though the hoop have entirely ceased for many weeks, the patient cannot be regarded as well; while the neglect of proper hygienic precautions may protract the duration of the cough for

* The estimate of the duration of the catarrhal stage is deduced from the observations of 55 cases, and the exact period of its continuance was 12·7 days. Of the 25 in which the total duration of the cough from the occurrence of the first hoop was noted, 11, or nearly half, showed a duration of eight weeks; and the duration in the remaining 14 cases varied from four to twelve weeks.

between three and four months,—an occurrence by no means unusual among the poor. I have on several occasions treated children for hooping-cough during the spring, in whom the hoop has disappeared, and the cough almost ceased, in the warm months of summer, but on the approach of autumn has returned with nearly its former intensity. In other cases, hooping-cough contracted in the early part of autumn, has returned during the prevalence of cold March winds, or a casual catarrhal seizure has been followed by a recurrence of all the signs of the disease in a severe form. These relapses of hooping-cough frequently set in with considerable severity, the paroxysms of cough being very frequent, and the hoop loud and often repeated, but, if treated judiciously, they are much more amenable to remedies than is the first attack of the disease.

A true *recurrence of hooping-cough*, after the disease has been perfectly cured, is at least as unusual as the occurrence of measles or small-pox twice in the same subject. Only one instance of hooping-cough affecting the same patient more than once has come under my notice. In that case the patient was a girl aged seven years, who, when three years old, had very severe hooping-cough, which lasted for several weeks, the paroxysms of cough being frequent, and the hoop loud and often repeated. In March 1845, hooping-cough being then epidemic, she experienced a return of the disease in a very severe form, and continued to suffer from it until the end of June.

But little more remains to complete the history of the disease, except that we notice briefly the *circumstances under which it comes on.* It is essentially an affection of childhood, few children escaping from it, while more than half of the cases of it occur before the completion of the third year. After the age of 5 years its frequency rapidly diminishes, and after 10 it becomes so extremely rare, that out of 815 cases in which I noticed the patient's age, I find but seven in which it exceeded ten years.*

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* Of the above 815 cases—

40·7	per cent.	occurred	during	the first	2 years of life.
55·7	"	"	"	3	"
80·9	"	"	"	5	"
97·9	"	"	"	10	"

The subjoined table shows the proportion borne by these hooping-cough cases, to cases of all diseases at the same age, which occurred, during the same period, at the Children's Infirmary. Cases of hooping-cough constituted—

7·5	per cent	of all cases	occurring	under the age of 6 months.				
8·7	"	"	"	from	6	months	to 12	months.
8·5	"	"	"	from	12	"	to 18	"
7·0	"	"	"	from	18	"	to 2	years.
10·4	"	"	"	from	2	years	to 3	"
12·9	"	"	"	from	3	"	to 4	"
11·0	"	"	"	from	4	"	to 5	"
9·4	"	"	"	under			5	"
7·6	"	"	"	from	5	"	to 10	"
·8	"	"	"	from	10	"	to 15	"

The occurrence of the disease appears to be influenced to a considerable degree by sex as well as age; and, as is the case with a large number of the non-inflammatory disorders of the nervous system, females suffer from it in a considerably larger proportion than males. Of 100 cases of hooping-cough at the Children's Infirmary, 55·4 per cent. occurred in females, only 44·6 per cent. in males; although the total number of female children to the total number of males among my patients at that institution was as 49·1 to 50·9.

Age and sex exert an evident influence on the mortality of the disease as well as on its prevalence, both being greatest in early childhood, though hooping-cough does not seem to be so formidable before the commencement of dentition as it is while that process is going on. Female children are not only more liable to the affection, but it proves more fatal to them than to boys in the proportion of about 3 to 2.*

Hooping-cough is a disease of all climates, and though more frequent in the cold than in the warm months of the year, yet its epidemics break out at almost all seasons. The epidemic of 1841-2 reached its acme in the months of December and January; while in 1845, cases of hooping-cough were by far more numerous in the months of June and July than during any other part of the year. Though little influenced by the season of the year, the outbreak of an epidemic of hooping-cough, seldom, if ever, takes place suddenly, and altogether without warning. Sometimes, as already mentioned, it succeeds to an epidemic of measles, but still more frequently it follows an unusual prevalence of catarrh, which gradually assumes a paroxysmal character, and puts on the characters of hooping-cough. In a similar way, epidemic hooping-cough sometimes resolves itself into simple catarrh; the signs of disturbance of the nervous system by degrees disappearing, and the cases presenting the indications of mere bronchial irritation.

The question whether hooping-cough is a contagious disease, has long

* The subjoined table shows the age at which death took place in 27 fatal cases of hooping-cough:—

0 under 6 months.	5 between 4 years and 5 years.
4 between 6 months and 1 year.	1 " 5 " 6 "
6 " 1 year " 2 "	2 " 6 " 7 "
5 " 2 " " 3 "	1 " 7 " 8 "
2 " 3 " " 4 "	1 " 10 " 11 "

This result tallies very closely with that afforded by the Fifth Report of the Registrar-General, from which it appears, that the deaths from hooping-cough in London were to the deaths from all causes, in the proportion of—

5·6 per cent. under 1 year old.	5·0 between 5 and 10 years.
10·6 between 1 and 3 years.	·8 " 10 and 15 "
10·2 " 3 and 5 "	

Of the 27 cases that came under my notice, 16 occurred in female, and only 11 in male children; and the mortality under ten years of age from hooping-cough is to the total mortality at that age in London in the proportion of 8·9 per cent. among female, and 6·1 per cent. among male children.

since been set at rest by a general answer in the affirmative. How long it retains this character is an inquiry to which it is not possible to return any very precise reply; but so long as a child who has suffered from hooping-cough continues to cough at all, even though only once or twice a day, I should be unwilling to restore him to the society of children who have not already had the disease. All children are not equally susceptible of the contagion, and infants under six months old appear to be especially indisposed to receive it, either by association with other children, or as the result of atmospheric influence. If carefully kept from contact with other children, infants of tender age will very often escape during the general prevalence of hooping-cough; and in nearly half of the cases of hooping-cough that I have met with in infants under six months old, other children in the family had suffered from it for a week or ten days before the infants showed any symptom of it.

You may expect, perhaps, that before I pass to the consideration of the treatment of hooping-cough, I should say something about the *morbid appearances* to which it gives rise, and about the essential nature of the affection. I know, however, of no morbid appearances peculiar to this disease, nor do I think that much would be gained by a disquisition on its seat, or on the occult cause of its symptoms. It is through the medium of the lungs, or of the brain, that death takes place in nearly every instance of fatal hooping-cough, and almost all the structural lesions of importance are found in one or other of these organs. The vessels of the brain and its membranes are often found over-filled with blood, though even in cases where death has taken place in convulsions, or has been preceded by a comatose condition, these appearances are sometimes much less marked than might have been expected, and occasionally are altogether absent. Softening of the cerebral substance, or other indications of inflammatory action, are very seldom met with; increased vascularity of the organ, with perhaps a small quantity of fluid in the ventricles, being almost the only morbid appearances in the encephalon.

It is but seldom that the lungs are found free from disease, though they present no structural changes that can be regarded as characteristic of hooping-cough. The mucous membrane of the bronchi is generally injected; sometimes it is intensely red, while an abundant secretion of thick mucus occupies the cavities of the air-tubes, and their calibre is much increased. This dilatation of the bronchi, which sometimes is very remarkable, arises from inflammation of the air-tubes, just as it does in ordinary bronchitis, and is not due, as has been erroneously supposed, to the violence of the child's inspiratory efforts. The emphysematous condition of the lung, which is likewise observed in some cases of fatal hooping-cough, has been referred to the same forcible attempts at inspiration. MM. Rilliet and Barthez,* however, have observed, with great justice, that the

* Lib. cit. vol. ii. p. 217.

supposed violence of the inspiratory efforts during hooping-cough, is altogether a mistaken assumption; for the efforts made during the paroxysm of coughing are expiratory; the lungs during a severe seizure being almost emptied of air, while in the inspiratory efforts that succeed, the air at first does not penetrate beyond the larger bronchi, and is long before it again freely permeates the pulmonary vesicles. My own experience fully confirms the statement of these gentlemen that emphysema is found only in those cases of hooping-cough in which it has been complicated with bronchitis or pneumonia; so that it is to these secondary affections rather than to the hooping-cough itself that the dilatation of the pulmonary vesicles is to be attributed. But, although the tendency of the paroxysms of hooping-cough is to prevent rather than to induce emphysema, the forcible expiratory efforts which characterize them, favour the occurrence of that collapse of the lung to which on a former occasion I directed your attention; and few cases of hooping-cough terminate fatally in which you will not find after death, a more or less considerable portion of lung in this condition. It may be simply collapsed, resuming its natural appearance readily when inflated, or the bronchial tubes may have been the seat of inflammation, and be more or less filled with puriform mucus, when the characters of vesicular bronchitis will be superadded to those of mere collapse or carnification, and air will permeate the organ very imperfectly, or not at all. It cannot be necessary to describe again those other changes which may take place in carnified lung, and which end in the infiltration of pus into its tissue, or in the formation of vomicæ, since I treated fully of this subject a few days ago.*

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* It would be unjust to leave this subject without calling the reader's attention to the excellent account of collapse or carnification of the lung contained in Dr. Alderson's paper on the pathology of hooping-cough, published in the year 1830, in vol. xvi. of the Medico-Chirurgical Transactions. In this paper he not only describes very correctly the anatomical characters of this condition, which had merely been indicated by previous observers, and speaks of it as a state different from pneumonia, which MM. Rufz and Gerhard did four years later; but he also suggests an explanation of its occurrence, which the recent researches of MM. Bailly and Legendre prove not to have been far from the truth.

It may be well to quote two passages from this paper:—"In many other [cases] I have invariably found the same appearances, uncomplicated with any evidence of pleuritic inflammation. In the lower and posterior portions of the lungs, the structure was rendered very firm and dense; the portions which were the subject of this change exactly defined by the septa; of a dull red colour, devoid of air, sinking instantly in water, and thin slices undergoing no change by ablution. The individual lobules were more dense than in hepatized lungs; and the cellular membrane between them, retaining its natural structure, conveyed to the touch the same sensation that is felt on touching the pancreas.....I apprehend that the appearances detailed differ from those found in peripneumony. In hooping-cough, the lung is always dense and *contracted*, as if the air had been expelled, and from the throwing out of adhesive matter, the sides of the air-cells had been agglutinated together; while in hepatization the lung is less dense than in hooping-cough, and is rendered more *voluminous* than in its natural state."—p. 90-91.

I do not dwell on other appearances in the chest, such as pleurisy and lobar pneumonia, which are much less often met with, and which have none other than a perfectly casual connection with hooping-cough; but I must notice one morbid condition alleged to have been frequently observed, and which is of the more importance, since it has served as the foundation of a theory of the disease. The pneumogastric nerve has been discovered by various observers redder than natural, and in some cases swollen and softened—appearances which have been regarded as indicating that it had been the seat of inflammation. Even those observers, however, who have noticed this condition, appear to have met with it but seldom, while others have sought for it in vain in a large number of cases. Professor Albers, of Bonn,* states, that, having examined the bodies of 47 children who died of hooping-cough, he found the nervi vagi perfectly healthy in 43. In 3 the vagus of the right side, and in 1 that of the left side, were slightly reddened; but this redness corresponded to the side towards which the body had been inclined, and in no respect differed from what is observed in the bodies of plethoric persons, and of patients who have died of typhus fever. Out of 18 examinations of the bodies of children who have died of hooping-cough, it has only once happened to me to observe any alteration in the appearance of the vagus, though my attention has been directed to it on every occasion. In this instance both nerves seemed to be of a decidedly redder colour than natural, although they were not otherwise altered. We are, I think, warranted in concluding, that an appearance so frequently absent, cannot be one of much moment, that it is probably a post-mortem alteration, and that certainly it is not a phenomenon which can be adduced in support of any particular hypothesis as to the nature of the affection.

I have endeavoured to describe to you the symptoms of this affection, to make you acquainted with the circumstances under which it occurs, with the course that it usually follows, and with the chief dangers that threaten a child while suffering from it. It now remains to examine the *treatment* which may be best calculated to mitigate its severity, and to ward off or overcome the dangers that attend it.

There are few diseases for the cure of which specifics have been more eagerly sought after, or more earnestly recommended, than for that of hooping-cough; neither is there anything unreasonable in the expectation that a remedy may some day or other be discovered which shall cut short its course with as much certainty as quinine arrests an intermittent fever, or which shall render the constitution insusceptible of its poison as infallibly as chicken-pox preserves from variola. At present, however, no such remedy has been discovered; and, though the severity of an attack of hooping-cough, or its duration, varies greatly in different individuals,

* Quoted by Aberle, De Tussi Convulsivâ, 8vo. p. 45. Vindobonæ, 1843.

during different epidemics, or at different seasons of the year, yet we are unable, by any medicinal agents, to produce effects such as in these cases flow from causes quite beyond our control.

For the present, then, the treatment of hooping-cough must be conducted in accordance with the ordinary principles of therapeutics, and we shall study their application best by examining in succession the course which, in each stage of the disease, it will be our duty to pursue. The *first stage* of hooping-cough is distinguished, as you know, by catarrhal symptoms, with some degree of febrile disturbance, and a cough, which gradually assumes more and more of a paroxysmal character, until at length it returns in well-marked fits, and is attended by a distinct hoop. In the majority of cases the treatment of this first stage of hooping-cough must be just that of an ordinary catarrh. The child must remain in the house, and it is desirable that it should be confined to its own apartments, both of which should be maintained at a temperature of 60°, so that when it leaves the day for the night nursery, it may not, as is too commonly the case, enter a colder atmosphere, and thus have the irritability of the bronchi increased, and the severity of the cough aggravated. If these precautions be carefully observed, and the diet be light and unstimulating, but little medicine is needed, beyond what may be required to keep the bowels regularly open. If the cough be at all troublesome, a mixture may be given, containing small doses of the Vinum Ipecacuanhæ and solution of tartar emetic, with a few drops of laudanum, or of the compound tincture of camphor,—medicines that I should advise you always to use in preference to the syrup of poppies, the strength of which is very variable, and its action uncertain. If, as is sometimes the case, the child should wheeze a good deal, this symptom will be much relieved by the administration of an emetic of ipecacuanha every evening, or more frequently if necessary. It is not always, indeed, that either much care or much medicine is needed ; and if hooping-cough come on in a perfectly healthy child, in whom the process of dentition is completed, and during the warm months of summer, strict confinement to the house may not be necessary. Usually, however, care in this stage is very important, and will do much towards mitigating the severity of the subsequent course of the disease, while no precautionary measure is of so much moment as the preservation of the child from fluctuations of temperature, and from damp as well as cold.

When the first stage of hooping-cough has passed into the *second,* in which the disease assumes its characteristic features, the condition of the patient must still determine whether any remedies are to be employed, and must likewise influence their selection. It sometimes happens that the cough and hoop are very slight, and the paroxysms but few in the course of the day ; and, under such circumstances, medicine can well be dispensed with. If the paroxysmal character of the cough be well marked,

and the fits of frequent occurrence, but the child in other respects ails little, much benefit will accrue from the use of the hydrocyanic acid. It may be given by itself, diffused in a little distilled water sweetened with simple syrup ; and I usually begin with a dose of half a minim every six hours for a child nine months old. This remedy sometimes exerts an almost magical influence on the cough, diminishing the frequency and severity of its paroxysms almost immediately ; while in other cases it seems perfectly inert ; and again, in others, without at all diminishing the severity of the cough, it exerts its peculiar poisonous action on the system, so as to render its discontinuance advisable. I have never but once, however, seen really alarming symptoms follow its use, though I have employed it in many hundreds of cases. In that instance I gave one minim of hydrocyanic acid every four hours to a little boy two years and a half old. He had hooped for four days before he came under my care, and was then suffering from rather severe cough, and considerable dyspnœa. He took the acid for four days without any effect being produced either on his system generally or on the cough ; but at the end of that time, after taking each dose, he uttered a cry, became quite faint, and would have fallen if not supported. This result having followed three or four times, the child's mother discontinued the medicine, and, of course, I did not resume its employment. Similar, though less severe, symptoms were produced by the same medicine in the sister of this child, a little girl of five years of age ; but in neither instance was the severity of the cough in the least mitigated by it. Though no other instances of the kind have come under my notice, I always give a caution to the parents to diminish the dose of the medicine, or even entirely to discontinue it, if the child appear faint, or dizzy, or bewildered, after its administration ; and I never persevere with the use of the acid if it do not give a very decided earnest of good, within three or four days after its first exhibition.

In many instances, although the severity of the cough may be greatly relieved by the hydrocyanic acid, it yet does not enable us entirely to dispense with other remedies. If there be much wheezing at the chest, an emetic of ipecacuanha should be given once or twice a day, in order to free the air-passages from the mucus which collects in them, often in very considerable quantity, and thus tends, by the obstruction it offers to the free admission of air, to favour the occurrence of carnification of the lungs. The degree to which the child suffers from the accumulation of phlegm in the bronchi must determine whether the emetic be given once or oftener during the day. If it be given but once, the evening should be the time selected for its administration ; and, after the air-tubes have been thus relieved, the child will often rest well, instead of passing, as it otherwise would do, a restless night, disturbed by dyspnœa and frequent fits of coughing. In other instances the cough is unattended by much secretion, the child

scarcely wheezes at all, and, even after a severe paroxysm, rarely vomits, and never rejects more than a small quantity of phlegm; but when night comes on, the cough grows very distressing by its frequent return, even more than by the severity of the paroxysms. When this is the case, a small dose of Dover's powder, or of Dover's powder and the extract of hemlock, often seems to soothe this irritability of the air-tubes, and diminishes the frequency of the cough. If there be a good deal of febrile disturbance, if the cough be hard as well as violent, if it seem to occasion pain, and be unattended with expectoration, while, in the intervals of the paroxysms, a frequent, short, hacking, cough distresses the child, and generally diffused rhonchus is heard throughout the lungs; the hydrocyanic acid may be advantageously combined with small doses of tartar emetic or of the Vinum Ipecacuanhæ. In other cases, if the existence of drowsiness, with a flushed face, becoming livid during the fit of coughing, and the suppression of the previously distinct hoop, betoken the presence of cerebral congestion, the application of a few leeches to the head will not only greatly relieve these symptoms, but will also diminish both the frequency and severity of the cough, and prepare the way for the more effective employment of the hydrocyanic acid.

Counter-irritation to the chest and spine is a popular remedy for hooping-cough, in which many non-professional persons place great confidence, while they employ it through all the stages of the disease. I do not think that you will in general gain much by the employment of counter-irritation until the disease has begun to decline, though it is then often of much service. There are, however, some circumstances under which counter-irritation may be advantageously resorted to, even before the affection has attained its greatest degree of severity. The attacks of dyspnœa which sometimes occur during the increase of the disease, are often much relieved by a mustard-poultice to the chest; and if, as occasionally happens, these attacks return, though with varying severity, almost every night for several nights together, the application of a mustard poultice to the chest, and the immersion of the lower part of the body in a hot bath, on three or four successive evenings, may be of service. In cases of this kind, too, the daily friction of the chest and spine with an embrocation of soap liniment and the Tinctura Lyttæ, so as to keep up a slight degree of redness of the surface, is often beneficial; or that popular remedy, Roche's embrocation, may be used, if the parents of the child fancy, as they often do, that it is possessed of some specific virtue.

As a general rule, blisters to the chest are not desirable remedies in young children; but if the cough should be frequent, hard, and painful, or if, in connection with the evidences of congestion of the brain, the cough be suffocative and the hoop suppressed, much good often results from their application. They must not, however, be allowed to remain

above four or six hours upon the skin; neither is it desirable to attempt to keep them discharging, on account of the very troublesome sores which they sometimes produce. For the same reason, too, I do not advise you to employ inunction of the tartar emetic ointment, although this proceeding was once highly recommended, and very generally adopted, as a remedy for hooping-cough.

Attention to maintain a warm and equable temperature around the child, to prevent the stomach becoming disordered by unsuitable food, and to avoid constipation, will in many instances suffice to conduct a child in safety through the second stage of hooping-cough. If the severity of the cough, or the condition of the child in other respects, seem to call for more decided interference, your motto in the selection and employment of remedies must be, "*ne quid nimis*:" and especially must this be your guide in the management of those complications which often render hooping-cough so dangerous a disease.

In no case is it of more importance to bear in mind this caution as to the danger of over-treating a patient who suffers from hooping-cough, than when, at the commencement of the second stage of the disease, a sudden increase of fever, and the supervention of a state of permanent dyspnœa, seem to announce to you that active inflammation has attacked the lungs or air-tubes. It is quite possible that such may be the import of the symptoms, but it is at least as likely that they result from disturbance of the nervous system. In such a case, then, I would advise you to allow nothing but the positive evidence of auscultation to lead you to resort to free depletion and the use of large doses of tartar emetic,—remedies to which you might feel disposed at once to have recourse. If you feel in doubt, remain for some time with the child, watch it carefully, auscultate it more than once during your visit, and repeat your visit every two or three hours,* rather than resort at once to measures which, powerful either for evil or for good, may, if unwisely employed, destroy the life they were intended to save.

Example teaches louder than precept, and you may learn a useful practical lesson from the following history:—

A little boy, about two years old, had had slight catarrh for a fortnight, and towards the end of this time it was thought he had hooped once or twice, though very slightly. He ailed but little, and had had none other than domestic remedies during this period; but one night, without any

* I cannot refrain from directing the attention of junior practitioners to the anecdote which Dr. Cheyne relates (at page xvii. of the introduction to his work on Hydrocephalus) of the very different results that followed the practice of two Army surgeons, one of whom visited his patients, during the prevalence of an epidemic disease, twice, the other four or five times daily. The moral which Dr. Cheyne drew from the tale, though obvious enough, is not sufficiently borne in mind by many who undertake the treatment of children's diseases.

apparent cause, he became very feverish, his cough grew worse, and his respiration very hurried. On this account he was depleted very freely by leeches, and calomel and antimony were given in large doses for two days, though without any considerable diminution of the dyspnœa. When this treatment was first adopted, it was thought that air entered one lung but scantily; but on the evening of the second day both lungs admitted air equally well, although a good deal of mucous râle attended the respiration. On the morning of the third day, the child's face was flushed, and looked much oppressed, his lips were rather livid, his respiration was extremely hurried and irregular; he coughed little, but his cough had a suffocative character, and was not attended by a distinct hoop. The hurried respiration was supposed to indicate the continuance of graver mischief in the lungs than was apparent on auscultation, and antimony was accordingly given in emetic doses. It did not produce much sickness, and the respiration diminished but little in frequency during its employment. On the fourth day the child still breathed very hurriedly, and its inspirations varied from 40 to 60 in a minute, without there being any obvious cause for these great changes in its frequency. On the fifth day the breathing increased in rapidity, while the pulse began to lose power; and not only had the antimony ceased to exert any emetic action, but squills and ipecacuanha failed to induce vomiting. Active measures were suspended towards the evening of this day, and a grain of Dover's powder, given every six hours, somewhat diminished the hurry of the breathing, but it was discontinued after the third dose, on account of the gradually deepening drowsiness of the child. The child, however, still continued heavy and oppressed, the cough became more frequent and more suffocative, the breathing more rapid and more irregular. On the morning of the seventh day, a fit of coughing terminated in convulsions, and from that time until the morning of the eighth day, when the child died, they were extremely violent, frequent in their return, followed by carpopedal contractions, which did not subside in the intervals between them, while after each convulsion the respiration became most distressingly hurried and irregular. After a time the breathing grew constantly laboured, the face became of a deep livid colour, the hands were clenched, and the wrists bent upon the fore-arm, the spine was drawn slightly backwards, and sensation was quite abolished. At length a slight convulsive movement passed across the face, and the limbs relaxed in death. Permission was not obtained to make a post-mortem examination.

Other cases have come under my notice, in some of which I fell into the error against which I have just tried to warn you: in some I saw the patient too late to rectify the mistake which others had committed, while in some the right course of treatment adopted from the first was followed by success. In a case such as I have related, the want of correspondence

between the general symptoms and the auscultatory signs should have deterred from the copious depletion and the free use of calomel and antimony in the first instance, while it still further contraindicated the employment of antimony in emetic doses subsequently. Two or three leeches to the head, when the serious symptoms first came on, would probably have relieved the congested brain, the tepid bath would have soothed the irritability and diminished the fever, and hydrocyanic acid would, most likely, have been of service in quieting the hurried breathing. If much febrile disturbance had still continued, small doses of ipecacuanha, antimony, and hyoscyamus, might have been tried, the antimonial not being given in such doses as to exert any very considerable depressing influence on the system. A stimulating liniment to the chest and spine should have been used several times in the course of the day, and any sudden access of the hurried breathing should have been met by the application of a mustard-poultice to the chest.

The difficulties of diagnosis are sometimes rendered smaller, and the right course of treatment more obvious, by the occurrence of occasional carpopedal contractions, or of momentary strabismus from the very commencement of this nervous dyspnœa; or in other cases by the absence of any auscultatory signs of mischief in the chest, such as could for a moment lead you to refer the hurried breathing to disease going on in the lungs.

Even when acute bronchitis really exists, you must not forget the peculiar impress which hooping-cough stamps upon it. You must bear in mind the impediment to the due aeration of the blood which each fit of coughing occasions, and the influence on the nervous system generally of the imperfect decarbonization of the circulating fluid; how it heightens the irritability of the spinal system, thus exciting the hurried and irregular breathing, and rendering the child peculiarly liable to convulsive seizures. If active interference, therefore, be necessary, you would abstract blood very cautiously, while you would employ nitre, ipecacuanha, and James's powder in small doses, as a febrifuge and expectorant, rather than attempt to bring the child rapidly under the influence of antimony. At the same time, the peculiar tendency to obstruction of the air-tubes, and consequent collapse of the lungs, which characterizes hooping-cough, would lead you to endeavour to keep the bronchi free, by the administration, once or twice a day, of an emetic of ipecacuanha. You would employ liniments, mustard-poultices, or blisters to the chest, to combat any exacerbation of dyspnœa; and if the paroxysms of cough be severe, you would combine hydrocyanic acid with your other remedies. If the powers appear to be on the decline, and the child neither expectorate with the cough nor reject much phlegm by vomiting, although the bronchi are loaded with mucus, you would at once discontinue antiphlogistic measures, and have recourse to

the decoction of senega, with ammonia and squills, while you endeavour by a nutritious diet to support your patient's strength.

The time allotted to this lecture will not enable me to do more than just indicate the main points to which your attention should be directed; and I must now pass on to notice briefly your conduct in the *third stage* of the disease. It is now that the cough diminishes in frequency and severity, that the hoop grows less loud and less constant, and that any signs of constitutional disturbance that had existed before by degrees disappear. When the disorder runs this favourable course no medicine is needed, and but few restrictions beyond such as the avoidance of damp and cold requires. Change of air generally expedites the cure; and if the opportunity offer, and the season of the year be favourable, it should never be neglected. There are many instances, however, in which medical treatment in the decline of hooping-cough is of very considerable service. It sometimes happens that the bronchi continue loaded with secretion, which is either expectorated, or rejected by vomiting in very considerable quantities after each fit of coughing, while the skin is cold, the tongue moist, and the pulse soft, and rather deficient in power. In this condition, alum, long a popular remedy in hooping-cough, is often of much service, diminishing the secretion, arresting the sickness, and rendering the cough much less frequent. It may be given in doses of three or four grains every four or six hours for a child of a year or eighteen months old. This remedy, indeed, may sometimes be used with advantage, even before the disorder has begun to decline, if the condition be such as I have just referred to, namely, fever being absent, and the bronchial secretion very abundant, even though the cough is violent. In other cases in which the cough continues violent after the other symptoms have abated, and in which, though there is no superabundance of secretion in the air-tubes, yet the attacks of cough often end with the rejection of a considerable quantity of mucus from the stomach, and loss of appetite and general dyspeptic symptoms are present, the hydrochloric acid is often of much service. It has been recommended as a specific against hooping-cough, in doses of from two to six drachms daily; but I have never employed it in other than moderate doses, such as it would be administered in under other circumstances.

If the cough continue frequent, and the hoop loud, while the only signs of constitutional disturbance are those of mere weakness, iron will generally put a stop to it sooner than any other remedy. If, however, there be a degree of feverishness, or of gastro-intestinal disorder, which for the present contra-indicates the use of iron, Battley's liquor cinchonæ may be given with great advantage, in combination with small doses of hydrocyanic acid; while every attention must, of course, be paid, by mild alteratives, and other appropriate means, to improve the condition of the digestive organs.

It is probably unnecessary to enter into further details, to specify minutely the diet that a convalescent requires, or to refer to the utility of liniments to the chest, or the occasional benefit of anodynes at night.

There still remain numerous remedies that have a more or less well-merited reputation in cases of hooping-cough. I must content myself with having pointed out to you the kind of weapons that, under different circumstances, must be employed; and must leave to you the selection of the one whose form and size may, on different occasions, seem to you most fitting. The armoury is large enough to yield you an ample choice.

LECTURE XXIV.

Pulmonary phthisis—differences exist between the tuberculous cachexia in the child and in the adult.—Anatomical peculiarities of pulmonary phthisis in the child—frequency of miliary tubercle and of grey granulations in the lung, independent of each other, and of other forms of tubercle—frequency of tubercular infiltration—rarity of cavities—frequent affection of bronchial glands—description of each of these peculiarities—changes in tuberculous bronchial glands—perforation of bronchi, and elimination of tubercular matter.

Symptoms of phthisis—their differences from those of the disease in the adult—danger of overlooking its early stage, or of mistaking it for remittent fever, &c.—peculiarities of its subsequent course.

Bronchial phthisis—its characteristics—remarkable fluctuations in its course—occasional unexpected recovery—case of its occurrence, attended with expectoration of tubercular matter—its fatal termination usually preceded by merging of its symptoms in those of general pulmonary phthisis—occasional fatal hæmoptysis, but this accident not limited to cases of bronchial phthisis.

Phthisis in very early infancy—pulmonary symptoms often obscured by signs of generally defective nutrition.

We enter to-day on the examination of one of the most painfully interesting diseases with which we have to do. It is a disease that we not only often see in hospitals, or in the dwellings of the poor, but which has brought grief into the habitations of many among us, and has robbed us of those whom we most dearly loved; while the very mention of its name gives rise to a feeling of utter hopelessness as to its issue. I need hardly say, that I propose to-day to call your attention to *Pulmonary Consumption*, or *Phthisis*,—a malady that attacks persons of all ages, of both sexes, and of every rank, and which, under every variety of condition, medicine seems to be equally unable to cure.

It may, however, occur to some of you, that important though this affection is, yet in speaking of it I am transgressing the bounds that I set myself, when I proposed to treat only of those maladies which are either limited in their occurrence to the period of childhood, or on which the early years of the patient impress some well-marked peculiarity. It is true, indeed, that at whatever age phthisis comes on, it presents the same

grand features, it works the same kind of changes, and tends to the same fatal result. But yet the disease in the young subject displays differences from its character in the old, sufficient to attract the notice of the observant; nor are these differences merely curious, but they influence our prognosis and modify our treatment,—and hence it is fitting that we devote some time to their examination.

"That great constitutional malady, of which pulmonary consumption is only a fragment, plays its part" in childhood as well as in adult age, "most conspicuously in the lungs." In the adult, however, the lungs are so almost invariably the seat of tubercular deposit, that out of 123 cases, M. Louis found but one exception to the rule, that if tubercle exist in any viscus, it will be discovered also in the lungs. In the child, though the lungs are still the most frequent seat of tubercle, yet M. Louis' law no longer holds good, for MM. Rilliet and Barthez found 47 exceptions to it out of 312 instances in which tubercle was discovered in some one or more organs of the body.

The first great difference, then, between the tubercular cachexia in childhood and in adult age, consists in the same organs not being equally liable to it at the two periods of life.

The following table will place this difference clearly before you. It shows the proportion per cent. in which different viscera were the seat of tubercle in children and in adults. The figures in the first column are deduced from 312 cases, which form the basis of MM. Rilliet and Barthez' essay on the tuberculous cachexia; those in the second, from the 123 cases on which M. Louis' work on phthisis is founded; and the third contains the results arrived at by Lombard on an examination of 100 adults.

Of 100 *instances in which tubercle was deposited in some of the viscera, it was present in—*

	Children from 1 to 15 years.	Adults from 20 years and upwards.	
	According to Rilliet and Barthez.	According to Louis.	According to Lombard.
In the Lungs	84	100	100
" Bronchial glands	79	28	9
" Mesenteric	46	33	19
" Small intestines	42	33	0
" Spleen	40	13	6
" Pleura	34	2	1
" Peritoneum	27	0	0
" Liver	22	0	1
" Large intestines	19	10	0
" Membranes of the brain	16	0	2
" Kidneys	15	2	1
" Brain	11	0·8	2
" Stomach	6	0	0
" Heart and pericardium	3	0	0

This table shews not only that the liability of certain organs to become the seat of tubercle is different in childhood from what it is in the adult, but also that tubercle is simultaneously deposited in a greater number of organs in the young than in the old. This greater intensity of the tuberculous cachexia in early life is a fact of much importance. It explains how it happens that death sometimes takes place in the child, before tubercle has any where undergone those changes which seem almost always to precede the fatal event in the adult.

These, however, are not the only peculiarities of the disease in early life, but the *anatomical characters of tubercle in the lungs*, (and of this I am now more particularly speaking) differ in some respects *in the child* from those which are observed in the grown person.

The *first* of these peculiarities consists in the frequency with which grey granulations and crude miliary tubercles exist in the lungs independent of each other, and of any other form of tubercular deposit. In the adult, M. Louis discovered miliary tubercles unassociated with grey granulations only in 2 out of 123 cases, or in 1·6 per cent., and grey granulations with miliary tubercles in 5 out of 123, or in 4 per cent. In the child, MM. Rilliet and Barthez found tubercle without grey granulations in 171 out of 265 instances, or in 64 per cent., and granulations alone in 36, or in 13 per cent., and my own observations, which are based on 54 cases wherein tubercle was present in the thoracic viscera, lead to very nearly the same result.

The great rapidity with which the deposit and development of tubercle often take place in early life, is doubtless one chief cause of this peculiarity. If we examine the lungs of an adult affected with the tuberculous cachexia, we shall often observe their lower lobes containing grey semi-transparent granulations ; as we advance higher, we shall probably find that the granulations have lost much of their transparency, and that they present a yellowish spot in their centre, while near to the apex of the lung the deposit exists in no other form than that of bodies presenting the whitish yellow colour, and friable texture, characteristic of crude tubercle. These appearances seem to betoken that the deposit of tubercle has taken place slowly and at successive periods, so that those tubercles which occupy the apex of the lung are already approaching maturity at a time when the disease is just beginning to invade the lower lobes. In the child, however, it not seldom happens that all the lobes of both lungs present a nearly equal amount of tubercular deposit, and that this is seen to be nearly equally advanced in all. Thus we may find the grey granulations diffused in about the same abundance through all parts of the lungs, and all equally transparent ; or we may observe each granulation presenting a yellow spot in its centre ; or the change may be complete, and crude yellow tubercle may be everywhere present.

This same fact, of the acute course of tuberculization of the lungs in

children, receives a further illustration from the *second* anatomical peculiarity of the disease; namely, the great frequency with which yellow infiltration of tubercle is observed in early life; MM. Rilliet and Barthez having met with it in 88 out of 265 children, or in 33 per cent.; and I in 16 out of 55, or in just the same proportion. It is a form of degeneration of the lung which seldom exists alone, but is almost invariably associated with grey granulations or yellow tubercle, and usually co-exists with a state of very far advanced tuberculization of the bronchial glands. It is often limited to one lobe, generally the upper: or sometimes the middle lobe, in those cases in which the right lung is the seat of the disease. Those portions of the lung which are affected by it become converted into a firm, solid, mass, having much both of the colour and consistence of cheese, presenting a smooth surface when cut, and by its solidity compressing the bronchial tubes which traverse it, so as considerably to reduce their calibre. If the patient's life be prolonged, a process of softening generally takes place, the tissue breaks down, and a cavity is the result, the parietes of which are formed by solid tubercle. At other times, especially if the disease run its course with great rapidity, the lung thus infiltrated seems to undergo a different kind of softening, which does not lead to the formation of a central cavity, but pervades its tissue throughout, which then presents a reddish yellow, or rose-coloured tint, and breaks down easily into a kind of putrilage, as if the changes produced were the result of a mixture of true pneumonic hepatization, and of tubercular degeneration. Cases of this sort go far towards substantiating the correctness of M. Rokitansky's theory, with reference to the nature of this tubercular infiltration, as compared with the ordinary form of tubercular deposit. He conceives that the deposit of tubercle in the form of grey or yellow granulations takes place in the interstitial cellular tissue of the lung; while in the case of tubercular infiltration, the matter poured out into the interior of the pulmonary vesicles during an attack of pneumonia, becomes converted into tubercle under the influence of the tubercular cachexia.

A *third* peculiarity of phthisis in the child, as contrasted with the same disease in the adult, consists in the greater rarity of cavities in the lungs during early life. Of 123 cases which form the basis of M. Louis' work on phthisis, cavities were present in by far the majority of instances; and though the numbers are not exactly stated, the exceptions would seem to have been but very few. Out of 265 cases, however, that came under the notice of MM. Rilliet and Barthez, only 76, or 28·6 per cent., presented cavities in the lungs; and they existed in only 30 per cent. of the cases which came under my own observation. These cavities sometimes resemble those which we usually meet with in the adult; and this is especially the case with children above six years of age, in whom, indeed, the general characters of phthisis approximate closely to those of the same disease in the grown person. In other instances, they are not so much

caverns, as very small excavations (*vacuoles*, as the French call them), produced by the softening of small tuberculous deposits. Such excavations communicate with the bronchi and with each other, and are sometimes exceedingly numerous; but do not occasion such a destruction of the pulmonary tissue as to produce any where a cavity of considerable dimensions. This appearance is one which MM. Rilliet and Barthez were the first to describe. It is not frequent, and has only once or twice come under my notice. Besides these two forms of cavity there is a third, to which I have already referred, namely, that produced by softening of the yellow tubercular infiltration, which is more commonly met with in very early life than subsequently. Cavities of this kind sometimes form with great rapidity, and attain a considerable size. The whole of one lobe of the lung may even become converted into a sac, which is often almost or quite empty, while its parietes are formed by little besides the pleura and the fibrous capsule of the lung, with a very thin lining of dense tubercular matter. It is far from unusual to meet with cavities of this kind in the bodies of infants only a few months old, who have never thriven, but have presented few signs of phthisis with the exception of progressive loss of flesh and strength, and somewhat hurried respiration.

The *last* anatomical peculiarity of phthisis in infancy and childhood to which I shall direct your attention, consists in the abundant deposit of *tubercle in the bronchial glands*, and the changes to which that deposit gives rise. Even in the adult, tubercle is deposited in the bronchial glands in about a fourth of all cases of phthisis, but the deposit there is subsidiary to its deposit in the lungs. In the child, however, this is far from being always the case; but the disease in the glands is often as important as that in the lungs, sometimes much more considerable.

Tubercle existed in the bronchial glands in 54, out of 55 cases, that came under my notice, in which it was present in some organ or other.

In 11 of these cases, it was in an incipient state.

In 25, all the glands were affected by it.

In 12, the tubercle was both generally diffused, and was more or less softened.

In 2, the tubercle was in a firm, friable, cheesy, state.

In 4, it had begun to undergo the cretaceous change.

The tubercular deposit does not appear to begin simultaneously in all the glands, nor to advance in all with the same rapidity; but those about the bifurcation of the trachea, and close to the primary bronchi, are usually the first affected; and the disease in them often attains a more advanced stage than elsewhere. The state in which the glands are most frequently met with is one of tubercular infiltration, the whole of their substance being converted into a firm resistant matter, resembling a portion of lung which has been the seat of tubercular infiltration; and this even although the number of affected glands be but small, and though the lungs be but

little or not at all involved in the disease. Sometimes, however, we may meet with the affection in an incipient state, and it is then usual to find the glands which it has attacked somewhat enlarged and injected, and their tissue infiltrated with fluid, and less firm than natural. The tubercular deposit does not proceed invariably from the centre to the circumference, but frequently two or three small deposits may be discerned at different parts of the same gland, or the tubercular matter may be accumulated entirely at one end of the gland, while its other extremity is merely softened and injected. Even when the disease starts from several points it is not often that the deposit presents the distinctly circumscribed form of miliary tubercle, and still less often that of grey granulation; but it generally presents the character of tubercular infiltration which had taken place at the same time in two or three different situations. Sometimes it is impossible to distinguish any one spot as that from which the disease started, but the whole tissue of the gland presents a whitish hue, which appears due to the general infiltration of tuberculous matter. Whatever may have been the mode in which the deposit of tubercle originally began, the tendency of the advance of the disease is to convert the entire substance of the gland into firm tuberculous matter, in which no trace of the original tissue can be detected. This metamorphosis of the gland is attended with considerable increase of its size; the enlargement, however, being much greater in the case of those glands which are situated externally to the lungs, than of those which are imbedded in the pulmonary substance. The enlargement of the glands is not attended, as might have been anticipated beforehand, with a thinning of their originally delicate cellular envelope, but this increases in density and firmness, while at the same time it acquires a very considerable thickness. Most of the glands which have become converted into tubercle are enclosed within a cyst a line or more in thickness, and extremely resistant; its inner surface being smooth, of a bright rose tint, and sometimes presenting a considerable degree of vascularity.

In a large proportion of cases in which tubercle is found in the bronchial glands, it has not passed beyond the crude stage, but if life be not cut short by the advance of phthisis in the lungs, a process of softening next commences; and the softening usually, though not invariably, begins at the centre of the glands, and extends towards their circumference. The softening is seldom found equally advanced in all the glands, but in some, a small central cavity containing liquid tubercle, is surrounded by a thick wall of solid matter; while in others, the whole substance has been softened, and the gland is no longer anything else than a cyst containing a quantity of puriform fluid. When tubercle deposited in the lung has undergone the process of softening, an effort is made by nature to get rid of the morbid matter, which is expectorated, and the cavity, thus emptied of its contents, now and then cicatrizes, and the patient is cured. The

cases of cure, indeed, bear but a very small proportion to those in which death takes place, for in general fresh deposits of tubercle successively undergo this softening, until but a comparatively small portion of the lung remains unaffected by the disease; or the abundant secretion from the bronchial tubes exhausts the patient, or death ensues from the degree to which other organs are implicated in the tuberculous cachexia. When the bronchial glands are the seat of the disease, a similar effort is made to eliminate the morbid matter from the system; and many circumstances concur to render this a more hopeful task than it is when the pulmonary substance itself in the seat of the disease.

The means by which this is effected deserve to be examined. When tuberculization of the bronchial glands has attained an advanced stage, we generally observe a process of thickening and infiltration to have commenced in the cellular tissue around each gland, by no means unlike that which takes place in the pia mater at the base of the brain in cases of tuberculous hydrocephalus. This cellular tissue often assumes a greyish semi-transparent aspect, and presents a number of minute granules of tubercle diffused through it. By a process of combined inflammation and tuberculization, the connection between the gland and the adjacent bronchial tube becomes extremely intimate. The cellular tissue in the intervals between the bronchial rings becomes next infiltrated with tubercle, and is then the first part of the wall of the bronchial tube which disappears during a process of absorption that advances from without inwards. The cellular tissue sometimes becomes quite removed before the cartilages of the bronchi are much affected, but in process of time they too become absorbed, and the perforation of the tube is then complete; the tuberculated gland, however, blocking up the aperture in its walls, and projecting into its cavity. The next step consists in the thinning of the envelope of the gland, and the next is the discharge of its contents into the tube; and the cyst then in all probability collapses and becomes applied to the outside of the bronchus, so as to form a part of its parietes; but we are still in want of some exact observations as to this last stage in the cure of bronchial phthisis.

This process does not take place with equal frequency in all the bronchial glands; for those which are situated around the trachea, and wholly external to the lung, meeting with no obstacle to their increase in size, often attain a great magnitude without at all compromising the integrity of the trachea. Those, however, which are in contact with the secondary and tertiary bronchi, and are imbedded in the pulmonary substance (which prevents their attaining any considerable size), not unfrequently perforate the tube in the manner above described,—and this not only after they have become softened, but even while the tubercle they contain is still in the crude state.

Although the progress of the tubercular degeneration is most obvious in those glands which are situated near to the larger air-tubes, yet it is by no means limited to them, but is in many instances observed also in the pulmo-

nary glands which are imbedded in different parts of the substance of the lungs. They do not, however, become enclosed within a cyst as dense and resisting as that which surrounds the tuberculous bronchial glands; while in a great number of instances the pulmonary substance for a short distance around them presents a far more abundant tubercular deposit than is apparent in any other part of the lungs. If a tuberculous gland, thus imbedded in the tissue of the lung, should become softened, the excavation thereby produced may easily be mistaken for a cavity in the lung itself. A pulmonary cavity of such small dimensions, however, is hardly ever solitary, unless it proceeds from the softening of tubercular infiltration; but the deposit of tubercle which takes place in the neighbourhood of a diseased pulmonary gland is always in the form of distinct deposits—not of tubercular infiltration.

Tuberculization of the glands does not occasion perforation merely of the bronchial tubes, but in some rare instances the œsophagus, trachea, and pulmonary artery, have been perforated by the same process as is usually limited to the air-tubes.

In some cases in which tuberculization has never advanced far, it comes to a stand-still, and the tubercle itself undergoes the cretaceous change. This, however, is a rare occurrence, for it has come under my notice only in four out of fifty-four cases; though on the other hand it is more frequent than in the lung, in which it has come under my notice in the child only in one in fifty cases. In two other instances the contents of the bronchial glands, though not actually cretaceous, were very dry and friable, as if the more fluid constituents of the tubercle had been removed, and the cretaceous change were about to commence. This change has never come under my notice as having taken place in any gland which had attained considerable size in consequence of the deposit of tubercle in it, nor have I ever seen it either when the tuberculization of the glands was general, or when the lungs showed evidence of general, or advanced, phthisical disease.

The *symptoms of phthisis in early life* resemble in many respects those which characterise the disease in adult age, while the points of difference become fewer and fewer in proportion as the child grows older, until they cease altogether at the period of puberty. During childhood, however, even those cases which run a course most similar to that of ordinary phthisis in the adult are in general distinguished by the absence of hæmoptysis at any stage of the affection,—the absence of expectoration, or its very rare occurrence,—the comparative slightness of the cough, and the rarity of those colliquative sweats which so much exhaust the grown person. In many instances the child droops, loses its appetite, and flesh, and strength, and complains of vague pains in the chest and abdomen for many weeks before the occurrence of cough excites any apprehension that the lungs are the seat of disease. When the cough does come on, it is slight, short, and dry, and attracts attention by its

frequency, rather than by the discomfort which it occasions the child. Its usual amusements cease to occupy the child, who sits about, listless and fretful in the day-time, while the skin often grows hot and dry, and the lips become parched as night approaches; but there is so little that is definite in these symptoms, that they are not infrequently supposed to indicate the existence of remittent fever, or to be due to the presence of worms in the intestines.

It is important to bear in mind, that strumous dyspepsia, as it has been called by many writers, is of more frequent occurrence in childhood than in adult age, and that its symptoms may be all that marks the advance of phthisis in the lungs until within a month or two of the patient's death. A definite commencement can almost always be assigned to an attack of remittent fever; and the great heat of skin, the very rapid pulse, the intense thirst, and the delirium at night, which attend it even in its less severe forms, are symptoms which, if borne in mind, would prevent our mistaking for it those slighter and more vague ailments that are experienced during the first stage of phthisis. The referring the symptoms of incipient consumption to the presence of worms in the intestinal canal, is a mistake even less excusable: the natural temperature of the skin, and natural frequency of the respiration,—the appetite at one time as ravenous as it is deficient at another,—the tongue either clean and moist, or else thickly coated,—the condition of the bowels, which is generally one of constipation, and the marked relief that almost always follows the action of purgatives,—are indications of the presence of worms sufficiently characteristic to guard the attentive observer from error.

Fluctuations take place in the child's condition, and a casual attack of bronchitis often seems to be the exciting cause of that aggravation of the pulmonary symptoms which is observed before long. The respiration now becomes habitually quicker than natural, instead of merely being easily accelerated, and is often attended with considerable wheezing: the cough grows more frequent, and lasts longer, but is still in most instances unattended with expectoration, owing to the circumstance that the child almost always swallows those matters which the adult would spit up. The loss of flesh, and the decay of strength, advance even more rapidly than the signs of pulmonary disease. Well-marked hectic, however, is infrequent; and if night sweats occur, they are often limited to the head and face. Towards the close of the disease the mouth often becomes aphthous, especially in infants; but though diarrhœa sometimes occurs, it does not often seem to contribute so much to the exhaustion of the child as to that of the adult, and that alternation of diarrhœa and hectic sweats which is often observed in the grown person, seldom or never takes place in the child. When death at length takes place, it either occurs from exhaustion, or succeeds to some intercurrent attack of bronchitis or pneumonia.

In those cases in which tubercle has been deposited in great abundance in the bronchial glands, constituting what is called *bronchial phthisis*, the symptoms deviate still more from those which are usually observed in the adult. Bronchial phthisis occurs in its best marked form between the ages of two and six years, although, as it is scarcely necessary to observe, tuberculization of the glands is by no means limited to that age. Its symptoms in many instances first become distinctly evident after some severe bronchitic seizure, which either accompanied measles or came on without any apparent exciting cause. In other cases, although the commencement of the affection is not clearly traceable to a single attack of severe bronchitis, yet the patients in whom it occurs had in all probability been subject to frequent returns of catarrh or bronchitis, which, though not alarming in their symptoms, yet left behind them a cough that never entirely subsided. By degrees this cough becomes severer: it returns in paroxysms not unlike those of pertussis: it sometimes induces efforts to vomit, and can scarcely be distinguished from the cough of the earlier stages of hooping-cough. The respiration grows habitually oppressed and wheezing, the face becomes puffed and swollen, the veins of the neck distended, just as in patients with heart disease, and the superficial vessels of the thorax become enlarged, just as those of the abdomen do in cases of ascites, or of mesenteric disease.

The great fluctuations which take place in the condition of the patient, constitute one of the most striking characteristics of this form of phthisis. Attacks of bronchitis sometimes come on, during which the respiration becomes painfully accelerated and oppressed, and the paroxysmal cough is merged for a time in a constant hacking, or in suppressed attempts at coughing. These bronchitic symptoms, which often seem to threaten life, and which sometimes actually destroy it, clear up by degrees in the majority of cases, but leave the child with a severer cough and a more hurried respiration than before, while it loses flesh rapidly, and not infrequently sweats a good deal about the head and upper part of the trunk. Accommodation of posture, too, in many instances becomes necessary to the comfort of the little patient, who perhaps can breathe only when supported in its mother's lap, or when much propped up in bed. It is seldom, when the disease has reached this degree of severity, that there is not also so large a measure of tubercular affection of the lungs and other viscera as to render recovery quite hopeless, and the characteristic signs of bronchial phthisis become lost by degrees in those of ordinary consumption. Sometimes, however, a long pause takes place in the progress of the disease, even though thus far advanced: the cough, which had acquired fresh intensity, gradually abates,—the respiration is no longer habitually wheezing,—the patient can repose in any attitude,—the flesh lost is regained,—and, were it not that cough still continues, though less frequent and less severe, that the breathing is more hurried than natural, and that auscultation

contributes still further to undeceive us,—we might fancy that all ground for anxiety was passing away, and that the child was on the high road towards recovery. In some cases, too, in which symptoms such as have been described are observed, recovery does eventually take place. It is seldom possible to say in any case by what means this recovery is brought about; sometimes, no doubt, the tubercular matter makes its way into the air-tubes, and is got rid of by expectoration. Once, I observed the disappearance of most well-marked general signs of consumption, in the case of a girl eight years old, during the copious expectoration of a tenacious mucus, in which were small quantities of a substance like broken-down cheese, or grains of boiled rice, and which alternated with an expectoration of thick, puriform, matter, more or less tinged with blood. In the case of this child an attack of measles, while in her seventh year, had been succeeded by cough, the formation of abscesses in her neck, and a frequent, puriform, and sanguineous, discharge from her nose. These abscesses had not been long healed when her mother's alarm was excited by her expectorating blood mixed with the phlegm which she brought up when coughing. Though not much emaciated, the child looked unhealthy, her pulse was very feeble, and there were many small petechiæ on her extremities. The lungs, however, were tolerably free from disease; for nothing more was heard during auscultation than a good deal of rhonchus mixed with some moist sounds, which were most evident at the upper part of the chest. Expectoration such as I have described continued for nearly three months, in the course of which time the child by degrees lost her cough, and acquired strength, under the use of steel and other tonics. Two years afterwards, no auscultatory signs of disease were perceptible, except a little creaking under both clavicles; and at the end of five years even this had disappeared.

The fatal termination of bronchial phthisis usually takes place in consequence of the lungs becoming seriously involved in the tubercular disease, though life is sometimes suddenly cut off by hæmoptysis, owing to the perforation of one of the larger vessels of the thorax by a tuberculated bronchial gland. It must not, however, be supposed that this is the only means by which fatal hæmorrhage is produced, for it takes place in other instances under precisely the same circumstances as in the adult. Four cases of fatal hæmoptysis have come under my own notice in children; but in two, no examination was made after death. In the third case, which was that of a boy between five and six years old, who died at the end of nine months' illness, blood pouring in abundance from his nose and mouth, the amount of disease, both of the lungs and bronchial glands, was very considerable, but no large vessel had been perforated, and it was not possible satisfactorily to determine the source of the hæmorrhage. In the fourth case, that of a little boy five years old, in whom symptoms of pneumonia had supervened upon previous signs of phthisis, the source of the

bleeding in the single and fatal attack of hæmoptysis which took place at a time when he seemed recovering, likewise eluded the most careful anatomical investigation.

A very considerable degree of tuberculization of the bronchial glands is by no means uncommon even in very early infancy; but it then generally forms only a part of such extensive tubercular disease, that its special symptoms are lost in those of the general malady. In such cases, too, it frequently occurs that the signs of any thoracic disease are almost entirely merged in those of generally defective nutrition. The existence even of a large cavity in the lung may be announced in early infancy by nothing more serious than some acceleration of the breathing and an occasional short cough; while the frequent vomiting,—the irregular, often relaxed, condition of the bowels,—the unhealthy evacuations,—the red tongue, and the aphthous state of the mouth,—may direct the attention almost exclusively to the condition of the digestive organs.

Many points still remain for our investigation, but we must postpone their consideration, and the study of the auscultatory phenomena of the disease, to the next lecture.

LECTURE XXV.

Phthisis, continued.—Peculiarities of its auscultatory signs in early life—some of less value than in the adult—influence of tuberculous bronchial glands in exaggerating the signs of disease of the lung—difficulty in appreciating some signs which are well marked in the adult—sign peculiar to early life.

Different forms of phthisis—acute phthisis; illustrative case—tuberculous pneumonia—bronchitis grafted on phthisis may lead to an over-estimate of the tuberculous disease.

Duration of phthisis; its course sometimes extremely chronic—cases in illustration.—Modes of death in phthisis—head symptoms sometimes precede death, independent of cerebral disease.

Prophylaxis, and Treatment of phthisis.

It would be little better than a waste of your time to enter into a minute description of all the modifications of the respiratory sounds to which the presence of tubercle in the lungs of children may give occasion: our time will be better spent than in such detail, if we direct our attention to those respects in which the *auscultatory signs of phthisis in childhood* differ from those which betoken its existence in the adult, or in which the same auscultatory phenomena require a different interpretation at the one period of life, from that which is justly applied to them at the other.

The grand difference, indeed, is to be sought in the latter rather than in the former of these respects. Tubercle, at whatever age it is developed in the lungs, gives rise to much the same auscultatory phenomena; but many of those modifications of the respiratory sound which would warrant us in pronouncing positively that phthisis existed in the adult, cannot be relied on with the same certainty in the child; still less can they be regarded as proving the existence of so large an amount of disease in the latter case as in the former. It may be stated, then, that

1st. *Many of the auscultatory signs of phthisis deserve less reliance, or have a less grave import, in the child than in the adult.*

One of the earliest signs of tubercular deposit in the lungs of the grown person, is furnished by that peculiar modification of the respiratory sound,

to which the name of coarse breathing has been applied; and this acquires still greater importance, when associated, as it often is, with dry rhonchus and creaking sounds. Much of the value of this sign depends on its being limited to the infra-clavicular regions, or, at least, heard there with much greater distinctness than elsewhere. In children, however, the deposit of tubercle in the lungs being more uniform, and more generally diffused, the additional value which the localization of these signs furnishes is lost; and it becomes impossible to determine whether the bronchial irritation which they betoken is induced by the presence of tubercle in the lungs, or by some other cause.

Prolongation of the expiratory sound beneath the clavicle, and interrupted respiration,—the *respiration saccadée* of French authors,—which are two of the earliest and most important indications of phthisis in the grown person, are, on the whole, of less value in the child. Their occurrence, indeed, should always excite suspicion as to the existence of phthisis, but they are not infrequently very well marked in cases where but slight disorder of the respiratory organs is present; and where the perfect recovery of the child, and its subsequent sound health, prove that tubercular disease either was altogether absent, or at any rate was extremely slight.

The exaggeration of these two signs, is, probably, in some measure due to a cause which adds greatly to the intensity of some other of those auscultatory phenomena that usually betoken far advanced phthisis. MM. Rilliet and Barthez were, I believe, the first who pointed out the fact that the bronchial glands, when enlarged by the deposit of tubercle, and thus brought into contact with the walls of the chest, which they do not touch in the healthy state, conduct to the ear of the auscultator sounds that under other circumstances are imperceptible. The air passing through the larger bronchi is now heard, on applying the stethoscope to the walls of the chest, in the supra-scapular, and less often in the infra-clavicular region, and can scarcely be distinguished from bronchial breathing produced by solidification of the pulmonary tissue itself. The sounds which are caused by the presence of mucus in the larger air-tubes, are in the same way conducted to the ear in other situations than those,—such as the root of the lung, where alone they would be heard if the glands were not enlarged. The auscultator may thus be betrayed into the error of supposing that hopeless phthisis exists, in cases where yet the amount of disease in the lungs is but small, and where life may be prolonged for many years. Morbid sounds, too, produced in one lung, may thus be conducted to the walls of the chest on the opposite side, and the extent of disease may, in consequence, be overrated; or the sounds which, when perceived in the front of the chest, may arise from real disease existing there, being transmitted to the back through the medium of the glands, may thus give rise to the conclusion that far more serious mischief exists than is really

the case. The means of avoiding error from this cause consist in the careful comparison of the results of auscultation with those of percussion, and of those of auscultation on one day with those which it yields a few days afterwards. If the sounds proceed from solidification of the lung, or from cavities in its substance, the results of auscultation will be as invariable as those of percussion; but if they be merely sounds transmitted from the larger air-tubes, they will be found to vary much on different occasions; while the dulness on percussion in certain parts will continue unchanged, inasmuch as it proceeds from the presence of the enlarged glands. This variability in the results of auscultation is one of the most important indications of bronchial phthisis. It depends not merely on the accidental variations in the sounds produced in the larger air-tubes, but also on the changes which the varying degree of compression of the bronchi, produced by the increase or diminution in the size of the glands may occasion, and on the variations in the irritation of the air-tubes which this pressure produces. The risk in cases of bronchial phthisis is not so much that of forming an altogether erroneous diagnosis, as of expressing a prognosis far more unfavourable than the nature of the case actually justifies. In cases where a considerable measure of bronchitis is associated with tuberculization of the glands, we are especially likely to fall into this error, and can avoid it only by much caution, and by frequently repeated auscultation.

There are differences of another kind, however, between the results of auscultation in cases of phthisis in the young and old, and which depend

2*d*. *On the absence, or difficult appreciation of some auscultatory phenomena in the child, to which much value is attached in the case of the adult.*

To this head belong those differences which result from the loss in the child, of almost all that information, which, in older persons, is afforded by the different modifications of the vocal resonance. The shrill voice of the child, the small power of modulating it which is possessed in early life, and the consequent difficulty of inducing the patient to utter a few sentences or even a few words in the same key, even when fear does not reduce the voice to a mere whisper, take away almost all value from the modifications of the voice-sound in young subjects.

The extreme excitability of children tends, as it does also in the female subject, to reduce very low the value of mere inequality of breathing between the two lungs, for it is by no means a rare occurrence for the lung which on one day seemed to admit but little air to yield the sounds of well-marked puerile respiration on the next day, and for the feeble respiration to have changed sides. Before, therefore, any conclusion can be drawn from the feebleness of the respiration in either lung, its situation, degree, and extent, must be confirmed by repeated observation.

The finer variations in the sonoriety of the chest are not so easily dis-

tinguished in childhood as in more advanced age. The main cause of this appears to be furnished by the extreme resonance of the chest in early childhood, which will admit of very considerable reduction before percussion elicits a sound that the ear would recognise as at all dull. Extremely gentle percussion is much more likely to elicit the more delicate variations of sound, than those smart taps of the chest, which, in the grown person, will often answer the purpose sufficiently well.

A last source of difference may be mentioned as arising

3d. From the occurrence of some physical signs peculiar to the form which phthisis assumes in early life.

The only sign that comes with propriety under this category, is that dulness between the scapulæ which is not unfrequently produced by the presence of tuberculous glands, and which, when it coexists with tolerable resonance over the upper part of the lungs, and moderately good respiration in these situations, may be regarded as pathognomonic of bronchial phthisis. The absence of dulness in this situation, however, does not of itself warrant the inference that the glands are free from disease, but merely that they have not yet attained any very considerable degree of enlargement.

It may perhaps be useful, before we proceed to the study of some other peculiarities of phthisis in childhood, briefly to recapitulate the *general characteristics of the disease in early life.* The chief of these are—

1st. The frequent latency of the thoracic symptoms during its early stages.

2d. The almost invariable absence of hæmoptysis at the commencement of the disease, and its comparatively rare occurrence during its subsequent progress.

3d. The partial or complete absence of expectoration.

4th. The rarity of profuse general sweats; and the ill-marked character of the hectic symptoms.

5th. The frequency with which death takes place from intercurrent bronchitis or pneumonia.

Bronchial phthisis is characterized by—

1st. The frequent development of its symptoms out of one or more attacks of bronchitis.

2d. The peculiar paroxysmal cough which attends it, resembling that of incipient pertussis.

3d. The great and frequent fluctuations in the patient's condition, and the occasional, apparently causeless, aggravation, both of the cough and dyspnœa.

In very early infancy, phthisis is remarkable for the very frequent latency of the chest symptoms, which, through its entire course, are often entirely merged in the signs of impaired nutrition.

The most important peculiarities in the auscultatory phenomena of consumption in the child are—

1st. The smaller value of coarse respiration, prolonged expiration, and interrupted breathing, owing to their general diffusion over the chest, and to their occasional existence independent of phthisis.

2d. The apparent, and to some extent the real, exaggeration of the signs both of early and of far-advanced disease of the lungs, in some cases of bronchial phthisis.

3d. The loss of that information which the phenomena of the voice furnish in the case of the adult.

4th. The small value of inequality of breathing in the two lungs.

5th. The difficulty of detecting minute variations in the sonoriety of the chest; and

6th. The existence of dulness in the interscapular region, together with moderate resonance of the upper parts of the chest, and tolerably good respiration there, which are characteristic of the presence of enlarged bronchial glands.

Hitherto we have been occupied with the study of the more common forms of phthisis in childhood, but *deviations* are occasionally met with *from the ordinary course of the disease*, with which it behoves us to make ourselves acquainted. *Phthisis occasionally runs a course so extremely rapid* that many of its most characteristic symptoms have not time to manifest themselves. In such cases we are exposed to considerable risk of error, for the history of the patient's indisposition goes back only to a few weeks or days, the evidence of impaired nutrition is almost or altogether wanting, and the *symptoms* appear to be those of an acute malady coming on suddenly, rather than those of a slow and wasting disease.

A remarkable instance of this came under my notice some years ago, in the case of a little boy, nine months old, who was fat and ruddy, and had always had perfectly good health until the 10th of April. On that day he was taken with symptoms which his mother supposed to be those of a bad cold. On account of this he was kept in the house, and various domestic remedies were employed, though without any improvement, and on April 24th he came under my notice. There did not then appear to be any urgent symptom, though the child seemed much oppressed at the chest. The case appeared to be one of rather severe catarrh, occurring during the period of dentition. The gums were lanced, and a mixture containing the vinum ipecacuanhæ was ordered, to which, finding the symptoms did not abate, small doses of antimonial wine were added on the 27th. On the 30th I was informed that the child was much worse, that his dyspnœa was greatly increased, and that his hands and feet had been swollen for the last forty-eight hours. I found the little boy breathing fifty times in the minute, with great oppression at the chest, the face much flushed, the skin dry, the trunk hot, the limbs cool, and the hands and

feet much swollen. Auscultation detected generally diffused small crepitation through both lungs, with indistinct bronchial breathing at the upper and back part of the left side. Three hours after this visit, the child died without a struggle, on being lifted out of bed for his mother to apply some leeches to his chest. On examining the body after death, a very thick layer of fat was found everywhere beneath the integuments. The lungs presented an extreme degree of tubercular degeneration, and many of the bronchial glands were enlarged by the morbid deposit to the size of a pigeon's egg. None of the tubercle in the lungs was softened, but it existed both in the form of yellow miliary tubercle, of tubercular infiltration, and of masses of crude tubercle, formed by the agglomeration of many separate deposits. The pulmonary substance in the intervals between the tubercular deposits was of a bright, red, colour, in the first stage of pneumonia, and in many parts bordering on the second stage, and there was very considerable injection of the bronchial tubes. The various abdominal viscera contained tubercle, but it was not far advanced in the mesenteric glands.

This case represents a class in which there is much hazard of forming an erroneous diagnosis. It shows the possibility of tubercular deposit taking place to a very great extent, without at all interfering with the general nutrition of the body, and without giving rise to any symptom so serious as to attract the notice of a very careful and affectionate mother. It illustrates also the mode in which the fatal termination of many cases of phthisis in children is brought about, and suggests the inquiry whether there be any means of distinguishing between *tuberculous pneumonia*, and pneumonia which occurs uncomplicated with phthisical disease of the lungs.

Pneumonia often complicates phthisis in early life, under circumstances in which no diagnostic difficulty occurs, but it is of much importance to detect the consumptive element in cases which to the superficial observer present no other symptoms than those of acute inflammation of the lungs. The existence of a considerable amount of tubercular deposit in the lungs, may be suspected in those cases in which the degree of oppression of the chest has, from the very commencement of the illness, been altogether out of proportion to the severity of the catarrhal or bronchial symptoms with which the disease set in. A further evidence of its nature is afforded, if the skin, though very dry, present, a less considerable or a less pungent heat than attends simple pneumonia, while the pulse from the very outset is less developed. Suspicion would be strengthened if the frequency of respiration very greatly exceeded the amount of mischief disclosed by auscultation, and especially, if the rapidity of the breathing, though so great that it would excite the most serious alarm if the case were one of pneumonia, should yet continue the same for days together without marked deterioration in the patient's condition. Auscultation also would throw much light on the nature of the case, for the sounds detected in the chest

would be the subcrepitant and mucous râles, rather than the small crepitation of pneumonia, while though the smaller sounds would be discovered at the lower part of the chest, the greatest dulness on percussion would generally be detected at the upper part, and bronchial breathing would very likely be perceived more or less distinctly in the same situation.

The importance of distinguishing those cases in which inflammation supervenes in a lung already the seat of tubercular deposit, from others in which the organ had been previously healthy, is by no means confined to cases of the severest kind, in which life is immediately threatened. In every instance of pneumonia in early life, both your prognosis and your treatment would be greatly modified, if there were good ground for believing that tubercular disease had for some time previously affected the lungs. Hence follows the necessity for that very minute inquiry as to the previous health of the patient, and of the other members of the family, on which so much stress was laid at the commencement of this course of lectures. If you learned that several children in the family had already died of phthisis or of some other affection, such as acute hydrocephalus, which you knew to be most intimately associated with the tuberculous diathesis, the possibility of the same complication existing in the patient under your care would at once occur to you. This complication would be rendered highly probable, if you were to ascertain that the child had been peculiarly liable to catch cold, or had for some months been seldom free from cough for many days together, or had suffered from cough every winter, for two or three years, and had already experienced two or three attacks similar to that you are called on to treat, and which, though severe, had yet subsided by degrees, without the employment of very active measures. The probability would be raised almost to certainty if there existed that want of correspondence between the general symptoms and physical signs, or between the results of auscultation and percussion, to which reference has already been made; or if the history of the present illness went back to a period anterior to that which you would be disposed to assign to it, if the affection had been simple pneumonia.

The case of tuberculous pneumonia you would deplete more sparingly, and would subject to less rigorous antiphlogistic measures, than that of simple inflammation of the lung. Bearing in mind the influence of enlarged bronchial glands in rendering parts of the chest dull on percussion, and in exaggerating in some respects the morbid sounds, you would not over-estimate the degree or extent of the inflammatory mischief, At the same time you would not allow even a considerable measure of improvement to lead you to speak too decidedly of the ultimate recovery of your patient, since you would not forget that if inflammation do not originate tuberculous disease, it may yet communicate increased activity to its progress.

The overlooking the more serious malady, owing to its symptoms being

thrown into the shade by those of the other more curable affection, is not the only error to which you are exposed in cases of infantile phthisis. The degree of *irritation of the bronchi* that exists in different instances, varies exceedingly; sometimes it is so considerable, that when the child is placed under your care its respiration is wheezing, difficult, and very hurried, its cough violent and exhausting, while such is the general anxiety of the countenance, and so great the depression of the vital powers, that the struggle seems as if it could not be long protracted. Percussion detects dulness at the upper part of the chest, the bronchi are so laden with phlegm that air scarely penetrates beyond the larger tubes, and mucous râle is heard throughout the whole of the lungs, while at their upper part it is so large as to amount almost to gurgling. You regard the case as one of far advanced phthisis, and suppose that softened tubercle is diffused through the whole of both lungs, and that cavities exist at their apex. You form the most gloomy prognosis, and entertain, very probably express, the conviction that a few weeks at furthest will be the period of your patient's life. By degrees, however, the most urgent symptoms subside, and some signs of returning health appear; the respiration grows slower and more tranquil, the cough abates, perhaps almost ceases. The signs of a cavity grow less and less distinct, in proportion as the secretion in the bronchi diminishes; and after some months, while the patient's general condition deviates but little from a state of health, a little dulness at the upper and back part of the chest, unequal breathing, prolonged expiration, or morbid sounds equally slight, are the only auscultatory evidence that the most careful examination can discover of pulmonary disease.

Non-professional persons are apt to imagine the mistake in cases of this kind to have been greater than it really was. The error is one as to the degree of the malady, rather than as to its kind. In cases that present these symptoms, phthisis has in reality existed, but the chief tubercular deposit has probably been seated in the bronchial glands, and their enlargement gave rise to much of the dulness on percussion, and exaggerated the morbid sounds at the upper part of the chest. From some accidental cause, such as cold or damp, or from the mucous membrane of the bronchi sympathizing with disorder of the digestive organs, or from inappropriate treatment which aggravated the evil it should have relieved, or even without any cause that we can assign, it had come to pass that the air-tubes were in a state of great irritation. The due regulation of temperature, generally appropriate treatment, and nature's own healing power, improved the general health and diminished the irritability of the bronchi; while very probably the diseased glands emptied themselves, at least in part, into the air-tubes, and the tubercle was thus eliminated from the system. You should, therefore, always express your opinion very guardedly with reference to the condition of a child suffering from phthisis, until you have confirmed

the results of auscultation by its frequent repetition, and till you have had the opportunity of determining how large a portion of the physical signs is due to the morbid deposit, and how much to that irritation of the bronchi which you may fairly hope to mitigate, if not to remove.

The average *duration of phthisis* in childhood is estimated by MM. Rilliet and Barthez, at from three to seven months, though, as they justly observe, its extreme limits vary from two months in unusually rapid cases, to two years and upwards in other instances in which the course of the disease is very protracted. It is my impression, indeed, that the ordinary duration of phthisis in childhood is less brief than the observations of these gentlemen, made among the children in the Hôpital des Enfans at Paris, have led them to believe, though the number of observations on which this impression rests is too limited to warrant my asserting it as a positive fact. Many cases, however, have come under my notice in which the course of well-marked phthisis has been extremely tardy, and some instances in which the disease has continued for two, three, four, and nearly five years, before it terminated fatally.

So little notice has been taken of this *chronic form of phthisis* in children, that it may be well to relate a few examples of it. In March, 1842, I saw a little girl six years old, whose father had died of phthisis, and who had had a cough ever since she suffered from measles two and a half years before. Her mother's anxiety had been excited by the increase of this cough, and by the child's losing flesh during the few weeks previous to her coming to me. Auscultation at this time discovered that air entered the lung in the left infraclavicular region more scantily than in the right, and that the respiration was coarse, and attended with much creaking, at the upper part of both lungs. In May, the general symptoms were much improved, and the creaking sounds were no longer heard. For many months the child continued to appear tolerably well, though her cough never ceased entirely; but in the early part of the winter of 1844 her health completely failed. Examination of the chest in the beginning of December, elicited great deficiency of resonance at the upper part of the left lung, both in front and behind. Bronchial breathing, intermixed with large mucous râle, was heard in the left supra-scapular region, and abundant moist sounds pervaded the lung posteriorly. In the left infra-clavicular and mammary regions the respiration was very deficient, and accompanied with distant moist sounds. Extreme coarseness of the respiration was the only morbid sound heard at the upper part of the right lung, and the breathing on that side was puerile in other parts. In January 1845, the child had slight hæmoptysis, which recurred occasionally at intervals of a few weeks or months until her death, but was not profuse at any time. In September, 1845, resonance was slightly impaired under the right clavicle; and also in a greater degree posteriorly, as far as the angle of the scapula. There was absolute dulness of the left side, as far

as the nipple in front, and the angle of the scapula behind. There was no natural breathing in the left lung, but the respiration was bronchial, and accompanied with large mucous râle as low as the nipple; the râle being smaller, and the admission of air scanty, below that point. About the left scapula there were cavernous sounds and distinct gurgling; smaller moist sounds lower down. In the right lung the respiration was puerile in front, except quite at the upper part, where the breathing was coarse, and attended with mucous râle; and posteriorly the same characters were still more marked.

It cannot be necessary to detail the results of the subsequent examinations of the chest, which showed that disease advanced slowly in the right lung, though there was at no time proof of the existence of a cavity there. The child's condition fluctuated: sometimes she seemed almost dying under an aggravation of all the symptoms, and then again she rallied and was able to walk about, and seemed tolerably comfortable. Life was prolonged until June 1st, 1847; and she had seemed almost as well as usual until a very few days before her death. Unfortunately, permission to examine the body could not be obtained; but the stethoscopic signs enable us to trace back the phthisical disease for more than five years, while the evidence of a large cavity in the left lung was distinct twenty-one months before death took place.

Nor is this a solitary case. In January, 1846, I saw a little boy, three years old, who had had cough ever since an attack of typhoid fever in the previous July; and for six weeks before he came under my notice his cough had grown more severe. There was then very marked flattening of the left side of the chest, which yielded a dull sound on percussion in the infra-clavicular and mammary regions; and air entered there very scantily. The same dulness existed in the left side posteriorly; and the scanty breathing was attended with a crumpling sound. In April, moist sounds were evident there; and in May they were becoming larger about the left scapula; and signs of incipient disease were now perceptible in the right lung. In September, there was absolute dulness in the left infra-clavicular region, slightly diminishing towards the nipple, and absolute dulness in the left scapular region. Large gurgling was heard in this situation, most marked behind, and rendered very striking during a fit of coughing, which was followed by expectoration of about a tea-spoonful of pus. From this time to the present the disease has continued nearly stationary. The child is considerably stouter than he was when he first came under my notice; but the cough and purulent expectoration continue. I auscultated his chest on Sept. 26, 1847; and at that time loud blowing respiration was heard over the whole of the left scapula, accompanied with gurgling; while lower down, there were large moist sounds, though not amounting to actual gurgling. From that time until August 1848, the child's health has continued tolerably good; he coughs but little, but suffers

from occasional attacks of diarrhœa. The left side of his chest is now much shrunken, and yields a dull sound every where except just under the clavicle. Air enters but scantily; moist sounds attend it, but the evidences of a large cavity are growing less and less distinct.

How long the disease may continue, or what may be the ultimate issue of the case, it would be useless to speculate on; though it is by no means unlikely that the child may live, with but little deterioration in his condition, until measles or hooping-cough imparts a fresh stimulus to the consumptive disease, or excites some fatal attack of bronchitis or pneumonia. I still see occasionally a little boy, now ten years old, who was aged only three years when he first came under my notice. At that time he had been suffering from cough ever since an attack of what his mother called inflammation of the lungs, when he was sixteen months old; his cervical glands had recently suppurated; he had unusually well-marked hectic fever, and profuse night sweats; and a month before I saw him had spit blood once. His right side yielded throughout a dull sound on percussion; breathing in that lung was scanty, and attended with large moist sounds. The child went into Devonshire to pass the winter, and as I expected, to die there of phthisis; but he returned in better health; has grown tall, and plays about like other children, though he seldom passes more than a few months without attacks of a pleuritic character, the pain of which he refers to his right side, and which usually subside in the course of a few days, without any treatment more severe than a mustard poultice, and some diaphoretic medicine. His cough never leaves him entirely; but both that and the quantity and character of his expectoration vary, and sometimes he spits a little blood. In October, 1844, the auscultatory signs were as follows, and there has since then been a slight degree of improvement in them. At that time the left lung yielded, as it had constantly done, the sounds of puerile breathing in front; posteriorly, the breathing in that lung was also good, except that there were some moist sounds in the infra-scapular region, and that the breathing had a coarse and almost tubular character about the upper angle of the scapula. In the right lung, in front, the respiration was puerile, with now and then a little distant crepitus, as low down as the lower edge of the second rib, at which point the moist sounds became larger. Posteriorly, there were large moist sounds, intermixed with puerile breathing in the supra-scapular region; gurgling, cavernous breathing, and bronchial voice about the scapula; and lower down there was very little respiration, and that of a bronchial character, becoming quite inaudible in the lateral region. In the axillary region the respiration was coarse, accompanied with large mucous râles.

In the present condition of our knowledge, it is not possible to state with certainty either the anatomical characters of phthisical cavities of long standing, or the signs which, during the patient's life-time, would

warrant the expectation that the disease will run a tardy course. We must now, therefore, pass on to notice briefly the treatment of the disease, after glancing for a moment at the *different modes in which it brings about a fatal issue.*

In a very large proportion of cases of phthisis, the functions of all the organs of the body become at length so much disturbed, and nutrition generally so impaired, that the patient dies, because the whole machine is worn out. But though this is the case in many instances, yet it often happens, even when the powers had long seemed nearly exhausted, and the body wasted almost to a skeleton, that death is far from tranquil, but is preceded by hours of severe agony, for which it is not easy to account. In many cases, and especially in those where the disease runs a rapid course, the fatal termination is due to an attack of intercurrent bronchitis or pneumonia, which is sometimes supposed to have been the patient's only disease, until a post-mortem examination reveals the tubercular degeneration of the lungs, to which the inflammatory affection was but secondary. Death from hæmoptysis is rare, and still rarer is the perforation of the lung, by the walls of the cavity giving way at some point, and thus producing pneumothorax. The abdominal symptoms sometimes mask the thoracic, and the patient dies of tuberculous peritonitis, who, had life been prolonged, would have sunk eventually under pulmonary phthisis. Many children, in whom the signs of incipient phthisis have appeared, die of acute hydrocephalus, excited by the membranes of the brain having become the seat of tubercular deposit; and some, in whom the disease has attained a more advanced stage, are suddenly carried off by head symptoms, the cause of which is explained by the discovery of large masses of tubercle in the cerebral substance. Convulsions, however, sometimes precede death for several hours, or head symptoms of greater or less intensity constitute the most striking feature in the patient's history for some days before death takes place; and yet, an examination of the body throws no light upon the cause of their occurrence. Sometimes too, the symptoms that precede death are those of fever of a typhoid character, rather than of serious mischief in the chest. They were so in the case of a little boy, nearly seven years old at death, who had shown the symptoms of phthisis for more than two years, and the right side of whose chest had during that time presented the indications of gradually increasing tubercular deposit. The disease had advanced slowly, and with long intermissions, though, on the whole, very manifestly increasing. On Nov. 8 there was a manifest aggravation of his chest symptoms, attended with much fever. On the night of the 12th his mind wandered, and, when sensible, he complained of his head. On the 14th he became delirious likewise during the day; and until his death, which did not take place before Dec. 1, his mind wandered during many hours of every day, while at night he was quite light-headed, extremely restless, and tried to get

out of bed, or at other times shrieked loudly, as if in violent pain. In the early part of his illness he had a frequent, short, cough, which subsided as the febrile symptoms increased in intensity; but his respiration throughout continued at about 50 in the minute; and this hurried breathing, coupled with the auscultatory signs, afforded the only evidence of the mischief that was going on within the chest. After death, the only morbid appearance of any importance was discovered in the upper lobe of the right lung. Its anterior fourth was perfectly solid and non-crepitant, of a yellowish red colour, owing to the infiltration of tubercle into it. Its posterior three-fourths were of a reddish colour, and of a much softer texture; while the slightest pressure with the finger reduced their substance to a putrilage, from which there flowed a dirty reddish liquid, which seemed like a mixture of blood, and pus, and serum. Inflammatory softening of this lobe seems to have been the cause of death, though manifesting itself less by local symptoms than by the signs of most serious constitutional disturbance.

Though the study of phthisis, in its effects and its symptoms, has occupied us during almost the whole of two lectures, yet there need be but little said with reference to its *treatment*. The main principles by which we are to be guided in its treatment are the same at every age; nor do the differences in the patient's years bring with them many or important modifications in the means by which these principles are to be carried into action.

Among the prophylactic measures adapted to early life, none is of more importance than the keeping the infant at the breast for the first twelve or eighteen months of its existence, by which time it will have passed through some, at least, of the dangers incidental to the period of teething. The task of thus nursing the infant, however, ought not to be undertaken by a mother who has shewn any tendency to consumption, or in whose family consumptive disease has been prevalent, but ought at once to be entrusted to a healthy wet-nurse. This rule does not rest on mere theoretical grounds; but actual observation has shewn that under some morbid states of the system the milk undergoes great changes, and loses much of its nutritive properties. In the case of the cow, these changes have been ascertained by Dr. Klencke of Leipzic to be very remarkable; and, though less considerable, yet analogical reasoning would warrant the belief that the scrofulous taint in the human subject may give rise to alterations of a similar kind. Dr. Klencke confirmed* the observation of Dr. Carswell and others, that stall-fed cows are very liable to become tuberculous; and found, moreover, that under these circumstances their milk loses much or the whole of its sugar; that the butter and casein diminish, while albumen is

* Ueber die Ansteckung und Verbreitung der Scrofelkrankheit bei Menschen durch den Genuss der Kuhmilch, 16mo. Leipzig, 1846.

found sometimes in as high a proportion as 15 per cent., and elain in the proportion of 1·4 per cent., and that in some cases lactic acid is likewise present. Even if we set aside the assumption of scrofulous disease being actually transmitted through the medium of the milk, of which there is perhaps no clear evidence, it is yet apparent that a very slight degree of such an alteration in its constituents, as has just been mentioned, must render it very unfit for the nutriment of a delicate infant.

It is needless to dwell here on the general rules for feeding and clothing children as they grow older, or to insist on the necessity for the bed-rooms being airy and well ventilated. When the damp and cold weather of winter approaches, removal to a warmer climate, in which exercise in the open air may still be continued, is, if practicable, much to be preferred to keeping the child for weeks together a prisoner to the house. In children who are old enough to be taught to wear it, I have sometimes seen the respirator of much service, in enabling them to continue to take exercise in the open air at a season when, on previous years, exposure to the external air had always induced or greatly aggravated the signs of bronchial irritation. Whenever catarrhal symptoms appear, no care can be too great to bestow on the attempt speedily to remove them. In doing so, however, and in the management of all ailments that come on in children who have shown a disposition to consumptive disease, much caution must be used, in order to avoid over-treating them. On this account it is of extreme importance to encounter them at their very commencement, when mild measures will suffice for their cure; and, for the same reason, the child should be defended with the most punctilious care from the contagion of hooping-cough and of the eruptive fevers—diseases in the course of which serious thoracic complications are so apt to supervene, and to require for their cure most active treatment.

In carrying out this plan of unwearied watchfulness, and of attention to minute detail continued for months and years, you will have brighter hopes with children for your patients, than if you were called on to exercise similar precautions in the case of persons more advanced in life. Without raising baseless expectations, too, you may communicate something of hope to the parents, and thus lighten for them their anxious task: nor will the appearance even of decided physical signs of tubercular deposit, nor the evidence that in some parts that tubercle is softened, warrant an absolutely hopeless prognosis. Cases, such as have been related, show how long life may be prolonged under circumstances the most inauspicious; and, where speedy death has been expected, an unlimited reprieve seems almost a pardon.

It may suffice to have said thus much about the management of phthisis in childhood; for when the disease is actually developed, we have the same indications as in the adult, and these must be met by similar means. Iron, quinine, and the mineral acids, are the most important of our tonic

remedies; and for these the extract of bark and the extract of logwood may be substituted, if much tendency exist to a relaxed state of the bowels. In cases where the glands of the neck are affected, and where there seems to be reason for supposing that the disease approximates to bronchial phthisis, the syrup of the iodide of iron may be employed with advantage. The sickness and the paroxysmal cough are best relieved by the hydrocyanic acid, with which the liquor cinchonæ of Mr. Battley may be combined, in cases where we are afraid to venture on any but the mildest tonics. Among local measures, the use of stimulating liniments to the chest is even more valuable in early life than in the adult; and sometimes the application of a blister about the size of a shilling, under one or other clavicle, and its frequent repetition, is followed by a very great amendment in the patient's condition, and by a marked improvement in the physical signs furnished by the subjacent lung.

I have very rarely employed local depletion, except in the treatment of the pneumonia which so often attacks the phthisical patient; but it has then seemed sometimes to be of great service; and it will probably be safer to trust to a moderate abstraction of blood by leeches, followed by small doses of antimonials, than to administer mercury, or to give antimony in larger doses without previous depletion. The habitual cough of phthisis requires small doses of ipecacuanha wine, combined or not with antimony, and laudanum, or compound tincture of camphor, in small doses—remedies which, on account of their strength being definite, are always to be preferred, in the management of the affections of childhood, to a preparation so variable as the syrup of poppies. Opiates in various forms, and for various purposes, may be needed to check diarrhœa or to relieve suffering; and you must not allow any preconceived notion of the danger of employing opium in infantile diseases to prevent your having recourse to so valuable a medicine.

We must here leave this subject, so full of painful interest, and proceed at our next lecture to the study of diseases of the heart in early life.

LECTURE XXVI.

Diseases of the Heart—much rarer in childhood than in the adult—often overlooked when present—rheumatic inflammation their most frequent cause—heart sometimes affected when rheumatic symptoms are very slight—both endocarditis and pericarditis may come on independently of rheumatism—as sequelæ of scarlatina—as complications of pleurisy—or as purely idiopathic affections—illustrative cases.

Idiopathic endocarditis sometimes attended by very few symptoms—importance of its early detection—tendency of valvular disease to grow worse and worse—power of the growing heart to ward off the effects of disease—absence of anæmic bruits in early life.

Congenital affections of the heart—reasons for not studying them here in detail—cases illustrative of some of their symptoms.

Among the many causes of suffering and death to which persons in adult age or advancing years are exposed, *diseases of the heart* and great vessels occupy a very prominent place. The frequency of these affections is, indeed, but very imperfectly shewn by our tables of mortality, which represent them as occasioning less than one and a half per cent. of the total deaths at all ages in the metropolis; but we know that in a large proportion of cases of rheumatism, asthma, bronchitis, and dropsy, the real cause of the fatal event is to be found in the cardiac mischief with which those maladies are so often associated.

In works on the diseases of childhood, however, so little mention is made of affections of the heart, and the instances of it that come under our own observation are comparatively so few, that it may appear to you almost superfluous to devote a whole lecture to their consideration. But, though infrequent, they are anything but unimportant, since their occurrence in childhood often embitters subsequent life, and shortens its duration; while their symptoms at first are in many instances so slight, that their existence may be overlooked, until the evils which follow in their train force themselves upon our notice.

Inflammation of the external investment of the heart, or of its internal lining, excited by an attack of acute rheumatism, is the most common form of cardiac disease before as well as after puberty. Its symptoms, both

general and physical, are the same at both periods of life, nor is there any peculiarity required in their treatment in the case of children, beyond that diminution in the doses of our remedies, which may be called for by the tender years of our patients. It is of importance, however, to bear in mind, that the risk of cardiac mischief supervening in any case of acute rheumatism, increases in direct proportion to the youth of the patient, and that the mildness of the general symptoms, the small amount of pain in the limbs, and the almost complete absence of swelling of the joints, afford no guarantee that the heart may not become the seat of most serious disease. It happens, too, less rarely in the case of children than of the adult, that the general indications of rheumatism follow, instead of preceding the heart affection, so that fever with hurried circulation and distinct endocardial murmur, may exist for two or three days, before the occurrence of pain, and the appearance of swelling of the joints, show that the disease of the heart is only a part of the great malady which has attacked the whole system.

Every threatening of rheumatism, therefore, is to be watched with the most anxious solicitude in the young subject, since so serious a complication as disease of the heart may accompany extremely slight general symptoms. Nor must auscultation be neglected in cases of what may seem to be simple fever, since rheumatic inflammation may attack the heart, before any other signs of rheumatism have manifested themselves.

Rheumatism, however, is far from being the only exciting cause of inflammation of the pericardium, or of the lining membrane of the heart. It may supervene, as in the adult, upon some disease in the course of which the composition of the circulating fluid becomes altered; or inflammation of some other internal organ may extend to the heart, owing to what has been termed affinity of tissue, or the affection of the heart may come on independently of any cause to which we can attribute it. In 6 out of 170 cases in which the state of the thoracic viscera was carefully examined, I discovered evidences of inflammation of the pericardium, or endocardium, or of both. In one of these cases, intense recent pericarditis, with endocarditis and softening of the muscular substance of the heart, were found in a girl 11 years old, who died on the 21st day, of an attack of acute rheumatism, with extremely slight general symptoms. In a boy, aged five years, considerable pericarditis, and slight affection of the mitral valve, were found in connection with pleurisy, chiefly of the left side, which had come on in the course of dropsy after scarlatina. In two girls, the one aged sixteen months, the other three and a half years, intense pericarditis was associated with double pleurisy, and purulent effusion into the left pleura. In a boy, aged five years, who died of phthisis, old disease of the mitral valve was found in connection with equally chronic pleurisy of the left side; and the sixth case was that of a girl in whom no other disease existed than old puckering and thickening of the mitral

valve, and shortening of the chordæ tendineæ; and this condition could not be traced back to its origin in any acute attack of disease. Other cases of pericarditis and endocarditis in childhood have come under my notice, but either they did not terminate fatally, or an examination of the body after death was not permitted. Including the six cases above mentioned, I have preserved a record of twenty-one. In six of these twenty-one cases, the heart affection supervened on acute rheumatism; in three it came on in the course of scarlet fever, or of the consecutive dropsy; in three it was associated with acute pleurisy; once it coexisted with chronic pleurisy in a phthisical child, and in another, who died of phthisis, the signs of valvular disease were likewise present; while in the remaining seven the disease of the heart was both idiopathic and uncomplicated.

The occurrence of *acute pericarditis in connection with acute pleurisy* is an accident but rarely met with, and many years have now elapsed since an instance of it came under my notice. The affection of the pericardium in some of these cases is most probably secondary to that of the pleura, since the products of a far more advanced inflammation may be found in the latter cavity than in the former. In some instances the two serous membranes would seem to have become affected simultaneously, while in others the indications of pericarditis are perceptible before those of pleurisy appear. In one of the three cases to which reference has been made, the patient, a little girl aged sixteen months, was almost moribund when she came under my notice; convulsions came on in two or three hours, and she died after they had continued for twelve hours. In this instance, the attack had commenced eight days previously, with violent sickness, followed by severe febrile disturbance and great dyspnœa, though by but little cough. In the second case, that of a little girl aged three and a half years, slight cough and febrile symptoms had existed for nearly a fortnight, when they suddenly, and without any obvious cause, became greatly aggravated; the cough became constant, short, and hacking; the respiration rose to 72, the pulse to 156 in the minute. The child grew extremely restless, appeared to suffer much, made frequent efforts to vomit, and often crammed her hand down her throat, as though to pull something away which obstructed her breathing. In neither of these cases was the existence of pericarditis suspected. In the last-mentioned case the restlessness of the child precluded careful auscultation; but dulness on percussion, and bronchial breathing, were perceived through the whole of the posterior part of the left side of the chest, and small crepitation was heard on the right side.

In the third case, the patient was a little girl five and a half years old, who was reported to have had frequent attacks of inflammation of the chest, but who was in good health at the time of her being seized with vomiting, followed by pain in the head, stomach, and back, and cough, with great fever. These symptoms had continued for three days when

she came under my notice. Her face was then anxious, her skin very hot; pulse frequent, quick, and wiry; respiration hurried; and she had almost constant hard cough, which occasioned pain in the epigastrium. She complained of pain in the left side, and across the chest. General sub-crepitant râle was heard through the whole chest. There was extensive dulness in the præcordial region, a loud, rough, bellows-murmur accompanied the first sound of the heart at the apex, and a similar sound was distinguished at the base, where it was suspected to be the commencement of a to-and-fro sound. The child was bled from the arm, leeches were applied over the heart, and two grains of calomel, with one-sixth of a grain of tartar emetic, were given every three hours; but on the following day her general condition was unchanged—the bruit with the first sound of the heart continued at the apex; and that at the base was now a distinct to-and-fro sound;—in addition to which a loud, pleural friction sound was heard, over both sides of the chest posteriorly. The remedies were continued, but by the next day the child's condition had deteriorated. The results of auscultation were much the same as before, but the pleural friction sound had almost completely disappeared, and percussion yielded a dull sound in both infra-scapular regions. Circumstances prevented my watching the child during the ensuing forty-eight hours, at the end of which time she died—eight days after the commencement of her illness. A post-mortem examination was not made; but there can be no doubt but that it would have disclosed appearances similar to those observed in the other two cases, except that perhaps evidences of inflammation of the endocardium would have been associated with those of pericarditis, and that the affection of the pleura would have been found to be secondary to, and less extensive than, that of the heart.

There is little danger, in cases which set in with symptoms so severe as those just described, of our falling into serious error, either of diagnosis or treatment. Everything would point to most serious mischief in the chest; and even should the tender age of the child, and its extreme restlessness, prevent careful auscultation, or should the signs of heart disease be masked by those of mischief in the lung or pleura, enough will yet be discovered to shew the necessity for immediate and active interference.

Inflammation of the pericardium, or of the lining membrane of the heart, or of both, sometimes comes on unaccompanied with any affection of the lungs or pleura, and in such cases the indications of disturbance of the respiration are either altogether absent or comparatively slight. If auscultation be neglected, or but carelessly performed, disease may, under such circumstances, go on unchecked till it has disorganized the heart, and doomed the patient to a life of remediless suffering.

A striking instance of this *idiopathic inflammation of the pericardium* and heart came under my notice some time since, in the person of a healthy

boy, eleven years old, who on May 8, 1843, complained of feeling cold, and began to cough. The chilliness was succeeded by fever, and he continued gradually getting worse till the 13th, when I visited him for the first time. He had had no other medicine than a purgative powder. On May 13th I found him lying in bed; his face dusky, and rather anxious; his eyes heavy, and his respiration slightly accelerated; coughing frequently, but without expectoration; skin burning hot; pulse frequent and hard. He made no complaint, except of slight uneasiness about the left breast. On examining the chest there was found to be very extended dulness over the heart, with slight tenderness on pressure. A very loud and prolonged rasping sound was heard in the place of the first sound, loudest a little below the nipple, though very audible over the whole left side of the chest, and also distinguishable, though less clearly, for a considerable distance to the right of the sternum. The second sound was heard clearly, just over the aortic valves, but was not distinct elsewhere, being obscured by the loudness of the bruit. Respiration was good in both lungs.

The child was cupped to ʒvi. between the left scapula and the spine; and gr. j. of calomel, with the same quantity of Dover's powder, was given every four hours.

On the following day it was found that the sense of discomfort in the chest had been relieved by the cupping, and that the child had slept well in the night. He looked less anxious, though his eyes were still heavy and suffused, and his skin was less hot and less dusky. His pulse was 114, thrilling, but not full. There was now slight prominence of the cardiac region, and the heart's sounds were obscurer and more distant than on the previous day. The bruit was now manifestly a friction sound, louder at the base than at the apex of the heart, and altogether obscuring the first sound, while the second sound could be heard over the aortic valves. Six more leeches were applied over the heart, and the hæmorrhage from their bites was so profuse as to occasion some faintness. Mercurial inunction was now superadded to the treatment previously employed; and the child's condition continued through the 15th to be much the same as it had been on the previous day. On May 16th there was some improvement in the general symptoms, and the pulse was softer. The friction sound was now no longer audible, but a loud rasping sound was heard in place of the first sound. The second sound was now distinguishable at the apex of the heart, as well as over the aortic valves, and its characters were quite natural. On the 17th the mouth was slightly sore, and the dose of the remedies was diminished. On the 22d the soreness of the mouth was considerable, and all active treatment was discontinued on that day. The child gradually regained his strength, but the bruit accompanying the first sound continued, and was heard a month afterwards, with no other change than being rather softer and more prolonged. Four years afterwards I

saw him again. He had continued well in the interval, and had never suffered from palpitation of the heart, nor from any other ailment referrible to the chest; but his pulse was small, jerking, and not always equal in force; and the natural character of the first sound was altogether lost in a loud prolonged bruit.

In cases such as this, the occurrence of the heart disease is not easy of explanation. No sign of rheumatism appeared during the whole course of the affection, nor was it associated with any other disorder, such as scarlatina, which, by the alterations that it induces in the composition of the circulating fluid, could be supposed to favour the supervention of inflammation of the heart or other viscera.* The organs of respiration were unaffected throughout, so that the case could not for a moment be conceived to be one in which the heart disease was secondary, and produced by the extension of the inflammation beyond the limits by which it was originally circumscribed. But though the cardiac affection came on independently of those conditions, which we regard, and with justice, as usually essential to its production, it ran as acute a course, and produced as extensive injury, as if it had been excited by any of its ordinary causes, and left, it is to be feared, as abiding a disorganization of the heart.

Idiopathic pericarditis, sufficiently severe to give rise to symptoms appreciable during the life-time of the patient, is a very rare occurrence. Unfortunately, I cannot speak with accuracy as to the frequency in early life of those slight inflammations of the pericardium which give rise to the white spots upon its surface, shown by M. Bizot and Mr. Paget† to be so common in the adult, for I have not recorded their presence or absence in my notes of dissections. My impression, however, is, that they are much rarer in early life than in the grown person.

Idiopathic endocarditis is less uncommon, and appears to be governed by the same laws, and to give rise to the same symptoms, as when it complicates acute rheumatism. Uneasiness, or actual pain at the heart, increase of its impulse, acceleration, perhaps irregularity, of its action, dyspnœa, a livid countenance, and threatening suffocation, are the signs by which it betrays itself to the observer. But, just as in rheumatic endocarditis, these symptoms may vary in degree, and be in one case so severe as to force themselves upon our notice, and in another so slight as almost to elude our observation; so it is in cases where the endocarditis is idiopathic. In cases of acute rheumatism you are aware of this danger;

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* As Bright's disease, for instance, in the adult favours the occurrence of pericarditis, according to the elaborate researches of Dr. Taylor, in vol. xxviii. of the Medico-Chirurgical Transactions.

† Mémoires de la Société Méd. d'Observation, tome i. p. 350; and Medico-Chirurgical Transactions, vol. xxiii.

you do not wait till the patient's sufferings inform you that the mischief has been done, but you are on the watch against the first threatenings of its approach,—and your sense of hearing gives you earlier information, and surer information, concerning this than all the other signs together. But if the same evil, against which you guard thus sedulously in cases of rheumatism, may occur independently of it, and may scarcely give warning of its approach, until it is almost or altogether too late to cure, a measure at least of the same precaution should be observed at all times; and in no instance of febrile disturbance in early life, how simple soever the case may seem, should you consider the examination of the patient complete until after auscultation. With all your care, there will probably still be cases in which the commencement of the heart affection will escape your notice; in which you will accidentally make the discovery of its existence when auscultating the chest for some other purpose, or in which the gradual supervention of the signs of valvular disease will call your attention to it long after the ailment has become chronic.

The early detection of the disease is of the more importance, since its gradual approach affords no assurance that it may not go on to ruin the health, and at length destroy the life of the sufferer. Nothing could be more gradual than the advance of the early stages of the disease of the heart, in the case of a little girl, eleven years old, who came under my notice in the month of March, some years ago. Her mother stated, that, though not robust, she had never had any definite illness, but that for the last year she had been growing thinner, and had suffered from palpitation of the heart, which had by degrees become more and more distressing, and that for the past three months she had likewise suffered from cough. The child when brought to me was greatly emaciated; her face was anxious and distressed; her breath short, so that it was with difficulty that she walked even a short distance; she had frequent short cough, without expectoration, and she suffered much from palpitation of the heart, and a sense of discomfort at the chest. The heart's action was violent; dulness in the præcordial region was extended; a very loud, harsh, rasping sound accompanied the first sound of the heart, loudest towards and to the left of the nipple, but heard over the whole of the chest, both before and behind. Various remedies brought slight but temporary relief to her sufferings, and she grew worse every month. She became more and more emaciated; the distress at the chest, and the palpitation of the heart, increased, her cough became more violent, and once she had an attack of hæmoptysis. For about a month before her death, the cough altogether ceased, but she was now unable to leave her bed from increasing weakness; the palpitation continued unmitigated, and her extremities became slightly anasarcous. During the last week of her life, her respiration was extremely difficult, and became increasingly so, till she died on the 10th of October. The lungs were very emphyse-

matous, and much congested, but not otherwise diseased. The heart was extremely large, but its right cavities did not exceed the natural size; the pulmonary valves were healthy; the edges of the tricuspid valve were slightly thickened; the left auricle was enormously dilated, but its walls were not at all attenuated; the pulmonary veins were much dilated; the left ventricle was dilated, its walls were thickened; the chordæ tendineæ of the mitral valve were greatly shortened, so that the valve could not close; the valve itself was shrunken, thickened, and cartilaginous; and there existed likewise slight thickening of the edges of the semilunar valves of the aorta.

The symptoms in this case, from the earliest period to which the patient's history goes back, were those of chronic valvular disease, with hypertrophy and dilatation of the heart; but no clue is afforded us by which we can guess when the inflammation of the endocardium, the first in this train of evils, attacked the heart. The constitutional disturbance which attended it was so slight as to escape the mother's notice, and to call for no special complaint from the child: but it is probable, that more watchful care would have taken the alarm at some comparatively slight feverish seizure; that auscultation would have discovered the disease at its commencement; and that treatment would have diminished, though it might not have altogether prevented, the subsequent disorganization of the heart.

The general tendency of the disease in the child, as in the adult, seems to be, to go on from bad to worse; and the endocardium once inflamed, appears to have acquired an increased liability to become the seat of renewed inflammatory action. Thus, a little boy, who came under my notice a few years ago, with all the symptoms of acute endocarditis, with dyspnœa, inability to assume the recumbent posture, palpitation of the heart, and irregularity of its pulsations, extended dulness of its præcordial regions, and a loud bruit accompanying the first sound, was reported to have had a similar attack two years before, from which he had been many weeks before he perfectly recovered. A little girl was attacked, when three and a quarter years old, with slight febrile symptoms, soon followed by uneasiness at the chest, shortness of breath, and palpitation; while a loud bruit, heard both at the base and apex of the heart, showed that its lining membrane had become the seat of disease. The general symptoms were relieved, but the child remained short-breathed and liable to palpitation, and the physical signs of injury to the valves continued unchanged when she was five years old. At the age of seven I saw her again, and learned that she had during the previous two years complained frequently of shortness of breath, and pain in her chest; that she had become unable to walk more than a short distance; while under any unusual exertion her lips and face became quite livid. She was brought to me, however, at this time, in consequence of a sudden aggravation of these symptoms

having followed exposure to cold; which, moreover, had occasioned a very violent cough, and severe pain in the left side. The dulness in the præcordial region now extended over a somewhat larger space than natural, and the first sound of the heart was completely masked at the apex by a loud, harsh, murmur, which was heard in a still harsher key over the aortic valves, and was likewise continued for some distance along the aorta.

The increase of the child's sufferings was but temporary, and when she had regained her usual health, I again lost sight of her for some years. In May 1848, however, I had the opportunity of seeing her, and of again examining her chest. She was then ten years and a half old; tall for her age, and tolerably well nourished, but there was a livid flush constantly on her face; her extremities were cold; her pulse 108, small, and unequal in power. Her mother stated that she was unable to walk a couple of hundred yards without suffering from violent palpitation, and from pain about and across the epigastrium, and that during these attacks she turned quite blue,—symptoms all of which had become much more marked during the preceding twelve months. The dulness in the præcordial region was now very extended; the results of auscultation continued the same, but the hand distinguished a slight *frémissement* when placed over the heart.

It is easy, in this case, to infer from the past, what will be the future history of this poor child. The valvular disease, and the heart's efforts to overcome its consequences, have already led to a considerable degree of hypertrophy of the organ; the danger of each acute attack will be aggravated by the old disease, and every fresh inflammatory seizure will add to the chronic mischief, until in the course of time the disorganization of the heart will have advanced so far as to render it unable to perform its office sufficiently well to maintain existence any longer, and a life of suffering will then be closed by a painful death.

But, you may ask, is a prognosis so gloomy to be formed with reference to every case in which our ear informs us that there is something wrong about the heart? Dr. Latham,—whose name I cannot mention without the expression of respect and gratitude due to one to whose instructions I owe so much,—mentions the case of two young ladies, in whom the auscultatory signs of valvular imperfection have existed from early childhood, but who have never suffered any important disturbance of the general health that could be attributed to it. With reference to these and other similar cases, he says, "Do not these facts give intimation of a certain *protective* power, possibly inherent in the *growing* heart, whereby it can accommodate its form and manner of increase to material accidents, and so repress or counteract their evil tendencies?"*

Cases that seem to show the existence of such a power have come under

* On Diseases of the Heart, vol. i. p. 241-3.

my own notice, and for some months I have been watching a striking illustration of it with much interest. A little girl, six years old, whose health had never been robust, and who had suffered much from measles and scarlatina, and afterwards from attacks of what was said to have been inflammation of the chest, came under my notice at the end of April 1846. She was then labouring under urgent dyspnœa, with symptoms of acute bronchitis, and, in the course of auscultation, a systolic murmur was heard at the apex of the heart. The bronchitic symptoms by degrees subsided, but dyspnœa continued; the child was wholly unable to rest, except when propped nearly upright; she was distressed by palpitation; her cough was frequent, and when worse than usual, she expectorated with it small quantities of florid blood. Her face was pale, but with a livid flush on either cheek; the carotids pulsated visibly, and the jugular veins were distended, while her heart beat at the rate of 150 in the minute. The heart's impulse was increased, and dulness in the præcordial region extended far beyond its proper limits. It was next noted that the smallness of the pulse corresponded ill with the labouring of the heart; and a distinct sense of *frémissement*, when the hand was laid upon the præcordial region, completed the signs of great contraction of the mitral orifice, with hypertrophy and dilatation of the heart. From time to time the child has suffered much since then with a return of her old symptoms; and, after the lapse of twenty months, the bruit still continues: the hand placed upon the cardiac region is still sensible of a distinct purring tremor, and the pulse is exceedingly small and feeble. But the heart no longer labours as it used to do; its pulsations do not exceed 110 in the minute; and though the child is still unable to lie flat in the bed, the distressing orthopnœa has ceased for many months. Her eyelids are no longer puffy, nor her limbs anasarcous, as they were before; her cough troubles her but little, and hæmoptysis is now very rare. She has gained flesh, is cheerful and plays, though not so boisterously as other children might do, yet with such heartiness, that I can scarcely believe her to be the little suffering thing for whom, a year ago, one would have chosen speedy death as the happiest lot that could befal her.

But though this case has made a great impression on me, as seeming to shew how large a power the growing organ possesses to adapt itself to a diseased condition, yet I should fear that the state of almost complete immunity from evil consequences which was the good fortune of the young ladies mentioned by Dr. Latham, must be confined to cases in which nothing existed more serious than some slight congenital imperfection; and that we cannot hope for so happy a result in any instance in which the heart has been damaged by inflammation. The subject is one on which I would speak with great diffidence; but it has seemed to me that, how slight soever the mischief may have been which a first attack of endocarditis inflicted, a second attack is almost sure to be excited by some

most trivial cause, and then a third, until the injury becomes irremediable, and its consequences such as nature, though she may alleviate, is yet unable to remove. If the evil be congenital, the heart may perhaps accommodate itself so completely to it as to do away with all that made it serious; but if the damage be produced by disease, the chances of that disease returning and aggravating it, are so great as to forbid our entertaining sanguine hopes with reference to what nature may be able to effect.

There is one more point to which, before quitting this subject, I must refer, since it tends to give a graver character in every instance to the auscultatory signs of cardiac disease in early life, than belongs to them invariably in the adult. It is unnecessary to describe to you the peculiar murmur heard in the heart and large vessels in the adult, in many cases in which no heart disease exists; but which is associated with a general condition of anæmia, and ceases to be audible when tonic remedies or abundant nutriment have re-invigorated the patient's frame. I have often sought for, but have never heard, those endocardial, arterial, or venous murmurs which are produced by an impoverished state of the blood in children under seven years old; and even at a later period they are exceedingly rare, until that age is attained at which the changes that take place as puberty approaches have already commenced, or are on the eve of beginning. Of the fact I think that I may speak with certainty, but I will not venture to assign a reason for it, since the very slight difference between the composition of the blood in early childhood and in after life can scarcely be regarded as affording a sufficient explanation of it.

It might perhaps seem to you that I had been guilty of a serious omission, if I were to conclude this lecture on the affections of the heart, without some mention of those symptoms which are observed in cases where the heart has been malformed from birth. From one of the most striking of these symptoms—a peculiar lividity of the surface, produced by the circulation through the body of imperfectly aerated blood—the term *cyanosis* has been applied to this morbid condition. It was once supposed that the admixture of venous with arterial blood, owing to the imperfect closure of some of the fœtal passages of communication between the two sides of the heart, was sufficient to produce this livid colour of the surface, and must invariably give rise to it. This, however, is by no means the case, and we are now aware that something more than the mere patescence of the fœtal openings is in general necessary to produce the cyanosis, the cold surface, the occasional attacks of suffocation, and those other symptoms which used to be regarded as characteristic of this defective development. Cases are on record in which such defects have not manifested themselves by any symptoms until the patient had grown up to childhood, or had even attained to adult age; while even then their consequences have sometimes been but slight and of short duration, and have shewn

themselves but seldom; or, on the other hand, having manifested themselves a few weeks before death, they have recurred with ever increasing intensity, until they destroyed life. Nor are these the only circumstances, which render the study of congenital malformations of the heart, difficult and intricate; but diseases acquired in after life sometimes give rise to similar symptoms; and aneurism in the grown person, or valvular disease in the young, occasionally assumes many of the characters that commonly belong to defects in the original structure of the heart. To do justice to the subject, therefore, would require that we should enter upon a field of pathological inquiry, interesting indeed, but in which we should be drawn aside from that special investigation of the diseases of childhood which is our business now.

I shall therefore merely lay before you my personal experience of cases of cyanosis, which is but small, since it includes only one case in which the nature of the affection was demonstrated by examination after death; and another, in which, though the patient still lives, yet her symptoms are so well marked as to preclude much doubt as to their cause.

In the former of these cases the patient was a little girl, whom I saw when she was three months old. She was stated to have been healthy when born, and to have continued so till two months old, when an eruption, apparently of a syphilitic character, broke out upon her body, and her health since then had failed. The condition in which she was when brought to me had been coming on gradually for three weeks. She was small, but not emaciated; her skin pale as marble, and rather cold; her buttocks were covered with the scars of a syphilitic eruption, which had nearly faded. A large purpurous spot on the abdomen, near the umbilicus, surrounded the ill-formed scab of a vesicle which had been situated there. A large ecchymosis had formed in the left hypochondriac region, and another similar one on the left wrist, and the legs were covered with petechiæ. The child seemed feeble, and its cry was very faint. Two days afterwards a slight fit occurred, in which the child died.

The upper lobe of the right lung, and many isolated lobules in the left, were in a state of carnification. The foramen ovale, though not closed, was yet not widely open, while no attempt whatever seemed to have been made to close the ductus arteriosus.

In this case, the livid colour of the surface, often observed when the two sides of the heart communicate freely, was altogether absent, and nutrition seems for a time to have gone on well. At this early period in infantile life a child's movements are but few and slight; and, as no cause arose to disturb the equability of the heart's action, there were no paroxysms of difficult breathing, and no symptoms of threatening suffocation. The temperature, however, was but ill maintained; and when the poison of syphilis had contaminated the blood, nutrition languished; for the circulating fluid was not only imperfectly aerated, but tainted with disease: the strength

failed, the inspiratory effort was no longer adequate to expand the lungs, and the patient died.

The other case was that of a puny, weakly, backward little girl, who came under my notice at three years old, when she was suffering from a severe attack of measles, with bronchitis. She was many months before she regained her health, and it was during her convalescence that the indications of disease of the heart first attracted my attention. She had always been ailing from her birth, and her extremities had habitually presented a deep blue colour, which at some times was much more striking than at others. When four years old, she had become strong and hearty, and very fat; but even then her finger-nails had a deep blue tinge, and the same colour was evident, though in a less degree, about her feet, while she always suffered much from cold. Occasionally she had sudden attacks of uneasiness, which lasted for various periods, were accompanied with complaints of great weariness, and of pain at the epigastrium, and during their continuance the hands, feet, lips, and inside of the mouth, turned of a deep blue colour. At this time a loud bruit accompanied the first sound of the heart, being louder at the base than the apex, continued along the aorta, and heard over the whole of the chest, both in front and behind. The child grew up, and passed through a very severe attack of scarlatina, though she nearly sank under the exhaustion which followed it. At nine years old her health was very good, but she was exceedingly fat, and quite unequal to any exertion. In going up stairs she laboured for her breath, and her face and hands turned blue, while the natural colour of her lips and extremities was very livid, and her surface very chilly. When quite quiet, her respiration was easy, and the sound of puerile breathing was heard throughout both lungs. Her pulse was about 90, small and feeble, and the heart's impulse weak. The results of former auscultations were confirmed, and the bruit was ascertained to be continued along the course of the pulmonary artery, as well as along the aorta. The child is now eleven years old. I often see her, and her condition, which continues just the same, seems to render it probable that, with care, she may reach the ordinary term of human existence.

And now, gentlemen, in bringing this lecture of details to a close, let me make my excuse, in better language than my own, for having to-day brought before you mere isolated facts, rather than a complete description of those diseases with the study of which we have been occupied.

"The subjects of our profession," says Dr. Latham, "require to be treated summarily or in detail, according to the degree of light that is brought to bear upon them from a general pathological principle. If you enter a spacious room with a small taper, you must carry it about and pick your way with it into corners and recesses, and round pillars and projections, and, after all, you will hardly know where you are, and will be lucky if you escape without accidents. But if you enter the same with

a bright burning lamp, you have only to place it on a pedestal, and then stand in the midst and look around, and then you will find all things, great and small, near and remote, brought out equally to view, and will at once understand and admire the beauty and proportions of the whole apartment.

"So it is with our clinical inquiries. We must deal much in detail; we must note cases one by one, while we yet want a great pathological principle which can show their natural relations, and reconcile them together. But once establish such a principle, and it will compass and illustrate perhaps a hundred particulars at once, and render their minuter examination needless and superfluous."

LECTURE XXVII.

Diseases of the Organs of Digestion and Assimilation.—Peculiarities of the digestive organs in infancy—they require a peculiar kind of food, the milk—composition of that fluid, its adaptation for the nutriment of the infant—changes in the digestive organs as the child grows older—these changes take place more slowly in the human subject than in animals.

Evils of giving other food than the mother's milk until the infant is old enough to bear it—shewn by the increased mortality it produces—different modes in which such food acts injuriously—appearances found in bodies of children who have died from imperfect nutrition.

Great importance of infants being suckled, even for a short time—rules for management of children whose mothers are unable to suckle them—substitutes for mother's milk—caution with reference to occasional unhealthy condition of cows' milk.

We prefaced our investigation of the diseases of the nervous and respiratory systems with an inquiry into the peculiarities of structure and of function which characterize those organs in early life. A similar inquiry will not be out of place now, as preliminary to the study of the *diseases of the organs of digestion and assimilation, and their dependencies.*

Man, when he has attained to maturity, is able to support his life, and to preserve his health, upon food of various kinds; and the structure of his organs is such as to enable him to live upon an exclusively animal diet, or upon food furnished entirely by the vegetable kingdom. We know that in either case the ultimate elements from which the body is nourished are the same; but that while in the former instance they are furnished as it were ready to hand, they have in the latter to be eliminated by nature's chemistry, through a process which occupies much time, and which requires considerable complexity in the apparatus that effects it.

Those powers, however, of which the adult is possessed, belong in but comparatively small measure to the infant. The growing animal, indeed, needs proportionably more food than the adult, for not merely is the daily waste to be repaired, and that constant reproduction of the tissues to be provided for which is essential to the maintenance of vitality in all parts of the body, but each day is to bring with it an increase in size and

stature. But though in early life an ample supply of food is so necessary, yet the organs by which it is to be assimilated, like those which have other offices to perform, are at that time frail and delicate, and must not be overworked. Their development is incomplete, not in strength only, but also in form.* The peculiarities which characterize the digestive process in ruminants do not begin till some time after birth: the fourth stomach is the only one called into use, the others are little more than indicated in the new-born animal. In the *infant*, too, *the form of the digestive organs*, as well as their feeble muscularity, shows them to be unsuited for food, which needs to pass through a long process of preparation within the body before it becomes fitted to nourish it. The shape of the human stomach in the first month of existence approaches that which it retains through life in carnivora, in whom the process of digestion is more simple than in any other mammalia. It is long, but little curved, growing narrower toward either end, where it passes into the œsophagus on the one hand, and into the intestine on the other. Its small curvature is but little arched, and approaches nearly to a straight line; the large curvature is but slightly developed, and runs almost parallel with the other,—characteristics which are all found in the stomach of carnivorous animals. Compare with this the form of the stomach in the adult. It is altogether more rounded: the œsophagus no longer enters at its left extremity, but nearly midway between that point and the pylorus. The pylorus itself is drawn back towards the cardia, and the two orifices are thus brought near to each other: hence the small curvature is very short; the great curvature of considerable extent, forming not merely the whole under part of the circumference of the stomach, but likewise bounding the whole of that pouch which is situated beyond its cardiac orifice. Besides this, too, the transition from the pylorus to the intestine is gradual in the child, while in the adult the demarcation between stomach and intestine is well marked. The result of all this is, that in the adult, who is an omnivorous animal, the stomach presents a form not unlike that which it has in some of the rodents—as the rat and the rabbit, and that the food in the course of digestion undergoes somewhat of a rotatory motion, not the simple onward movement which is communicated to it in the stomach of the carnivora. The stomach in the adult, then, is framed to act upon substances which may require some time for their digestion, while that of the infant is ill suited to retain matters long within it, and its small size unfits it for receiving much at once. If, therefore, the food given to an infant be such as it can digest with facility, it soon passes out of the stomach, and the

* Many of the facts mentioned concerning the peculiarities of the digestive organs in early life, are to be found in Burdach's Physiologie, vol. iii. § 512 to 540; and in Schultz's essay, Ueber den Akt des Erbrechens, &c. in the Analekten ueber Kinderkrankheiten, vol. ii Heft vi. p. 62.

infant speedily seeks for more. Nor are these arrangements calculated for the rapid digestion of easily assimilated food, confined to the stomach of the infant, but the form and proportions of the intestines correspond thereto: the small intestine is of relatively shorter length than in the adult; the large intestine of smaller calibre; the cæcum less developed; whilst the peristaltic action of the bowels is more rapid than in later life; excrementitious matters are quickly expelled, and the healthy infant passes three or four evacuations in the twenty-four hours.

But while the digestive organs of the young of all mammiferous animals are thus adapted to ensure the rapid performance of their functions, and to provide for the quick as well as for the complete nutrition of the body, the question naturally suggests itself, where shall that food be found, which, while it yields the necessary sustenance, is yet so easily assimilated as not to require powers of which the delicate organs of the young are destitute? We should search in vain through the animal and vegetable kingdom for any substance completely fulfilling these conditions, had not nature supplied the want, and given to every mother the means of herself nourishing her young.

Milk, the proper aliment of the young, expressly prepared for it within its mother's organism, contains, ready combined, all those elements which are necessary, whether for its growth or for the maintenance of its proper temperature, by serving as materials for respiration. The mean of 14 analyses of human milk, by the late Professor Simon, of Berlin,* yields the following result:—It is composed of

Water	883·6
Solid matters	116·4

100 parts of these solid constituents are made up of

Casein	31·2
Butter	23·0
Sugar of milk, and extractive matter	43·8
Incombustible salts	3·0
	100·0

How small must be the effort needed to effect the assimilation of this fluid! The chief of its solid constituents, the casein, differs little, if at all, from the albumen of the blood, while in combination with it is a considerable quantity of the phosphate of lime—a salt that enters largely into the composition of the bones. Among its other components we find butter

* The statements with reference to the chemistry of the milk are taken from Scherer's article "Milch," in Wagner's Handwörterbuch der Physiologie, Part 10.

and sugar, the former of which, probably, in part, contributes to the formation of the fat which is so abundantly deposited in the healthy infant, while the remainder of it supplies materials for the generation of heat, by being resolved, together with the saccharine matter, into its ultimate elements of carbonic acid and water. This food, too, is not merely suitable for the infant soon after birth, but it continues to be the aliment most proper for it for many months; the casein increasing in quantity as the infant grows older, and the demand for materials to maintain its growth increases.

By degrees the stomach alters in form: its muscularity increases; the powers of the digestive organs become greater, and the child becomes able to derive support from food in which the nutritive principles are not presented in so simple a form as in the milk. At the ninth month teeth begin to appear; the first clear evidence of those changes which nature is working in the organism, and the indication that before very long the child will be able entirely to dispense with that elaborately prepared nourishment, which it has hitherto derived from its mother. In the human subject the process of dentition not only begins late, but it goes on slowly; the first molar tooth is seldom cut before the commencement of the second year: dentition is not concluded till its end. Nature's object in the laws by which she governs the brute creation, appears to be to fit the young animals as soon as possible to provide for themselves, and to shorten the period during which they must depend for sustenance on their mother, and, therefore, they begin to cut their teeth much sooner, and the process is complete within a much shorter time, than in the infant. Young rabbits are already provided with two teeth when born, and the others make their appearance within ten days; in the different ruminants, the teeth have either begun to appear before birth, or they show themselves a few days afterwards, and in either case dentition is completed within the first month; and in dogs and cats during the first ten weeks of existence.

For the difference in this respect between the lower animals and man, it seems to me that a moral reason, not altogether visionary, may be assigned. The young animal has to learn nothing more than how to apply those instincts, with which Almighty power has endowed it, for its own support, and the perpetuation of its species. But the infant is to be trained to become a man: its moral as well as its physical nature is to be cultivated: parental influence is to be the means of doing this; and Providence may have wisely determined that the infant shall for months be dependent on its mother for support, in order that her instinctive feelings may lay the firm foundation of that love which causes her to cling to her little one with a fondness that surpasses all other affection, and which gives her the patience, the gentleness, the untiring energy, that make her the child's best guardian, friend, and teacher, during its early years.

But whether it be right or wrong to seek in something higher than the

material, for the reasons of this physical law, it yet is a law, and one which cannot be violated with impunity. The infant whose mother refuses to perform towards it a mother's part, or who, by accident, disease, or death, is deprived of the food that nature destined for it, too often languishes and dies. Such children you may often see, with no fat to give plumpness to their limbs,—no red particles in their blood to impart a healthy hue to their skin,—their face wearing in infancy the lineaments of age,—their voice a constant wail,—their whole aspect an embodiment of woe. But give to such children the food that nature destined for them, and if the remedy do not come all too late to save them, the mournful cry will cease, the face will assume a look of content, by degrees the features of infancy will disclose themselves, the limbs will grow round, the skin pure red and white; and when, at length, we hear the merry laugh of babyhood, it seems almost as if the little sufferer of some weeks before must have been a changeling, and this the real child brought back from fairy-land.

Much care, much patience, judicious management in all respects, may, indeed, counteract the otherwise inevitable evils that result from the attempt to bring up infants by hand. The statement, however, just made with reference to the hazard of such an experiment, and to the evil consequences that almost of necessity attend it, is by no means overcharged. M. Villermé, one of the most distinguished statisticians of France, has compared the results of the two systems as followed in three of the principal foundling hospitals in that country.* At Lyons, each infant, on its reception, is given into the charge of a wet nurse, and its stay in the hospice does not exceed a very few days, after which it is sent to be nursed in the country. At Rheims, the stay of the infant in the hospice is equally short; but neither while there, nor afterwards when at nurse in the country, is it brought up at the breast. At Paris, the stay of the children in the hospice is often very much longer, but they are usually, though not invariably, suckled by wet nurses. The mortality under 1 year of the children admitted into these institutions is—

At Lyons	33·7	per cent.
" Paris	50·3	"
" Rheims	63·9	"

These results need no comment, and render it almost unnecessary to adduce any farther evidence of the dangers that are inseparable from the attempt to bring up infants on artificial food. One more illustration of the fact, however, may be adduced from the work of a benevolent ecclesiastic, M. Gaillard, on the foundling hospitals of France. He observes—

* De la Mortalité des Enfans Trouvés, in the Annales d'Hygiène, vol. xix. p. 47. Further information on this and other allied subjects, will be found in a review of the works of Terme Monfalcon and others on the Foundling Hospitals of France, published by the author in the British and Foreign Medical Review, for April 1842.

"At Parthenay, in the department of Deux-Sevres, of 153 foundlings, 54 died between the ages of one day and twelve months, or 35 per cent., which is a higher proportion than that presented at Poitiers. At X——, of 244 new-born infants, 197, or 80 per cent., had died by the end of the first year. Struck by the enormous difference between this rate of mortality and that afforded by the hospices at Poitiers and Parthenay, I determined to investigate its cause. I ascertained that in this hospice as much attention is paid to the children, and the nurses are under as strict oversight, as at Poitiers and Parthenay. But at X—— none of the children are suckled, but all are fed; and the reason assigned for so doing is the fear of infecting the nurses with syphilis. Be this as it may, I have been assured by many persons connected with the institution, that the fearful mortality just mentioned, can be attributed to no other cause than the practice of not suckling the children. The officers of the hospice have tried all means to remedy this evil, but neither their own efforts nor those of some most excellent female assistants have been of the slightest service; and the only measure by which they could reduce the mortality, was the having recourse to suckling the children by wet nurses."*

It can hardly be necessary to say that these statements are not to be taken as representing the ordinary mortality among infants brought up by hand, since many causes will suggest themselves to you as concurring to render the life of foundlings especially precarious. Neither, indeed, is the whole of the mortality among other children who have been deprived of the mother's milk to be attributed to the food which is substituted for it; but in many cases, if the mother do not suckle her infant, she delegates to another the performance of her other maternal duties, and the baby is left to languish in the house of a stranger. That this cause is very influential in producing a high rate of mortality among infants, appears from the fact mentioned by M. Benoiston de Chateauneuf,† that, while among children suckled by their mothers only 18·36 per cent. die within a year after their birth, 29 per cent. of those put out to wet-nurse die during the same period.

It is not enough, however, for us to know that food other than the mother's milk is injurious to the young infant; but it behoves us, both as physiologists and as physicians, to push our inquiries further, to ascertain as far as possible the means by which this injurious effect is produced, and to determine what organs of the body suffer most severely, and the mode in which they are affected. Unfortunately, the information which I am able to give you on these points is much less definite than I could wish; for the evils that result from improper food in infancy do not, like some diseases, arrest attention by their alarming symptoms, or by their rapidly

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* Recherches sur les Enfans Trouvés, &c. par l'Abbé A. H. Gaillard, 8vo. p. 166. Paris, 1837.

† Considérations sur les Enfans Trouvés, 8vo. p. 57. Paris, 1824.

fatal result, and hence they have received less than their due share of notice.

If *improper food* be given to an infant, the contractions of the stomach are in general speedily excited, and the food is rejected. Owing to the form of the stomach in infancy, and the position which it occupies in the abdomen—approaching to the perpendicular rather than the transverse—vomiting is then attended with little distress : the child eructates the food almost without effort, and in a few minutes seems well again. This eructation of a portion of its food may indeed be noticed even in infants at the breast, who have either sucked more than their stomach can conveniently hold, or whose digestive powers are temporarily weakened by some trivial ailment. But the hint which nature gives is too often thrown away on those who have the charge of the infant. Food of the same kind is given again, perhaps in smaller quantity, or with some slight difference in its mode of preparation, and part, or the whole of it, is now retained. The shape of the organ, however, does not allow of substances remaining long within it ; and hence those which need much time for their digestion, if not rejected by vomiting, pass the pylorus while that process is but half completed. Unfortunately the farinaceous articles of food which are so often selected, on account of their supposed lightness, as fit to form the almost exclusive diet of infants, belong to the class of substances that are assimilated with difficulty ; so that a large proportion of the contents of the stomach, in the young child brought up by hand, enter the duodenum in a state wholly unfit to be acted on by the bile. The intestines become irritated by these undigested matters ; and, in the effort to get rid of them, diarrhœa is excited ; while, if not speedily expelled, they pass into a state of fermentation or putrefaction, and thus produce those horribly offensive evacuations which are frequently voided by children under these circumstances.

It would be natural to expect that a child should lose flesh and strength even if the food given to it were no otherwise objectionable than as being difficultly digested. The stomach, indeed, becomes in time more accustomed to it ; and it has been stated* that its form sometimes undergoes a change by which it approximates to that of the stomach in the adult, or even in the herbivorous quadruped, and thus becomes able to retain food within it for a longer time. But even though this change took place to a much greater degree than there seems reason for believing to be the case, the evil of such a diet would not be half remedied ; for not only are the sago, arrow-root, or gruel, with which the child is fed, in themselves less easy of digestion than the milk, which is its proper aliment ; but, when reduced to their ultimate elements, they present essential differences from it, and differences by which they are rendered so much the more inapt to nourish the body

* Schultz, loc. cit. p. 74-5.

during the period of its most active development and growth. It would be out of place to enter here into minute details with reference to the physiology of digestion, or the composition of different articles of food, in order to illustrate this subject; neither, indeed, is it necessary to do so. You are aware that physiological and chemical research has proved that food has to answer two distinct purposes in the organism: the one to furnish materials for the growth of the body; the other to afford matter for the maintenance of its temperature; and that life cannot long be supported, except on a diet in which the elements of nutrition and the elements of respiration bear a certain proportion to each other. Now in milk, the proper food of infants, the elements of the former are to those of the latter, according to the approximative estimate of an English chemist,* in the proportion of 1 to 2; while in arrow-root, sago, and tapioca, they are only as 1 to 26, and even in wheaten flour only as 1 to 7. If to this we add the absence in these substances of the oleaginous matters which the milk contributes to supply the body with fat (and which can be eliminated from farinaceous substances only by a conversion of their elements, to which the feeble powers of digestion in early life are not equal,) and the smaller quantity, and, to a certain extent, the different kind of the salts which they contain, it becomes at once apparent that by such a diet the health, if not the life, of the infant must inevitably be sacrificed. The body wastes most rapidly; for it is forced from its own tissues to supply the nitrogenous elements essential to the maintenance of life, and which its food contains in far too scanty a proportion. Every organ in the body contributes to the general support, and life is thus prolonged, if no kind disease curtail it, until each member has furnished all that it can spare, and then death takes place from starvation; its approach, indeed, having been slower, but the suffering which preceded it not therefore less, than if all food had been withheld.

I have dwelt at length upon this, which is the most frequent cause of the *atrophy of new-born children:* but similar effects are produced when, from any other reason, an infant is imperfectly nourished, whether, as sometimes occurs, the mother's milk is so deteriorated as to be unsuitable for its support; or whether, as oftener happens, the child having been weaned prematurely, its digestive organs are unequal to the task of assimilating the food that has been substituted for the mother's milk. In both cases the abdominal viscera become disordered, nutrition is ill performed, and the child falls ino a state of atrophy.

On examining after death the bodies of children who have died under these circumstances, the complete absorption of all the fat, and the removal of much even of the cellular tissue, is the point that first attracts our

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* Dr. R. D. Thomson, On the Relation between the Constituents of the Food and the Systems of Animals, in vol. xxix. of the Medico-Chirurgical Transactions.

notice. The thoracic viscera present no unnatural appearance, unless it be that large portions of the lungs are sometimes found in a state of collapse. There is also seldom anything unnatural in the condition of the liver, except the congested state of the organ, the vessels of which, being often loaded with venous blood, form a marked contrast with the generally anæmic appearance of the other viscera. The gall-bladder is usually full of bile, probably because, as in the case of persons who have died of inanition, the empty stomach has long ceased to stimulate it to contraction by its movements. The stomach and small intestines are in general nearly empty; the fundus of the stomach is sometimes found more or less softened, a condition, the occurrence of which after death, is probably favoured by the tendency of those kinds of food that are usually given in early life, to pass into a state of fermentation, in the course of which an acid is produced which is capable of dissolving the animal tissues. In some instances in which children have been fed on an exclusively farinaceous diet, the mucous membrane, even low down in the intestines, has been found covered with a thin coating of starch, which presented the characteristic blue colour when tested with iodine.* The intestines are generally pale, though with patches intermingled of a red or dark grey colour; besides which small circumscribed spots of bright vascularity are sometimes interspersed through the small intestines, being especially evident at their upper part. Peyer's glands usually appear much more prominent than is natural; sometimes they are of a brighter red than the surrounding intestine, and somewhat swollen, and sometimes they are of a dark grey tint, and present a singular, punctated, appearance. In the large intestines there is also sometimes a remarkable development of the solitary glands, the dark orifice of which renders them very evident; and in a few instances they become still more apparent from the mucous membrane immediately around each presenting a dark grey colour. The appearances, in short, are those of general inanition, coupled with the signs of irritation or inflammation of the whole secreting apparatus of the intestinal canal.

The full consideration of every question connected with the imperfect nutrition of infants, would require little else than a complete treatise on *the dietetics of early life*. In these lectures I can aim at nothing more than to bring before your notice a few points of the greatest importance.

Although it is very desirable that for the first six months of their existence children should derive their support entirely from their mother, and that until they are a year, or at least nine months old, their mother's milk should form the chief part of their food, yet many circumstances

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* According to some experiments by M. Guillot, of Paris, referred to by Dr. Stewart, of New York, in a paper republished from an American Journal in the Dublin Medical Journal, March 1845.

may occur to render the full adoption of this plan impracticable. In some women the supply of milk, although at first abundant, yet in the course of a few weeks undergoes so considerable a diminution as to become altogether insufficient for the child's support; while in other cases, although its quantity continues undiminished, yet from some defect in its quality it does not furnish the infant with proper nutriment. Cases of the former kind are not unusual in young, tolerably healthy, but not robust women; while instances of the latter are met with chiefly among those who have given birth to several children, whose health is bad, or whose powers are enfeebled by hard living or hard work. The children in the former case thrive well enough for the first six weeks or two months; but then, obtaining the milk in too small a quantity to meet the demands of their rapidly growing organism, they pine and fret, they lose both flesh and strength, and unless the food given to supply their wants be judiciously selected, their stomach and bowels become disordered, and nutrition, instead of being aided, is more seriously impaired. If, however, a healthy wet nurse be employed to supply the mother's inability to nourish her child, its health will soon return; and by the sacrifice of the infant of the poor woman, the offspring of the wealthy will be preserved. But many circumstances besides those moral considerations, which should never be forgotten before the determination is formed to employ a wet nurse, may put this expedient out of the question; and it becomes, therefore, our duty to inquire what course a mother should pursue, who has learnt by experience that she is unable to suckle her child for more than a very short period.

Knowing the attempt to rear her child entirely at the breast to be vain, the mother may in such a case naturally be tempted to bring it up by hand from the very first. But, how short soever the period may be during which the mother is able to suckle her child, it is very desirable that she should nurse it during that period, and also, that her milk should then constitute its only food. For the first four or five days after the infant's birth the milk presents peculiar qualities, and abounds in fatty and saccharine matters, and is found to exert a mild purgative action on the infant. It afterwards loses these characteristics, but still, during the first few weeks of life, it contains casein in smaller quantities than enter into its composition at a later period. The secretion, in short, is especially adapted to the feeble powers of the digestive organs soon after birth; and hence, the difficulty of providing any good substitute for it, is greater in proportion to the tender age of the infant, while art often imitates but ill, that gradual increase of the casein, by which the main element of the infant's sustenance is made to bear a constant proportion to the demands of its daily growth.

The same course of conduct would be proper in the case of women whose milk is of so poor a quality that their infants do not thrive upon it,

since, though its deficiency in casein may render it unfit for the permanent support of the child, yet that circumstance will not prove prejudicial to it during the first few weeks of its existence.

In both of these cases, however, it is only for a season, and usually a very brief season, that the mother is able to suckle her infant with advantage; while instances are by no means rare in which the important question of the *best substitute for the mother's milk*, has to be answered within a few hours after the infant's birth. It is obvious that the more nearly the substitute that we select approaches to the character of the mother's milk, the greater will be the prospect of the attempt to rear the infant upon it proving successful. Discarding, therefore, all those preparations of arrow-root, flour, or biscuit powder, in which the vulgar repose such confidence, we shall not need any laboured argument to convince us, that in the milk of some other animal we shall be likely to find the infant's most appropriate food. You will perceive, however, by the subjoined table, that there are many important differences between the milk of all the domestic animals and of the human female, while the infant who is fed upon the milk of any of them, loses those advantages which, when it is suckled by its mother, result from the gradual change that takes place in the proportion of its constituents as the infant advances in age.

Table shewing the Composition of the Milk in Man and in various Animals.

	100 parts contain—		100 parts of the solid constituents contain—			
	Fluid.	Solids.	Casein.	Butter.	Sugar and Extractive Matters.	Salts.
In Man	883·6	116·4	31·2	23·0	43·8	2·0
" the Cow	842·0	158·0	42·1	28·1	23·9	5·7
" " Ass.....	907·0	93·0	18·0	13·2	68·5	
" " Goat	865·0	134·0	41·1	28·0	30·0	
" " Ewe	856·2	143·8	31·2	29·2	34·7	4·7

The expense of asses' milk, which, from the small quantity of casein that it contains, is especially fitted for young or delicate infants, unfortunately prevents it being generally employed; and in the majority of instances in which children are brought up by hand, cow's milk is used as being the most easily procured. As this, however, contains more casein than human milk, and less sugar, it is necessary that it should be given in a diluted state, and slightly sweetened. The degree of dilution must vary according to the infant's age; at first, the milk may be mixed with an equal quantity of water, but as the child grows older, the proportion of water may be reduced to one-third. Attention must be paid to the temperature of the food when given to the infant, which ought to be as nearly as possible the same as that of the mother's milk, namely from 90° to 95°

Fahrenheit; and in all cases in which care is needed, a thermometer should be employed in order to ensure the food being always given at the same temperature. Human milk is alkaline, and even if kept for a considerable time it shews but little tendency to become sour; the milk of animals in perfect health likewise invariably presents an alkaline reaction, and that of cows when at grass forms no exception to this rule. Comparatively slight causes, however, exert a marked influence upon the milk of the cow in this respect; and if the animal be shut up and stall-fed, its milk almost constantly acquires a strongly acid property*—a fact which of itself is sufficient to account for the symptoms of gastric and intestinal disorder so often produced by it in the case of children brought up in large towns. Whenever, therefore, the attempt is made to rear an infant by hand, under circumstances which render it impossible to obtain the milk of cows which are at pasture, it is desirable that the milk should be daily tested, and that any acidity should be neutralized by the addition of lime water or of prepared chalk, in quantity just sufficient to impart to it a slightly alkaline reaction. If the bowels be disposed to be constipated, carbonate of magnesia may be substituted for the chalk. Unfortunately, there seem, as I stated a day or two ago, to be good reasons for believing that the milk of stall-fed cows often undergoes a deterioration much more serious than the merely becoming ascescent; and that changes not unfrequently take place in it such as must render it wholly unfit for an infant's food, and calculated only to promote disease. The possibility of their occurrence shews the necessity, when an infant who is brought up by hand fails in health, for making a careful inquiry into the source of the milk with which it is fed; and for examining the fluid, both chemically and under the microscope, before proceeding to prescribe remedies for ailments which may be caused entirely by the unwholesome nature of its food.

It may suffice for to-day, thus to have brought before you the main principles by which you must be guided in the attempt to rear a young infant by hand. Details as to the general dietetic management of infancy or childhood would not only carry us beyond the period allotted for this lecture, but would be a departure from our special object of investigating the *diseases* of early life.

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* See the results of Dr. Mayer's observations on cows in Berlin and its neighbourhood, in a valuable paper on the Artificial Feeding of Infants, in the first volume of the Verhandlungen der Gesellschaft für Geburtshülfe in Berlin, 8vo. p. 56. Berlin, 1846.

LECTURE XXVIII.

Atrophy of young children—not a special disease, but a condition that may be induced by various causes.

Peculiar affection of mouth often associated with impaired nutrition—aphthæ and muguet—different degrees of same affection—conflicting opinions as to nature of the deposit—treatment.

Dentition—high rate of mortality while it is going on—erroneous views with reference to the cause of this, and to the nature of the process—physiology of dentition—order of appearance of the teeth—pauses in their evolution—frequently attended with local suffering—various morbid conditions of mucous membrane of the mouth excited by it.

Management of children when teething—circumstances under which lancing the gums is likely to be useful—dietetic and medical management—treatment of affections of the mouth—caution with reference to cure of cutaneous eruptions during the time of teething.

At our last meeting we were occupied with various preliminary inquiries, of importance to the thorough understanding of the diseases of the digestive organs in early life, on the study of which we are now about to enter. We examined the structural and functional peculiarities of those organs in the young, and endeavoured to ascertain wherein consists the special fitness of the mother's milk for the nutriment of her infant. We further tried to discover the mode in which other food acts injuriously on the infant, and sought from the knowledge thus acquired to deduce rules for our guidance, whenever it should become necessary to provide a young child with a substitute for that sustenance which nature intended that it should receive.

These considerations naturally brought under our notice the symptoms which betoken that the process of nutrition is imperfectly carried on, and the appearances which, when death takes place from this cause, are revealed on an examination of the body. It may seem to you, however, that the *atrophy of young children* calls for a more elaborate study than ours of yesterday, and for a more minute account of its symptoms. But to attempt this would be to enter upon almost endless details, which would leave upon your memory no clear impression. Whether all food is withheld from an infant, or whether it is supplied with food which it

cannot assimilate, or whether disease prevents it from digesting food on which a healthy infant would thrive, the main result is the same, and the child dies of inanition. Various accidents may abridge the infant's life, or make it sink, in one case, under circumstances somewhat different from those which precede its death in another. Sometimes the vital powers grow so feeble, that the inspiratory efforts no longer suffice to fill the lungs with air; sometimes the irritable stomach rejects all food, while at other times diarrhœa comes on which no medicine can check. But in these symptoms there is nothing characteristic of one special cause,—they may occur alike in the infant who, though healthy when born, was early deprived of its mother's milk, or in the child who is the subject of general tuberculous disease, or whose strength has been exhausted and its digestive powers impaired by dysentery. The symptoms, then, that accompany the atrophy of new-born children must be expected to vary much in different cases; while the considerations brought before you in the last lecture will, I think, furnish you with a clue to the complete understanding of them all.

Before we pass, however, to the special study of the diseases of the digestive organs and its appendages, I would beg to call your attention to a *peculiar condition of the mucous membrane of the mouth*, which is so frequently met with in connection with the artificial feeding of young infants,—so almost invariably associated with the evidences of their impaired nutrition, that the present seems to be the best time for noticing it.

If you examine the mouth of a young infant on whom the attempt is being made to bring it up without the mother's milk, you will often observe its mucous membrane to be beset with numerous small white spots, which look like little bits of curd lying upon its surface, but which on a more attentive examination are found to be so firmly adherent to it, as not to be removed without some difficulty, when the subjacent membrane is left of a deep red colour, and often bleeding slightly. These specks appear upon the inner surface of the lips, especially near the angles of the mouth or the inside of the cheeks; and upon the tongue, where they are more numerous at the tip and edges than towards the centre. They are likewise seen upon the gums, though less frequently, and in smaller number. When they first appear, they are in general of a circular form, scarcely larger than a small pin's head: but after these *aphthæ*, as they are called, have existed for a day or two, some of the spots become three or four times as large, while at the same time they in general lose something of their circular form. By degrees these small white crusts fall off of their own accord, usually leaving the mucous membrane where they were seated redder than before—a colour which gradually subsides as the mouth returns to its natural condition; or the white specks are reproduced, and again detached several times before the membrane resumes its healthy

aspect. In some cases these specks coalesce, or the deposit, from its first appearance, presents more of the character of a false membrane ; and the mouth is then seen to be extensively coated with it. Under these circumstances, the deposit generally loses something of the dead white colour characteristic of the smaller spots, and presents a slightly yellowish tint. The smaller spots constitute the disease called *aphthæ* or *thrush :* the more extensive deposits were once supposed to depend on a different malady, the *muguet* of French writers.

Children in whom either form of this deposit exists in any considerable degree, usually appear out of health, and it will generally be found on inquiry that this indisposition had preceded for some days the eruption in the mouth. For the most part such children are emaciated, and present those symptoms that attend upon imperfect nutrition, while the bowels are in general relaxed, and the evacuations of a green colour, and very sour. The acridity of the motions sometimes irritates and inflames the margins of the anus, and a blush of erythematous redness not infrequently extends over the nates and buttocks, while in some instances a deposit of a similar kind to that in the mouth occupies the edges of the intestine. The deposit in the mouth sometimes renders sucking very difficult, and may even impair deglutition, while the child, thus obtaining but little food, lies in a state of torpor and drowsiness, the result of its debility.

In its more serious form, as *muguet*, this affection was said to prove fatal to a large number of the inmates of the different foundling hospitals on the continent. Observation has shown, however, that although the deposit exists in the mouth of very many children who die in those institutions, yet their death is due not to the local affection, but to the constitutional disease of which that is only one out of many evidences.

At the time when the local affection was regarded as in itself of such grave import, every inquiry into its nature presented a degree of practical importance, which no longer attaches to it. The differences between that slight ailment, the simple thrush, in which the deposit appears in the form of a number of isolated specks, and the more serious affection, the *muguet*, in which it completely lines the mouth, were thought to be differences of kind, not merely of degree. This opinion is now, however, ascertained to be erroneous ; and though observers are not yet quite agreed as to the intimate nature of the deposit, yet its identity in both cases is no longer matter of dispute. The microscope has not yet cleared up all doubts with reference to its nature, and while some persons are disposed to regard the deposit as being a parasitic growth, like the muscardine which attacks the silk-worm, or the confervæ found on other living animals, other observers look upon it as a false membrane similar to that of diphtheritis or croup, and consider that the development of confervæ in its substance is an

accidental occurrence, and one which is frequently absent.* According to the former opinion, the white deposit is made up of epithelium thickened by swelling of its cells, in the midst of which a parasitic growth is developed in greater or less abundance, so that the aphthous mass is composed partly of this microphyte, partly of epithelial cells. The relation of the two elements to each other, varies according to the duration of the disease and the age and constitution of the patient, but the development of the aphthophytes, as this growth has been termed, is regarded as essential to the production of the affection.

On the other hand, the existence of the vegetable parasite has been considered to be purely accidental, the disease consisting, according to this view of its nature, essentially in the formation of a false membrane beneath the epithelium; this adventitious production serving as a nidus for the parasitic growth which under favourable circumstances may be developed in it. The fibrils observed in the deposit, which by some persons have been regarded as proving it to be in reality a vegetable parasite, are stated by the opponents of that view to be nothing more than very delicate fibres, having a parallel arrangement, and owing the branched appearance which they sometimes seem to present entirely to an optical illusion.

I cannot pretend to decide, from personal observation, the point at issue between the supporters of these two conflicting theories, but my opinion decidedly leans to the adoption, as generally correct, of that view which sees in the deposit of aphthæ and muguet the result of an inflammatory process ending in the formation of false membrane, wherein a parasitic growth may become developed. The endemic prevalence of the affection in foundling hospitals, and other similar institutions, may be accounted for by the noxious influences to which infants are there subjected, and which, as we have already seen, in the case of diphtheritis and of malignant coryza, are favourable to the formation of false membranes upon the different mucous surfaces. The frequency of the parasitic growth in the false membrane is possibly dependent on the actual transplantation of its sporules from one patient to another by means of the cups, spoons, &c. used by them in common, and generally without sufficient attention being paid to ensure their perfect cleanliness. Whether, in any case, the deposit of these sporules upon the surface of the healthy mucous membrane is followed by the development of the confervæ and the alteration of the epithelium of the mouth, is a question to which it is not possible at present

* Not to encumber this lecture with the citation of authorities, it may suffice to refer to the essay of Dr. Berg, of Stockholm, analyzed in the Journal für Kinderkrankheiten for September and October 1847, as an able defence of the first-mentioned opinion; and to the papers by Dr. Kronenberg, of Moscow, in that journal for February and September of the same year, for observations and arguments tending to support the opposite view. With reference to the production of confervæ on the mucous surfaces of the human body in disease, the fullest account is given by Hannover, in Müller's Archiv. for 1842, p. 281.

to give a satisfactory reply. For my own part, I should greatly hesitate to answer it in the negative.

In the *treatment* of this affection, the removal of the constitutional disturbance is of at least as much importance as the ministering to the local malady. It is, however, only the local treatment that it will be expedient to dwell on here, since the general management of the case must vary as widely as the causes to which the affection of the mouth is due. One point of considerable moment, and to which less care than it deserves is usually paid, is the removing from the mouth, after each time that the infant is fed, all remains of the milk or other food which it has taken. For this purpose, whenever the least sign of thrush appears in the infant, the mouth should be carefully wiped out with a piece of soft rag, dipped in a little warm water, every time after food has been given. Supposing the attack to be but slight, this precaution will of itself suffice in many instances to remove all traces of the affection in two or three days. If, however, there be much redness of the mucous membrane of the mouth, or if the aphthous spots be numerous, some medicated topical application is useful. Various detergents have been recommended, among which the mel boracis, and a mixture of the Armenian bole with honey, are very frequently employed. An objection, however, has been raised to any application into the composition of which honey or other saccharine matters enter, on the ground that the tendency of those substances to pass into a state of fermentation will make them favour rather than prevent the formation of confervæ in the interior of the mouth. Without determining the precise value of this objection, it will yet, I think, be found that water is the best menstruum for any local application to the mouth. It is my custom to dissolve a scruple or half a drachm of borax in an ounce of water, and to direct that after the mouth has been carefully cleansed with warm water, the lotion should be applied to it on a piece of lint or soft linen. In the milder forms of the affection, this borax lotion usually answers every purpose. Should it, however, appear insufficient, a solution of five grains of the nitrate of silver in an ounce of distilled water, may be employed in the same way twice a day, while at other times the solution of borax may be used in the manner just directed.

The close connection that subsists between this local affection and the condition of generally impaired nutrition, which engaged our attention yesterday, induced me to bring the subject now under your notice. I do not know, however, that any better plan can be adopted, in studying the diseases of the organs of digestion and assimilation, than closely to follow an anatomical arrangement, and to consider, first, the diseases of the mouth, then those of the stomach, then those of the intestines, and lastly those of the other abdominal viscera.

It may, perchance, seem to you that, according to this plan, it is not

proposed to assign any place of importance to the disorders of *dentition*, though in our tables of mortality we find teething registered as having occasioned the death of nearly 5 (4·8) per cent. of all children who died in this metropolis under one year old, and of 7·3 per cent. of those who died between the age of twelve months and three years. Many other circumstances, too, tend to increase the impression which this fact naturally makes; for not only do nurses attribute to teething the most varied forms of constitutional disturbance, and mothers express serious apprehensions as the period of dentition approaches, but medical men hold forth to anxious parents the expectation that their child will have better health when it has cut all its teeth. The time of teething, too, is in reality one of more than ordinary peril to the child, though why it should be so is not always rightly understood. It is a time of most active development of the organism—a time of transition from one mode of being to another, in respect of all those important functions by whose due performance the body is nourished and built up. Statistics,* embracing the largest numbers, prove the dangers of the period, and warrant us in regarding the completion of the process as fair subject for congratulation.

The error which has been committed with reference to this matter, not merely by the vulgar but by members of our own profession also, consists, not in overrating the hazards of the time when changes so important are being accomplished, but in regarding only one of the manifestations—though that, indeed, is the most striking one—of the many important ends which nature is then labouring to bring about. A child in perfect health usually cuts its teeth at a certain time and in a certain order, just as a girl at a certain age presents the various signs of approaching puberty, and at length begins to menstruate. In her case we do not fix our attention solely on the menstrual flux; nor, if it fail to appear, should we have recourse to the empirical employment of emmenagogue medicines. We should examine into the cause of its absence, should try to ascertain whether it depended on the state of the health in general, or of the uterine system in particular, and should regulate accordingly our attempts at cure. The epoch of dentition is to be looked at just in the same way as that in which we regard the epoch of puberty. Constitutional disturbance is common, and serious disease more frequent, at these times than at others; but their causes lie deeper than the tooth which irritates the gum that it has not yet pierced in the one case, or than the womb which has not yielded the due discharge of blood in the other. You might produce hæmorrhage from the uterine vessels in the latter instance, or might cut through the gum which enclosed the tooth in the

* See, for instance, the table of mortality at different months, at p. 36 of MM. Quetelet et Smits, Recherches sur la Réproduction et la Mortalité, &c. 8vo. Bruxelles, 1842.

former, with no other effect than that of aggravating the condition of your patient.

In speaking of the diseases of the nervous and respiratory systems, your attention has on several occasions been drawn to the greater frequency of some of those affections just at the time when the process of teething is going on; and you will have to remark a similar fact with reference to some of the disorders of the abdominal viscera. These maladies, however, are not peculiar to the time of teething, nor, when they occur at that period, do they present symptoms different from those which characterise them under other circumstances, while it often happens that the changes which mark the transition from infancy to childhood are accomplished so quietly, as to be attended with no notable disturbance of the general health.

The great changes which nature is constantly bringing about, around us and within us, are the result of laws operating silently but unceasingly; and hence it is that in her works we see little of the failure which often disappoints human endeavours, or of the dangers which often attend on their accomplishment. Thus, when nature's object is to render the child no longer dependent on the mother for its food, she begins to prepare for this long beforehand. The first indication of it is furnished by the greatly increased activity of the salivary glands. If you look into the mouth of a young infant, you will be struck by the very small amount of saliva that moistens its surface—a circumstance which explains in great measure the tendency to dryness which the tongue then presents under the influence of very trivial ailments. About the fourth or fifth month, however, this condition undergoes a marked alteration: the mouth is now found constantly full of saliva, and the child is continually drivelling; but no other indication appears of the approach of the teeth to the surface, except that the ridge of the gums sometimes becomes broader than it was before. No further change may take place for many weeks; and it is generally near the end of the seventh month, oftener later than earlier, before the first teeth make their appearance. The middle incisors of the lower jaw are generally the first to pierce the gum; next in order appear the middle incisors of the upper jaw, then the lateral incisors of the upper jaw, and next the lateral incisors of the lower. The first four molars next succeed, and often without any very definite order as to whether those of the upper or of the lower jaw are first visible, though, in the majority of cases, the lower molars are the first to appear. The four canine teeth succeed; and, lastly, the four posterior molars—making, in all, the number of twenty deciduous teeth.

We must not, however, picture to ourselves this process as going on uninterruptedly until completed—a mistake into which parents often fall, whose anxiety respecting their children is consequently excited by observ-

ing, that, after several teeth have appeared in rapid succession, dentition seems all at once to come to a stand-still. Nature has so ordered it, that the process of dentition, beginning at the seventh or eighth month, should not be completed till the twenty-fourth or thirtieth; and has doubtless done so in some measure with the view of diminishing the risk of constitutional disturbance, which might be incurred if the evolution of the teeth went on without a pause. A little observation will show you, that, while the irruption of the lower central incisors is generally completed in a week, an interval of six weeks or two months often takes place before the upper incisors make their appearance, which then are quickly followed by the lower lateral incisors. A pause of three or four months now frequently occurs before we see the first molar teeth, another of equal length previous to the appearance of the canine teeth, and then another still longer before the last molars are cut.

Though a perfectly natural process, dentition is yet almost always attended with some degree of suffering. Many of us, no doubt, can remember feeling much pain when we cut our wisdom teeth, and children probably experience the same kind of annoyance. This, however, is not always the case; for sometimes we discover that an infant has cut a tooth, who yet had shewn no sign of discomfort, nor any other indication that dentition was commencing, with the exception of an increased flow of saliva. More frequently, indeed, the mouth becomes hot, and the gums look tumid, tense, and shining, while the exact position of each tooth is marked, for some time before its appearance, by the prominence of the gum: or the irruption of the teeth is preceded or accompanied by a somewhat different condition of the mouth, in which there are much heat, and intense redness of the mucous membrane, an extremely copious flow of thin saliva, and a disposition to the formation of small aphthous ulcerations on the tongue, at the outer surface of the alveolæ, or at the duplicature of the lip, though the gums themselves may not be particularly swollen or painful. Either of these states is usually attended with some degree of febrile disturbance, and apparently with considerable suffering to the infant, who is constantly fretful and peevish, or cries out occasionally, as if in pain. A third morbid condition of the mouth is sometimes seen, which is usually ushered in or attended by very considerable fever, and disorder of the chylopoietic viscera. The gums then become extremely hot and swollen, and intensely tender, especially over some tooth or other in particular, and in that situation we shall find the gum swollen up into a kind of little tumor. Small unhealthy ulcerations, with a sloughy appearance, often form upon the summit of the gum, and especially around any tooth which has partly pierced through it. To this affection, which is always very painful, and often difficult of cure, the name of *Odontitis Infantum* has been applied by some continental writers.

In considering the rules by which you must direct the *management of children when teething*, it can scarcely be necessary to caution you against regarding all diseases that may come on during dentition as of necessity connected with that process, or with the general changes then going on in the organism : still less need I warn you against looking upon all ailments at that time as symptomatic of the local uneasiness which the child suffers in its mouth. Some persons, indeed, act as if they held both these notions in their fullest extent, and, following up in practice this coarsely mechanical theory, they lance the gums of every child who has not yet cut all its teeth, almost or altogether irrespective of the nature of the affection from which it suffers. Such a proceeding is nothing better than a piece of barbarous empiricism, which causes the infant much pain, and is useless or mischievous in a dozen instances, for one in which it affords relief. Still less is the gum-lancet to be employed, merely with the view of expediting the process that nature is engaged in. The gradual protrusion of the teeth occasions the slow absorption of the superjacent gum, and for this process the division of the gum by a scalpel forms at best but a clumsy substitute.

The circumstances under which the use of the gum-lancet is really indicated are comparatively few. You may employ it when a tooth is so nearly through that you can feel sure it will burst the gum in a day or two at latest ; for then, by making an incision through the very thin gum, you may certainly spare the infant some suffering. Or, you may lance the gums if they be red, and swollen, and tense, and injected ; but then you scarify them in order that they may bleed, and that their congested vessels may be thus relieved : you do not divide them in order to let out the imprisoned tooth. Under such circumstances it may be necessary to repeat your scarification several times with the same object ; and it is therefore well to explain beforehand to the mother the reasons of your proceeding, lest she should expect to see the tooth at once make its appearance. There are, besides, cases in which the general constitutional disturbance that often attends dentition, continues for several days, or even weeks, while yet the condition of the swollen gum remains unaltered, and the tooth does not seem to approach nearer to the surface. In such a case you might try the experiment of lancing the gums, or you might try it in the case of a child in whom you had already observed that catarrh, or fever, or diarrhœa, had been excited by the approach of each tooth to the surface, and had ceased immediately that the tooth had pierced the gum. Lastly, in the cases of sudden, and apparently causeless convulsion, which are occasionally met with in children, you would be justified in lancing the gums if you found that the process of dentition was at that time in activity ; but you would do no good if you lanced the gums during one of those periods of repose which you will remember interrupt from

time to time the evolution of the teeth. You must therefore inquire not merely what teeth the child has cut, but also when the last made their appearance; and must seek for some evidence either that the process is still going on, or that its activity is once more recommencing, before you would have ground for supposing the source of irritation of the nervous system to be such as your gum-lancet would relieve.

If the process of teething be going on perfectly naturally, no interference, medical or other, would be either necessary or proper. The special liability of children to illness at that time must indeed be borne in mind, and care must be taken not to make any alteration in the infant's food while it is actually cutting its teeth, but rather to choose the opportunity of some one of those pauses to which reference has been made, as occurring between the dates of irruption of the successive teeth, for any such change. Should the child at any time appear very feverish, some simple febrifuge medicine may be given; as for instance a mixture of the bicarbonate of potash not quite neutralized with citric acid, to each dose of which two or three minims of the tincture of hyoscyamus may be added, if the child be very restless and fretful. The diet must be carefully regulated, and as the heat of the mouth may induce the child to suck too often in order to obtain the grateful relief of moisture, and by so doing to overload its stomach, water or barley-water should be freely given to it; and the mother should be cautious not to put it too frequently to the breast. If the child have been weaned, still greater care will be required, for it will often be found that it is no longer able to digest its ordinary food, which either is at once rejected by the stomach or else passes through the intestines undigested. Very thin arrow-root made with water, with the addition of one-third of milk, will suit in many cases; or you may occasionally substitute for this, equal parts of milk and water thickened by dissolving isinglass in it till its consistence equals that of thick barley-water; or may employ the white decoction of Sydenham with the addition of one part of milk. If the bowels be disordered, half a grain of Dover's powder night and morning will often restrain their over action; while the child may take during the day a mucilaginous mixture containing small doses of the vinum ipecacuanhæ and of some alkali, as the bicarbonate of potash or the liquor potassæ. The dysuria from which infants sometimes suffer when teething is relieved by a similar plan of treatment, with the addition of small doses of castor oil if the bowels do not act regularly, while the tepid bath is often extremely serviceable in diminishing that great heat of skin which exists in many of these cases.

That state of the mouth in which small aphthous ulcers appear upon the tongue and about the alveolæ is usually connected with disorder of the digestive organs, to the relief of which our treatment must be chiefly directed. It is seldom necessary to do more locally, than to pay great

attention to cleanse the mouth every time after the child has sucked or taken food, and afterwards to apply to it a solution of borax, in the manner I pointed out to you at the commencement of this lecture. Now and then the submaxillary glands become swollen and tender while the infant is cutting some of its teeth, but this condition generally subsides of its own accord. Sometimes, however, the irritation extends to some of the absorbent glands beneath the jaw or near its angle, and in scrofulous subjects they occasionally inflame and suppurate. In such children, too, strumous ophthalmia and otorrhœa are not infrequently excited by dentition.

That severe form of inflammation of the gums to which the name of *Odontitis* has been given, sometimes occasions great suffering, and may even endanger the child's life, though no instance has come under my own notice in which it proved actually fatal. The gum-lancet will here do no good whatever; its employment would be intensely painful, and that unhealthy ulceration which attends the inflammation of the gums would attack the edges of the cut, and thus aggravate instead of relieving the child's sufferings. Local depletion by leeches, however, is extremely useful in such cases. Some writers have suggested that the leeches should be applied to the gum itself; but I have always contented myself with the much easier plan of applying them to the angle of the jaw, and have seldom been disappointed in obtaining very marked relief of all the symptoms. The diet must be most carefully regulated, the state of the bowels attended to, and a mildly antiphlogistic plan of treatment adopted, while the borax lotion may be used locally with advantage. There is, however, one remedy which acts in the various forms of stomatitis almost like a charm, and which proves exceedingly useful even when inflammation of the mouth is associated with the process of teething. This remedy, for the introduction of which into practice in cases of stomatitis, the profession is indebted to Dr. Hunt,* is the chlorate of potash, which may be given dissolved in water and sweetened, in the dose of one grain every four hours to a child a year old, with an almost absolute certainty of effecting a cure in the course of four or five days.

In conclusion, I may just refer to those *eczematous and impetiginous eruptions* on the face and scalp which often occur in teething children. The old prejudice which regards diseases of the skin appearing at this time as having in them something salutary, and that consequently it is not desirable to attempt their cure, is not destitute of a certain foundation in fact. Instances of the sudden disappearance of eruptions on the scalp during the period of dentition, being followed by serious impairment of the general health, by convulsions, or by other signs of mischief in the brain, are far from uncommon. Their removal, therefore, must never be

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* Medico-Chirurgical Transactions, vol. xxvi. p. 142.

attempted except by the gentlest means, while every threatening of the supervention of cerebral congestion, or of more serious disease of the brain, must be most closely watched for and most vigorously combated. Sometimes, too, it will be found that whenever the cutaneous affection has made a certain advance towards cure, the signs of other disease invariably appear. In such a case it is wiser to content yourselves with keeping the local ailment in check, than by persevering in the attempt to cure it, to endanger in far more serious respects the welfare of the child.

LECTURE XXIX.

Inflammation of the mouth, or stomatitis—its three varieties.

Follicular stomatitis—often a secondary affection—most frequent before dentition is completed—its symptoms—character of the ulcerations of the mouth—not a serious disorder.—Its treatment.

Ulcerative stomatitis—principally affects the gums - its course usually chronic—has very little tendency to degenerate into gangrene.—Its treatment—the chlorate of potash almost a specific for it.

Gangrenous stomatitis—extremely rare, but very fatal—essential differences between it and the other forms of stomatitis, but begins likewise in interior of mouth—its symptoms, local and general—state of the gangrenous parts on dissection.—Treatment—importance of efficient cauterization—what caustics are to be used, and how they are to be applied.—The disease does not depend on the administration of mercury.

Cynanche parotidea—most common near period of puberty—epidemic and contagious—its symptoms—metastasis of inflammation rare.—Treatment.

Among the local accidents which complicate dentition we noticed a condition of the mucous membrane of the mouth, which, though not attended with serious danger, is often the source of much suffering to the patient.

Inflammation of the mouth, however, is an occurrence by no means confined to the period of teething, but it comes on in children of all ages, assumes very different forms, and leads to very different results in one case from those which characterize it in another. The mucous follicles of the mouth are the chief seat of the disease in one case, the substance of the gum in another, that of the cheek in a third. In the first, the affection issues in the formation of numerous small ulcers, which heal eventually of their own accord; in the second, an unhealthy process of ulceration destroys the gums and denudes the teeth, but it is tardy in its advance, and tends to a spontaneous cure; while, in the last, mortification involves all the tissues of the cheek, and spreads with a rapidity which remedies generally fail to check, and which is arrested at last only by the patient's death.

Each of these varieties of *stomatitis* requires from us more than a passing notice.

The first—the *follicular stomatitis* of some writers, the *aphthous*

stomatitis of others—is met with either as a concomitant or sequela of measles, or as an idiopathic affection. In the former case it depends on the extension to the mouth of a state of inflammation similar to that which gives rise to the eruption on the skin; in the latter, it is often aasociated with obvious gastric or intestinal disorder. Under either of these conditions it is rare after five years of age; and though it often depends on causes quite independent of dentition, yet from the period when teething has commenced, to the end of the third year, is the time of its most common occurrence. When it constitutes an idiopathic affection, more or less fever, and restlessness, loss of appetite, an unhealthy state of the evacuations, and frequently a relaxed condition of the bowels, precede the local ailment for several days. Attention is generally called to the state of the mouth by the child being observed to suck, or to take food, with manifest pain and difficulty, while at the same time the secretion of saliva is greatly increased, and the submaxillary glands are swollen and tender. The mouth is hot, its mucous membrane generally of a livid red, while a coat of thin mucus covers the centre of the tongue. On the surface of the tongue, especially near its tip, on the inside of the lips, particularly on the lower lip and about its fold, on the inside of the cheek, near the angles of the mouth, and less often in other situations also, may be seen several small isolated transparent vesicles, or the ulcers which, after bursting, they leave behind. The ulcers are small, of a rounded or oval form, not very deep, but having sharply-cut edges; and their surface is covered by a yellowish-white, firmly-adherent slough. When attention is first directed to the mouth, several of these small ulcerations usually exist, for the vesicular stage of the affection appears to be generally very short, while the ulcers are indolent, and sometimes continue for many days without shewing any disposition either to heal or to increase in size. The eruption of a single crop of vesicles, and the change of these vesicles into minute ulcerations, that heal in the course of time, do not complete the history of this affection, for while the mucous membrane in the situation of some of these ulcers at length resumes its natural condition, other vesicles appear, which again degenerate into little ulcers, and thus keep up the ailment, sometimes for weeks together. In some cases, not above five or six of these little ulcers exist at once, or they may even be less numerous, while it is very seldom that more than fifteen or twenty of them are observable at one time. By the successive appearance of fresh ulcerations, and the coalescence of several, an ulcerated strip of considerable extent sometimes forms, especially at the tip of the tongue, or on the lower lip. When the ulcers are healing no change in their aspect is observable, and they continue to the last covered by the same yellow slough, but by degrees they diminish in size; and seldom or never is any cicatrix observable in the situation which they occupied. In some cases the affection is complicated with a herpetic eruption about the edges of the lips, the

vesicles of which degenerate into ulcerations similar to those observed in the interior of the mouth, and by their soreness add very much to the sufferings of the patient.

Even though no remedies be employed, this affection shows no tendency to rapid increase, neither is it, in general, associated with any disposition to the formation of false membrane in the mouth, still less with any tendency to gangrene. It is sometimes a source of much annoyance to the child, but need never excite any serious solicitude, except when it occurs as a sequela of measles. In that case, however, as was observed some days ago, it occasionally becomes associated with diphtheritic deposits on the fauces, and with ulcerative inflammation of the larynx, though our anxiety is then excited less by the affection itself than by its concomitants.

In the *treatment* of this affection, our attention must be chiefly directed to correcting the gastric and intestinal disorder by which it is accompanied; and when this object has been attained, the local ailment in many cases speedily subsides. The borax lotion mentioned in the last lecture is one of the best local applications that can be used; but if the ulcerations shew no tendency to heal, it may be desirable to touch them once or twice a day with a solution of five grains of nitrate of silver in an ounce of distilled water.

Between the mild affection we have just been studying, and the *second form of stomatitis*, to the examination of which we are now about to pass, there are comparatively few points of resemblance. This variety of the disease attacks the gums, and sometimes destroys them extensively, unlike the former ailment, which, even though it should continue long, seldom occasions any actual loss of substance. The process, however, by which the destruction of the gums is accomplished is one of ulceration, not of mortification—a fact which it is of importance to bear in mind, lest we should fall into the error of some observers who have confounded together, under the name of Cancrum Oris, both this affection and that more formidable malady, true gangrene of the mouth. To preserve the distinction between the two diseases, it may be well, following the example of some writers, to apply to the former the designation of *Ulcerative Stomatitis*, or *Noma*,* and to the latter, that of gangrenous stomatitis, or gangrene of the mouth.

It is by no means a constant occurrence for any special derangement of the general health to precede the attack of *ulcerative stomatitis*, though the children who are affected by it are seldom robust, and in many instances are such as have suffered from deficient food, or a damp and unhealthy lodging, or both. In children who are not very carefully tended, the ulceration has sometimes made considerable progress before its existence is suspected, and the profuse flow of the saliva, or the offensive smell of

* From νομαι, used by Hippocrates with reference to putrid and eroding ulcers. See Foesius, Œconomia Hippocratis, p. 432.

the breath, is the circumstance which at length excites attention. Coupled with these symptoms, too, there is often considerable swelling of the upper lip, and the submaxillary glands are frequently swollen and painful. On opening the mouth, the gums are seen to be red, and swollen, and spongy, and their edge is covered with a dirty white, or greyish, pultaceous, deposit; on removing which their surface is exposed, raw and bleeding. At first, only the front of the gum is thus affected; but as the disease advances, it creeps round between the teeth to their posterior surface, and then, destroying the gum both in front and behind them, leaves them denuded, and very loose in their sockets, but it is not often that they actually fall out. The gums of the incisor teeth are usually first affected: those of the lower jaw more frequently and more extensively than those of the upper; but if the disease be severe, the gums at the side of the mouth become likewise involved, though it is seldom that the two sides suffer equally. Sometimes aphthous ulcers, like those of follicular stomatitis, are seen on the inside of the mouth in connection with this state of the gums; but oftener it exists alone. On those parts of the lips and cheeks, however, which are opposite to, and consequently in contact with, the ulcerated gums, irregular ulcerations form, which are covered with a pultaceous pseudo-membranous deposit, similar to that which exists on the gums themselves. Sometimes, too, deposits of false membrane take place on other parts of the inside of the mouth, the surface beneath being red, spongy, and bleeding, though not distinctly ulcerated. If the disease be severe and long-continued, the tongue assumes a sodden appearance, and is indented by the teeth, and the cheek, on one or other side, is somewhat swollen, while the saliva, though rather less abundantly secreted than at the commencement of the affection, continues horribly fœtid, and is often streaked with blood, the gums themselves bleeding on the slightest touch. But even if left alone, the affection usually subsides in the course of time, though it may continue almost stationary for days or weeks together, and this notwithstanding that the general health is tolerably good. It would be too much to say that this unhealthy ulceration never degenerates into gangrene; but though a very large number of cases of ulcerative stomatitis have come under my notice, I have seen only one instance in which it was succeeded by true gangrene of the mouth. When recovery has commenced, the disease ceases to spread; the drivelling of fœtid saliva diminishes; the white pultaceous deposit on the gums, or on the ulcerations of the cheek or lips, becomes less abundant; the ulcers themselves grow less; and, finally, the gums become firm, and their edges of a bright red, though still for a long time shewing a disposition to become once more the seat of the ulcerative process, and continuing for a still longer time to cover the teeth but very imperfectly.

Various internal remedies and local applications have been at different times recommended for *the cure of this affection*. Tonics have been much

employed, and the supposed analogy between this state of the gums and that which exists in scurvy, has led practitioners to give the preference to remedies reputed to be possessed of antiscorbutic properties. Lotions of alum, or the burnt alum in substance, or the chloride of lime in powder, have all been used locally with more or less benefit. It was my custom also to prescribe these remedies in cases of ulcerative stomatitis; but since I became acquainted with the virtues of the chlorate of potash, I have learnt to rely upon it almost exclusively. It appears, indeed, almost to deserve the name of a specific in this affection; for a marked improvement seldom fails to be observed in the patient's condition after it has been administered for two or three days; and in a week or ten days the cure is generally complete. Three grains every four hours, dissolved in water, and sweetened, is a sufficient dose for a child three years old; and five grains every four hours is the largest quantity that I have administered to a child of eight or nine. If the bowels be constipated, a purgative should be previously administered; but there seems to be no form nor any stage of the affection in which the chlorate of potash is not useful. The diet should be light but nutritious, and quinine or other tonics are sometimes serviceable if the child's health should continue feeble after the local malady has been cured.

Ulcerative stomatitis is an affection of such frequent occurrence, that many instances of it come under my notice every year, especially during the damp autumnal months; while it is attended with so little danger, that the only case in which I have known it prove fatal, was one in which gangrene of the mouth supervened upon it. *Gangrenous stomatitis*, on the other hand, is a disease so rare, that I have only six times had the opportunity of witnessing it; but so fatal, that in five out of those six cases the patients died. The larger experience of other observers shows an equally unfavourable result, since twenty out of twenty-one cases that came under the notice of MM. Rilliet and Barthez had a fatal termination. The formidable nature of the disease requires that we study it more closely, than, considering the rarity of its occurrence, would otherwise be necessary; and it is the more important to do so, in order that we may avoid the not very uncommon error which confounds this dangerous affection with that comparatively trifling ailment—ulcerative stomatitis.

The constitutional disturbance which often precedes the other two affections of the mouth that we have just been studying, was seen to be generally of a trivial nature, and never so severe as to excite serious anxiety. Gangrene of the mouth, on the other hand, seldom comes on, except in children whose health has been already much impaired by previous disease, and especially by such diseases as are connected with important changes in the circulating fluid. Of twenty-nine cases which MM. Rilliet and Barthez either observed themselves, or of which they found mention in the writings of other physicians, only one appeared to be an instance of idio-

pathic gangrene of the mouth; while in twelve cases the disease followed an attack of measles. Of the six cases which I have observed, and three of which I examined after death, two succeeded to typhoid fever, two to measles, one came on in a child whose health had been completely broken down by ague, and one supervened in a tuberculous child, who had been affected for many weeks with ulcerative stomatitis in a severe form. Though not confined to any one period of childhood, gangrene of the mouth is more frequent between the ages of two and five than either earlier or later. Of the twenty-nine cases mentioned by MM. Rilliet and Barthez, nineteen occurred between two and five; ten between six and twelve. Of the six cases that came under my own observation, two were in children between two and three years old, one in a child aged three, one between four and five, one at six and a quarter, and one at eight years of age.

Although all the tissues of the cheek become involved in the course of this affection, yet difference of opinion has existed with reference to the part in which it commences; some observers conceiving that it generally begins in the substance of the cheek, while others regard the mucous membrane as being the part which is invariably the first attacked. So far as my own observation enables me to judge, I am disposed to regard this latter view, which is that of MM. Rilliet and Barthez, and of M. Baron, as correct.

The early stages of the affection are attended by scarcely any suffering, owing to which, as well as to the circumstance that the children in whom it supervenes are almost always labouring under some other disease, or in the course of convalescence from it, it is probably due that the malady is often not discovered until after it has made considerable progress. There may for a day or two have been an unusual fœtor of the breath, and a profuse secretion of offensive saliva; but the appearance of swelling of the cheek is frequently the first symptom that leads to a careful examination of the state of the mouth. The characters of the swelling of the cheek are almost pathognomonic of gangrene of the mouth. It is not a mere puffiness of the integument, unaccompanied with any change of its colour, such as is sometimes observed in ulcerative stomatitis, but the cheek is tense, and red, and shining,—it looks as if its surface had been besmeared with oil, and in the centre of the swollen part there is generally a spot of a brighter red than that around. The cheek feels hard, and is often so unyielding, that the mouth cannot be opened wide enough to get a good view of its interior. The disease is almost always limited to one side, and generally to one cheek. Sometimes, however, it extends to the lower lip, and occasionally it begins in that situation. The upper lip is now and then reached by the progress of the disease, but is never its primary seat. Whatever be the situation of the external swelling, there will generally be found within the mouth, at a point corresponding to the bright red central spot, a deep excavated ulcer, with irregular jagged edges, and a surface

covered by a dark brown shreddy slough. The gums opposite to the ulcer are of a dark colour, covered with the putrilage from its surface, and in part destroyed, leaving the teeth loose, and the alveolæ denuded. Sometimes, especially if the disease be further advanced, no single spot of ulceration is recognizable, but the whole inside of the cheek is occupied by a dirty putrilage, in the midst of which large shreds of dead mucous membrane hang down. As the disease extends within the cheek, a similar process of destruction goes on upon the gum, and the loosened teeth drop out one by one. The saliva continues to be secreted profusely, but shows by the changes which take place in its characters the progress of the disease. At first, though remarkable for its fœtor, it is otherwise unaltered, but afterwards it loses its transparency, and receives from the putrefying tissues over which it passes, a dirty, greenish, or brownish colour, and at the same time acquires a still more repulsive odour.

While the gangrene is thus going on inside the mouth, changes no less remarkable are taking place on the exterior of the face. The redness and swelling of the cheek extend, and the deep red, central spot, grows larger. A black point appears in its midst; at first it is but a speck, but it increases rapidly, still retaining a circular form,—it attains the bigness of a sixpence, a shilling, a half crown, or even a larger size. A ring of intense redness now encircles it, the gangrene ceases to extend, and the slough begins to separate. Death often takes place before the detachment of the eschar is complete, and it is fortunate when it does so, for sloughing usually commences in the parts left behind. The interior of the mouth is now exposed, its mucous membrane and the substance of the cheek hang down in shreds from amidst a blackening mass, and form one of the most loathsome spectacles that can be conceived; while the horrible stench which the mortified parts spread around, makes the task of watching the poor child as repulsive as it is distressing.

Happily it is not often that the acute suffering of the child occurs to heighten the distress of the sad scene. Usually the patient has but little pain from the very first, but is generally more drowsy than natural, though sometimes the nights are restless; and in those cases in which gangrene of the mouth supervened in the course of typhoid fever, the delirium which existed before, continued unmodified. The pulse grows feebler as the disease advances, but gleams of cheerfulness may sometimes be perceived, even long after the appearance of the black eschar on the cheek has shewn the case to be all but hopeless, and the desire for food often continues unabated, till within a few hours of the child's death, which generally takes place quietly, though sometimes it is preceded by convulsions.

Since gangrene of the mouth occurs in the course of a great variety of diseases, the only morbid appearances characteristic of it are those which result from the local mischief. On two occasions I dissected the gangrenous parts very carefully, and the alterations which presented them-

selves to my notice were precisely the same as have been described by MM. Rilliet and Barthez. The absorbent glands, both superficial and deep-seated, on the affected side, are enlarged, and the cellular tissue of the cheek is infiltrated with serum, which is more abundant the nearer one approaches to the slough. In the substance of the eschar, the distinction of parts is no longer easy, but with care the vessels and nerves may still be traced; and the reason why fatal hæmorrhage so seldom cuts short the life of patients suffering from this affection, is at once explained by the clot which plugs up the vessels for some distance on either side of the gangrenous mass. On one occasion I found the root of the tongue, the tonsils, pharynx, both surfaces of the epiglottis, and about an inch of the œsophagus, completely coated with a moderately firm, yellow false membrane, about a line in thickness, easily detached, and leaving the subjacent mucous membrane only a little redder than natural. A few patches of a similar deposit existed in the larynx, but not continuous with that in the pharynx. In this case, great difficulty of deglutition had existed for three days before the death of the child. The association of diphtheritis with gangrene of the mouth, is, however, an accidental complication, and one of not very frequent occurrence.

The arrest of the sloughing is the one point to which in the *treatment* of this affection the attention of all practitioners has been directed. The small amount of success which has attended their efforts is partly attributable to the circumstance that the affection has frequently been overlooked until it has already made considerable progress; in part also to the fact that when recognized, the local remedies employed in order to check the gangrene have either been too mild, or have been applied with too timorous a hand. Unfortunately, too, there is considerable difficulty in applying any caustic effectually to the interior of the mouth, for not only does the tense and swollen condition of the cheek prevent our obtaining easy access to the gangrenous parts, but the child naturally resists an operation which cannot but occasion it most severe pain. Ineffectual cauterization, however, is useless, or worse than useless; and though every endeavour should be made to prevent the needless destruction of healthy parts, yet of the two evils, that of doing too much is unquestionably less than that of doing too little. It is of importance, moreover, not only that the cauterization should be done effectually, but also that it should be practised early. M. Baron, indeed, speaks of incising the slough in the cheek, aud then applying the actual cautery to the part; but I am not aware of any instance in which this suggestion has been acted on with a good result. When once the mortification has extended through the substance of the cheek, the chances of arresting its progress must be very few. As the sloughing advances from within outwards, it is to the interior of the mouth that our remedies must be applied, and since the advance of the disease is too rapid to allow of our

trying mild means at first, and afterwards resorting, if necessary, to such as are more powerful, we must employ an agent sufficiently energetic at once to arrest its progress. Various caustics have been recommended for this purpose, but none appear to be so well fitted to accomplish it as the strong hydrochloric or nitric acid. I am accustomed to employ the latter, applying it by means of a bit of sponge, or of soft lint or tow, fastened to a quill, while I endeavour, by means of a spoon or spatula, to guard the tongue, and other healthy parts, as far as possible, from the action of the acid. In the only case that I saw recover, the arrest of the disease appeared to be entirely owing to this agent, and though the aveolar processes of the left side of the lower jaw, from the first molar tooth backwards, died, and exfoliated, apparently from having been destroyed by the acid, yet it must be owned that life was cheaply saved even at that cost. Some increase of the swelling of the cheek almost invariably follows the application of this agent—a circumstance which may at first occasion unfounded apprehension lest the disease be worse. Twelve hours, however, must not be allowed to elapse, without the mouth being carefully examined, in order to ascertain whether the disease has really been checked, or whether there is any appearance of mortification in the parts beyond the yellow eschar left by the first application of the acid. The cauterization may now be repeated, if it appear necessary, and even though the disease had seemed completely checked; yet reliance must not be placed on the improvement continuing, but the mouth must be examined every twelve hours, for fear the mortification should spread unobserved. During the whole progress of the case the mouth must be syringed frequently with warm water, or with camomile tea mixed with a small quantity of the solution of chloride of lime, in order to free it from the putrid matters that collect within it, and to diminish as much as possible their offensive odour. Should the case go on well, the frequent repetition of the strong acid will be unnecessary, but the surface may still require its application in a diluted form, or it may suffice to syringe the mouth frequently with a chloride of lime lotion, or to apply the chloride in powder once or twice a day, according to the suggestion of MM. Rilliet and Barthez. In the last two cases of this affection that came under my notice, I likewise employed the chloride of potash internally, but it did not appear to exert any influence over it; and valuable though the remedy is in ulcerative stomatitis, it would, I think, be merely trifling with your patient's chances of recovery to trust to it in true gangrene of the mouth.

During the whole course of treatment you have another indication to fulfil—namely, to support your patient's strength by nutritious diet, and by the employment of wine and other stimulants, and by the administration of quinine, or of the extract or tincture of bark, or whatever form of tonic may seem best suited to the peculiarities of the case.

In conclusion, let me remind you that during the whole progress of the case your prognosis must be regulated by the state of the local disease, rather than by the urgency of the general symptoms. So long as the sloughing is unchecked, the affection is tending rapidly to a fatal issue, and this even though the pulse be not very feeble, though the appetite be good, and the child still retain some show of cheerfulness.

It might seem to you to be an omission on my part, if I left the subject of inflammation and gangrene of the mouth, without some notice of the supposed influence of mercury in its production. There can be no doubt but that this preparation, even when given in small doses, has in a few instances produced severe ptyalism, inflammation of the mouth, loss of the teeth, and necrosis, more or less extensive, of the lower jaw. In some cases, too, the inflammation has terminated in gangrene of the cheek which has presented many of the characters that we have just been noticing; and under such circumstances inquests have sometimes been held, and blame has been attached to the medical attendant for alleged want of caution in the administration of so powerful an agent as mercury. Now, although mercury should never be given without necessity, nor its administration continued without watching its effects most carefully, yet I cannot but regard the supervention of gangrene of the mouth during its use as merely an accidental coincidence, or else as the result of some peculiar idiosyncrasy of the patient, such as has been observed in the adult as well as in the child. During the past nine years, nearly 14,000 children, of all ages, have come under my care at the Children's Infirmary, and I have administered mercury to any of them who seemed to require it, but have hardly ever seen salivation follow its employment before the completion of the first dentition; and have never observed that medicine, at any age, produce an affection of the mouth sufficiently serious to occasion me a moment's anxiety.

Inflammation of the parotid gland,—the *Cynanche parotidea* of scientific writers, called *mumps* by the vulgar,—is an affection met with among children and young persons, concerning which a few words only need be said. It attacks young persons near the period of puberty, especially boys, much oftener, and with much greater severity, than infants, or children under seven years old. Though it sometimes occurs as a sporadic affection, it is more commonly met with as an epidemic; and being likewise propagated by contagion, it not infrequently attacks most of the inmates of a boarding-school, or of any other public institution in which large numbers of the youth of either sex are collected together. The seat of the disease is in one or both parotid glands, and in the adjoining cellular tissue; but if the attack be at all severe, the submaxillary and other salivary glands generally become involved during its progress. It generally sets in with the ordinary symptoms of slight fever or catarrh, which are followed in about twenty-four hours by stiffness of the neck and pain about the lower

jaw, any movement of which, either for the purpose of speaking or of mastication, is obviously attended with considerable suffering. At the same time, too, a swelling makes its appearance about the angle of the lower jaw, sometimes on one side only, at other times on both; and this swelling increasing rapidly in size, occasions great disfigurement of the face. The swelling is usually very tense, but the colour of the skin is in general unaltered, except in some cases, in which the glands on both sides, being swollen and pressing much upon the veins, the return of blood from the head is impeded, and the face assumes a flushed appearance. If the swelling be very considerable, deglutition for a short time becomes so difficult as to be almost impossible, and the tongue becomes dry from the child breathing with its mouth open; but the secretion of saliva is neither morbidly increased nor diminished. If the disease be severe, the child suffers much, is very feverish, and may even be light-headed; but in the course of forty-eight hours from the appearance of the swelling it reaches its height, and the fever begins to subside and the swelling to diminish. The time of the final disappearance of the swelling is very variable, being five or six days in some cases, ten days or a fortnight in others; while in some instances the glands on one side are affected first, and when the attack is subsiding there, those of the opposite side become affected in a similar way, and the duration of the ailment is thus protracted. The occurrence of suppuration in the neighbourhood of the gland is a rare termination of the inflammation, but is, I believe, oftener met with in infants and young children than in those who are approaching the period of puberty. On the other hand, metastasis of the disease from the parotid to the mamma, the testicle, or the brain, of all of which instances are recorded by different writers, appears to be rare in proportion to the tender age of the patient. The most formidable of these metastases, indeed,—that to the brain, would seem to be an accident very seldom met with, and neither of it, nor of the translation of the disease to the mamma or the testicle, can I say any thing from personal experience.

The *treatment* of this affection is in general very simple, and requires the judicious selection of precautionary measures rather than active interference. Mild antiplogistic medicines, with the application of warmth locally, are all that is usually needed, and local depletion is not either necessary or useful. The period during which much distress and much difficulty of deglutition exist is generally very short, so that even in severe cases it will be our wisest course to await the spontaneous subsidence of the swelling. If suppuration should take place in the cellular tissue about the gland, a warm poultice must be substituted for the fomentations previously employed. Even when the gland remains enlarged, as it sometimes does for some time after the subsidence of the febrile symptoms, it is yet in general the best plan to let it alone, since the swelling is sure eventually to disappear of its own accord.

With reference to the management of the metastases of the disease I have no observations to make, further than that inflammation of the brain, however induced, is not an affection with which we can safely temporize; while a mild and palliative treatment will generally answer every purpose, when either the mamma or the testicle has become the seat of the affection.

LECTURE XXX.

Diseases of the Stomach.—Vomiting often symptomatic of disease elsewhere—occasionally occurs suddenly in a previously healthy infant without signs of general illness—its treatment—is often one out of many symptoms of indigestion. Infantile dyspepsia—sometimes connected with general debility of the system; at others, dependent on special disorder of the stomach—its symptoms and treatment.

Softening of the stomach—discovered after death in various degrees—different theories as to its nature—great frequency in early infancy—Dr. Elsässer's explanation of this fact—probably not correct to the full extent.

Hæmatemesis—very rare—sometimes connected with injury to the child during labour—its occurrence often difficult of explanation—illustrative cases.—Spurious hæmatemesis.

The diseases to which the *stomach* is liable in early life are neither numerous nor important, although its functions are more or less disordered in the course of most of the affections of childhood. *Vomiting*, indeed, is more frequent in the infant than in the adult, and this not merely because the delicate structure of the organ renders its irritability greater, but because the form of the viscus, and its position in the abdomen during early life, are such as greatly to facilitate the discharge of its contents. Even when the first few months of existence have been passed, vomiting is still an occurrence often met with. It is sometimes one of the first symptoms of inflammation of the lungs or pleura: it frequently ushers in the eruptive fevers, and marks the early stages of cerebral disease. Causes more purely local produce a similar effect, and vomiting often attends upon infantile diarrhœa, and is associated with signs of intestinal disorder, especially when such disorder has been excited by improper food. But besides these cases, in which the disorder of the stomach is either the result of disease seated elsewhere, or in which the disturbance of its function is sufficiently explained by the nature of the ingesta, instances are sometimes observed in which the stomach becomes so irritable as almost always to reject its contents, or in which, though the food taken be not brought up again, yet the organ is unable to effect its digestion.

It sometimes happens that young infants are suddenly seized with

vomiting, which, though violent, and frequently repeated, is attended with few or no indications of general intestinal disorder. The child in such cases seems still anxious for the breast; but so great is the irritability of the stomach, that the milk is either thrown up unchanged, immediately after it has been swallowed, or it is retained only for a very few minutes, and is then rejected in a curdled state; while each application of the child to the breast is followed by the same result. It will generally be found, when this accident takes place in the previously healthy child of a healthy mother, that it has been occasioned by some act of indiscretion on the part of its mother or nurse. She perhaps has been absent from her nursling longer than usual, and, returning tired from a long walk, or from some fatiguing occupation, has at once offered it the breast, and allowed it to suck abundantly; or the infant has been roused from sleep before its customary hour, or has been over-excited or over-wearied at play, or, in hot weather, has been carried about in the sun without proper protection from its rays.

The infant in whom, from any of these causes, vomiting has come on, must at once be taken from the breast, and, for a couple of hours, neither food nor medicine should be given to it. It may then be offered a teaspoonful of cold water; and, should the stomach retain this, one or two more spoonfuls may be given in the course of the next half hour. If this be not rejected, a little isinglass may be dissolved in the water, which must still be given by a teaspoonful at a time, frequently repeated; or cold barley-water may be given in the same manner. In eight or ten hours, if no return of vomiting take place, the experiment may be tried of giving the child its mother's milk, or cow's milk diluted with water, in small quantities, and from a teaspoon. If the food thus given do not occasion sickness, the infant may in from twelve to twenty-four hours be restored to the breast, with the precaution, however, of allowing it to suck only very small quantities at a time, lest, the stomach being overloaded, the vomiting should be again produced.

In many instances where the sickness has arisen from some accidental cause, such as those above referred to, the adoption of these precautions will suffice to restore the child to health. If, however, other indications of gastric or intestinal disorder have preceded the sickness, or be associated with it, medicine cannot be wholly dispensed with. According to the age of the child, a quarter, half, or a whole grain of calomel may be laid upon the tongue, while sucking is forbidden, and the plan already recommended is in other respects strictly carried out. If the vomiting have already continued for several hours before the adoption of any treatment, a small mustard poultice may likewise be applied to the epigastrium. In about a couple of hours after the calomel has been given, the child may have a teaspoonful of a mixture containing small doses of the bicarbonate of potash and of hydrocyanic acid; and this may be continued every

three or four hours so long as any unusual irritability of the stomach remains.

Sickness, however, is not always a solitary symptom, unattended with other indications of gastric disorder, but is sometimes associated with the signs of general impairment of the digestive powers. In its graver forms, *indigestion* is associated with greatly impaired nutrition, and with all those serious results which are characteristic of the atrophy of young children. But it sometimes happens that, though the child does not lose much flesh, yet digestion is ill performed, and various dyspeptic symptoms appear, which would be troublesome rather than alarming, if it were not that they are often connected with the strumous diathesis, and are the first indications of a state of constitution in which, after the lapse of a few months, pulmonary phthisis is very apt to supervene.

In some of these cases there is complete anorexia, the infant caring neither for the breast nor for any other food that may be offered it. It loses the look of health, and grows pale and languid, although it may not have any special disorder either of the stomach or bowels. It sucks but seldom, and is soon satisfied; and even of the small quantity taken, a portion is often regurgitated almost immediately. This state of things is sometimes brought on by a mother's over-anxious care, who, fearful of her infant taking cold, keeps it in a room too hot or too imperfectly ventilated. It follows also, in delicate infants, on attacks of catarrh or diarrhœa, but is then for the most part a passing evil, which time will cure. In the majority of cases, however, the loss of appetite is associated with evidence of the stomach's inability to digest even the small quantity of food taken, and there exists more or less marked gastric or intestinal disorder. Anorexia, too, is far from being a constant attendant upon infantile dyspepsia, but in still more numerous instances, although the power of assimilating the food is in a great measure lost, yet there is an unnatural craving for it, and the infant never seems so comfortable as when sucking. But though it sucks much, the milk evidently does not sit well upon the stomach; for soon after sucking, the child begins to cry, and appears to be in much pain until it has vomited. The milk thrown up is curdled, and its rejection is followed by immediate relief, but, at the same time, by the desire for more food, and the child can often be pacified only by allowing it to suck again. In other cases, vomiting is of much less frequent occurrence, and there is neither a craving desire for food, nor much pain after sucking, but the infant is distressed by frequent acid or offensive eructations: its breath has a sour or nauseous smell, and its evacuations have a most fœtid odour. The condition of the bowels that exists in connection with these different forms of dyspepsia is variable. In cases of simple anorexia, the debility of the stomach is participated in by the intestines, their peristaltic action is feeble, and constipation is of frequent occurrence, though the evacuations do not always present any

marked deviation from their character in health. Constipation, however, though a frequent, is not an invariable attendant on indigestion, but the bowels in some cases act with due regularity. If the infant be brought up entirely at the breast, the evacuations are usually liquid, of a very pale yellow colour, often extremely offensive, and contain shreds of curdled milk, which, having escaped through the pylorus, pass unchanged along the whole tract of the intestines. In many instances, however, the infant having been observed not to thrive at the breast, arrow-root or other farinaceous food is given to it, which the digestive powers are quite unable to assimilate, and which gives to the motions the appearance of putty or pipe-clay, besmeared more or less abundantly with intestinal mucus. The evacuations are often party-coloured, and sometimes one or two unhealthy motions are followed by others which appear perfectly natural; while attacks of diarrhœa often come on, and the matters discharged are then watery, of a dark, dirty green colour, and exceedingly offensive odour.

Dyspeptic infants, like dyspeptic adults, often continue to keep up their flesh much better than could be expected, and in many cases eventually grow up to be strong and healthy children. Still, the condition is one that not merely entails considerable suffering upon the child, but, by its continuance, seriously impairs the health, renders the child but little able to bear up against any intercurrent disease, and develops the seeds of latent phthisis.

Within the space that can be allotted to each subject in these lectures, it is not possible to do more than just glance at some of the main points to be borne in mind in the *treatment* of infantile dyspepsia. Those cases, the chief symptom of which consists in the loss of appetite, usually require, and are often much benefited by, a generally tonic plan of treatment. All causes unfavourable to health must be examined into, and, as far as possible, removed. It must be seen that the nursery is well ventilated, and that its temperature is not too high; while it will often be found that no remedy is half so efficacious as change of air. Next it must not be forgotten that the regurgitation of the food is due in great measure to the weakness and consequent irritability of the stomach; and care must therefore be taken not to overload it. If these two points be attended to, benefit may then be looked for from the administration of tonics. These tonics may either be such as the infusion of orange-peel with a few drops of sulphuric acid and of some tincture; or, should any disposition to diarrhœa have appeared, the extract with the compound tincture of bark will be preferable; or, if the stomach be very irritable, the liquor cinchonæ in combination with small doses of hydrocyanic acid may be given with advantage, when any other medicine would be rejected. As the general health improves, the constipated condition of the bowels so usual in these cases will by degrees disappear. Even if the symptom should call for medical interference, it is not by drastic purgatives that its cure

must be attempted. A soap suppository will sometimes excite the bowels to daily action; or friction of the abdomen twice a day with warm oil, or with a liniment composed of one part of Linimentum Saponis, one of olive oil, and two of tincture of aloes, will sometimes have the same effect. Should it become necessary to give aperients internally, the decoction of aloes sweetened with liquorice, and mixed with caraway or aniseed water, generally answers the purpose very well; while the employment of mercurials must be restricted to cases in which there is very evident deficiency in the biliary secretion.

A different plan must be adopted in those forms of indigestion which depend on some cause other than the mere debility of the system. The rule, indeed, which limits the quantity of food to be taken at one time is no less applicable here, for the rejection of the curdled milk may be the result of nothing more than of an effort which nature makes to reduce the work that the stomach has to do within the powers of the organ. But when, notwithstanding that due attention is paid to this important point, uneasiness is always produced by taking food, and is not relieved till after the lapse of twenty minutes or half an hour, when vomiting takes place, or when the infant suffers much from flatulence and from frequent acid or nauseous eructations, it is clear that the symptoms are due to something more than the mere feebleness of the system.

It is not, however, in these cases the mere fact of the infant vomiting its food, or of the milk so vomited being rejected in a coagulated state, which indicates the stomach to be disordered, but it is the circumstance of firmly-coagulated milk being rejected with much pain, and after the lapse of a considerable interval from the time of taking food, which warrants this conclusion.* The coagulation of its casein is the first change which the milk of any animal undergoes when introduced into the stomach, though the coagulum formed by human milk is soft, flocculent, and not so thoroughly separated from the other elements of the fluid as the firm hard curd of cow's milk is from the whey in which it floats. In a state of health, the abundantly secreted gastric juice speedily re-dissolves the chief part of the casein, while the subsequent addition to it of the alkaline bile converts it into an albuminate of soda; and being thus assimilated as nearly as possible to the characters of one of the chief elements of the blood, it is easily absorbed by the lacteals, and passes into the mass of the circulating fluid.

Milk tends, however, to undergo changes spontaneously, which produce its coagulation, and the occurrence of these changes is greatly favoured by

* The physiology and chemistry of the digestion of the milk will be found fully treated in the article Milch, in Wagner's Handwörterbuch der Physiologie; and in Elsässer's essay, Ueber die Magenerweichung der Säuglinge, 8vo. Stuttgart, 1846. They are the authorities for the statements in the text.

a moderately high temperature, such as that which exists in the stomach, But the alterations in the fluid which attend upon this spontaneous coagulation are very different from those which are brought about in it by the vital processes of digestion. A free acid becomes developed abundantly within it, and the acid thus generated shows none of the solvent power of gastric juice, but by its presence impedes, rather than favours, digestion. Every nurse is aware that a very slight acidity of the milk with which the infant is fed will suffice to occasion vomiting, stomach-ache, and diarrhœa; and the result, as far as the child is concerned, must be much the same whether the acetous fermentation had begun in the milk before it was swallowed, or whether it commences afterwards, in consequence of the disordered condition of the stomach, and the absence of a healthy secretion of gastric juice.

The nature of the food is the first point that requires attention in the management of these cases of infantile dyspepsia. If the child had been fed on cows' milk, the symptoms may have been produced by the gastric juice being unable to re-dissolve the hard curd formed by the coagulation of its casein. In this case the infant may sometimes be restored to health without the employment of any medicine, by diluting the milk, by substituting asses' milk for it, or even by giving whey for a day or two, until the stomach recovers its power of digesting casein. The addition of a small quantity of some alkali—as the carbonate of potash, or prepared chalk—to the milk, is another precaution which should not be omitted, since, while it does not at all interfere with digestion, it tends to prevent the matters taken into the stomach so readily undergoing the acetous fermentation. The indiscriminate employment of alkalies as medicines, is, however, not to be recommended;—they are of service combined either with minute doses of hydrocyanic acid, or of laudanum, when the irritability of the stomach is extreme, as in those cases which were referred to at the commencement of this lecture;—they are also useful in cases of a more chronic kind, where the sour smell of the evacuations, and the frequent occurrence of acid eructations, indicate the presence of an excess of acid in the *primæ viæ*. I do not give them by themselves, but in combination with some tonic, as the infusion of calumba, to which the extract of dandelion and the tincture of rhubarb may be added, if, as sometimes happens, the functions of the liver appear to be but ill performed.

Vomiting of the milk in a coagulated state is no proof of the presence of an excess of acid in the stomach. It may indicate a condition in which the secretion of the gastric juice is either disordered or insufficient, and in which the acetous fermentation is set up in the contents of the stomach, because the organ is inadequate to the proper discharge of those vital functions which would prevent its occurrence. Such cases, and they are many—and among them may be classed all those in which the breath is offensive and the infant is distressed by nauseous eructations—are benefited by the

mineral acids in combination with some bitter infusion; as, for instance, the infusion of cascarilla with hydrochloric acid. I have often observed the action of the bowels become regular, and the appearance of the evacuations healthy, during its administration. The use of mercurials, indeed, so generally resorted to in order to correct some real or fancied disorder of the liver, has become too indiscriminate a practice. The diarrhœa, with very pale light yellow evacuations, that comes on in some of these cases, is often arrested by a spare diet and by the administration of very small doses of sulphate of magnesia and tincture of rhubarb; such as five grains of the former and ten minims of the latter three times a day to a child a year old. In cases where diarrhœa has been long continued, or where the evacuations are very white, and resemble putty, mercurials are generally needed; as they are, also, in those cases where the horribly offensive odour of the evacuations proves that the contents of the intestines have been undergoing a process akin to putrefaction. The mercury and chalk powder, in small doses night and morning, is the mildest preparation that can be given. Sometimes, however, it causes nausea or vomiting, and very small doses of calomel must then be substituted for it; while, if the mercurial should excite the bowels to over-action, this tendency may generally be checked by combining it with Dover's powder.

The same rules must guide us in the management of children in whom, though they be still at the breast, the symptoms of dyspepsia make their appearance. Disorder of the digestive function is, however, much less common before weaning than afterwards. It may depend on the mother's milk being from some cause or other ill adapted to the support of the child, and hence the condition of the parent's health must in all these cases engage our attention.

With these general rules I must dismiss the subject of indigestion, content to have pointed out the principles that should guide you. It must be left to your own experience in future years to supply the details. I have touched on the subject, too, only with reference to the infant, for as the child grows older and its food becomes the same as that of the adult, the symptoms of disorder of its digestive organs become the same too, and require a similar treatment.

In many works on the diseases of childhood we meet with an enumera tion of rather obscure symptoms, which are stated to indicate the existence of gastritis or gastro-enteritis, and to be followed by more or less considerable *softening of the stomach or intestines,* or of both. A similar condition of the stomach was observed by John Hunter in the adult, and was conceived by him to be the result of the action of the gastric juice upon the tissues after death. The carefully conducted experiments of Dr. Carswell have completely confirmed the opinion of John Hunter with

reference to the agent by which this softening is effected; while they have further shewn that it is independent of the person's previous health, and that the presence of gastric juice in the stomach is the only condition essential to its production. Some writers, among whom may be mentioned those eminent authorities M. Cruveilhier and Professor Rokitansky, have, however, dissented in a measure from these views, and have endeavoured to distinguish between two kinds of softening, one of which they regard as a post-mortem occurrence, the other as the result of disease.

The softening of the stomach observed in infancy is believed by M. Rokitansky to be of the latter kind, and to depend upon a disease which he regards as almost peculiar to early life. It varies in degree from a slight diminution in the consistency of the mucous membrane, to a state of complete diffluence of all the tissues of the organ, in which it breaks down under the finger on the slightest touch, or even gives way of its own accord, and allows of the escape of its contents into the abdomen. When the change is not far advanced the exterior of the stomach presents a perfectly natural appearance, but on laying it open, a colourless, or slightly brownish, tenacious mucus, like the mucilage of quince seeds, is found closely adhering to its interior, over a more or less considerable space at the great end of the organ, and extending along the edges of its rugæ. This mucus is easily washed away, and the muscular coat of the stomach in those parts to which it had adhered is then left almost or altogether bare, and denuded of its mucous membrane. When the change has gone further, the stomach at its great end presents a semi-transparent appearance, though not uniformly so, but in streaks running in the direction of the rugæ; the destruction of the tissues having in those situations reached deeper than elsewhere, and involved a portion of the muscular as well as the mucous coat of the organ. If roughly handled, the stomach in many cases gives way, an irregular rent taking place at its great end, where the coats of the organ are found to be soft and pulpy, and to break down easily under the finger. In the next degree, the coats of the stomach are found to have been already dissolved in some parts, so that the contents of the organ have escaped into the abdominal cavity. The whole of the great end of the stomach, and a considerable extent of its posterior wall, are now reduced to a gelatinous condition, in which no distinction of tissues is apparent; and the parts thus altered are either transparent and colourless, or else of a pale, rose-red, hue. The interior of the organ sometimes presents a similar tinge, even beyond the limits to which the softening of its tissue has extended. This, however, is by no means constantly observed, while in no case is there any injection of the vessels of the stomach, or any evidence of its having been the seat of real inflammatory action. The opaque and brownish appearance of the tissues—characteristic of pulpy softening—is but seldom met with in infancy.

Softening of the intestines, though much less frequent than softening of the stomach, is observed under similar circumstances, and presents much the same characters. The exterior of the intestines is generally anæmic, and the softened parts present no trace of increased vascularity, but are either colourless, or of a pale rose hue. The mucous membrane in their interior is neither ulcerated nor abraded, but is found in some parts to be much softened, or even altogether absent in small patches. The muscular coat, too, is sometimes destroyed, though no abrupt edge marks the limits of its destruction, but there is a gradual attenuation of the tissue down to the spot where the peritoneum is laid completely bare. Several of these softened patches are generally met with in the same subject, and at some of them the bowel is often found to have given way, or it breaks down in the attempt to lay open its cavity.

The apparently well founded allegation, that softening of the stomach in the adult occurs with greater frequency in persons who have died from some diseases, than in those who have died from others, has led to the hypothesis that, in the former case, a diseased and superabundant secretion of gastric juice during the life of the individual, had caused the softening of his stomach after death. The same hypothesis has been applied to account for its peculiar frequency in infancy, since at no period of life is gastric disorder so common as then. Some writers have advanced still further, and have endeavoured to connect the existence of a softened state of the stomach after death, with certain well-marked symptoms of disorder of its functions. For my own part, however, I have not been able to discover any peculiarity in the character of such symptoms, nor even any constancy in their occurrence; nor have I observed that the disease of which the infant died has exercised any appreciable influence in predisposing to softening of the stomach, or in preventing its occurrence.

It would, perhaps, not be right to pass wholly unnoticed the theory of the cause of softening of the stomach, recently propounded by Dr. Elsässer.* He refers the alteration of the tissues, not to the gastric juice itself, but to the acids generated during the decomposition of the food contained within the stomach and intestines at the time of death; and endeavours to account for the frequency of the occurrence in the case of infants, from the facility with which a free acid is generated in the milk, which forms the chief part of their sustenance. According to his researches, which appear to have been carefully conducted, the change never ought to take place when the stomach is empty; but his assertion that it never does, is opposed to universal experience.

Though by no means true to their full extent, there is yet probably a considerable measure of truth in Dr. Elsässer's opinions. At present,

* Die Magenerweichung der Saüglinge, 8vo. Stuttgart, 1846.

however, we cannot go with certainty beyond Dr. Carswell's conclusions, as to the nature and cause of this pseudo-morbid appearance.*

Among those rare diseases, too seldom met with for any one person to have what can be called real experience about them, may be mentioned the *vomiting of blood* occasionally observed in infants and young children. In some cases that are on record, the occurrence has taken place within a day or two after birth, and has followed a tedious or difficult labour, in which the head of the child has been much compressed, or in which its abdomen has been pressed upon or otherwise injured during attempts at its extraction. In the majority of instances, however, no such cause could be assigned for it; and the vomiting of blood, sometimes associated with its discharge per anum, has been unattended with other indications of disorder of the abdominal viscera. In most cases the hæmatemesis has not recurred above two or three times in any quantity; and the children, though at first very much exhausted by the loss of blood, have eventually recovered. When death has taken place, the liver and the abdominal veins have sometimes been found gorged with blood, and blood has been found within the intestines, or extravasated between their coats, constituting what has been termed abdominal apoplexy; appearances which have been supposed to indicate that some impediment to the establishment of the new course of the circulation which the blood should follow after birth, has given rise to the accident. In one of two instances of this accident that came under my notice, the cause of the occurrence was very obscure; in the other, the vomiting of blood was accompanied with many indications of hepatic disorder.

The subject of the first observation was a male child, who was born of a healthy mother, after a short and easy labour, at 11 A.M., on Sept. 23, 1845. The infant was well grown, and apparently strong and healthy, and continued so till 2¼ A.M. on the 24th, when, without any previous sickness, or other indication of illness, he vomited nearly half a teacupful of blood. This vomiting was not attended with any pain, nor was any large quantity of blood rejected afterwards, but the child continued at intervals of not more than an hour to throw up small quantities of dark greenish matter, resembling meconium, and mixed with mucus; and on the morning of the 25th, he vomited a small portion of coagulated blood, as

* The recently published very elaborate work of MM. Herrich and Popp, Der plötzliche Tod aus inneren Ursachen, 8vo. Regensburg, 1848, contains, at p. 330, a table of 104 cases in which softening of the stomach was found after death from different causes, and at various ages. In no instance were symptoms observed that would have enabled any one to pronounce beforehand that softening of the stomach would be discovered after death. In by far the greater number of the cases the stomach was empty, shewing that the occurrence was very often independent of digestion; while the period of childhood, the rapid course of the fatal disease, and death from cerebral affections, were the only circumstances which appeared to have any clearly appreciable influence in favouring its production.

big as the top of the little finger. Between the time of the child's birth and the morning of the 25th, the bowels acted seven times; the motions were rather scanty, and consisted entirely of meconium. The child sucked well, did not appear in distress; its surface was warm, and its abdomen neither full nor tender. The matters vomited did not decompose, although they were kept for some days; and when examined under the microscope, they were seen to be made up of a great number of granular globules, with which were intermixed some scales of tesselated epithelium.

The 27th of September was the last day on which the dark solid matter like meconium was vomited; but the child continued to be sick occasionally until October 7, although the attacks of sickness did not seem to be excited by sucking, but occurred in general when the stomach was empty, and ended with the rejection of a small quantity of mucus, occasionally of a greenish colour. The bowels were rather constipated, and the evacuations for the first week after the child's birth continued very dark coloured: they afterwards assumed a more natural colour; but the bowels remained very constipated during the whole of the child's life. The child never throve; it lost flesh, occasionally vomited the milk, had a frequent and troublesome cough; its strength decayed, and it died exhausted on April 28, 1846, at the age of seven months. On examining the body, nothing was found to explain the child's illness: there was no tubercle in any organ; the viscera were anæmic; no trace of inflammatory action was visible anywhere. A few lobules in both lungs were in a collapsed condition; the small intestines presented several recent intussusceptions; and the stomach was remarkably small, and undeveloped in form as well as in size; but no other morbid appearances existed in any part of the body.

In the other case, the child, likewise a boy, had perfectly good health till he was two months old, when he began to appear stuffed at his chest, and had frequent, though not severe cough. At the age of ten weeks, he brought up a small quantity of dark blood while coughing, and afterwards had frequent attacks of retching and vomiting, independent of cough. During these attacks, he brought up a dark red fluid, like blood, sometimes in as large a quantity as two-thirds of a tea-cupful. On Feb. 17, 1844, after these symptoms had continued for four days, I saw the child, whose face was slightly flushed, and the expression of his countenance dull. His abdomen was full and rather tender, especially in the right hypochondriac region; his urine was very high coloured, and his evacuations were quite white. From Feb. 17, to April 13, the child remained under my care, and during this time the above-mentioned symptoms continued, although with a gradual amelioration in the child's condition. Within a week after I first saw him, he had a severe convulsive seizure, and attacks of a similar kind occurred a great many times afterwards, independent of any obvious

cause. The bowels were always constipated ; the evacuations usually very white, though occasionally almost black, sometimes accompanied with a slight discharge of blood, and blood was now and then voided unmixed with fæcal matter. The stomach became very irritable, and the child suffered from frequent vomiting ; the matters rejected being untinged with blood for days together, and then, without any apparent reason, blood was abundantly mingled with them. Sometimes the infant cried much, and appeared in very great pain, and these attacks often terminated in the rejection of a considerable quantity of nearly pure blood. The face soon lost its flush, and became pale, but the puffiness continued, and was evidently due to a slight degree of anasarca. From the tender age of the child, I was unable to obtain any of his urine, in order to ascertain whether or not it contained albumen. The treatment followed was directed to diminish the abdominal tenderness, by the application of a couple of leeches over the right hypochondrium, and to overcome the constipated state of the bowels, and induce the healthy action of the liver, by the employment of small doses of mercurials, and of the sulphate of magnesia, to which it became sometimes necessary to add the administration of an active purgative. In May, 1844, the child was sent to Margate, where the convulsive attacks, and the other symptoms, altogether ceased. On his return to London, after a stay of six months at the sea-side, his health failed, partly, as it seemed, in consequence of his mother's poverty preventing her from supplying him with proper food. In Nov., 1846, when much out of health, and suffering from diarrhœa, he came again under my care, but died suddenly of hæmorrhage into the arachnoid.* There was no appearance in the abdominal viscera after death which threw any light on the cause of the hæmatemesis and melæna, from which the child had suffered for so many months during his early infancy.

This case and the preceding one may serve to confirm, what other observations of hæmatemesis likewise shew, that the immediate danger to life is much less than might be feared from the formidable nature of the occurrence ; and secondly, that when any indications of general disorder are present, they are generally such as point to more or less serious disturbance of the function of the liver.

It will not be necessary to do more than allude to cases of what has been called *spurious hæmatemesis*, in which an infant vomits blood drawn from some crack or ulceration of its mother's nipple, or which has been furnished by some little vessel cut in dividing the frænum linguæ, or in performing some other operation on its mouth. You would at once suspect the source of the blood vomited after the operation on the infant's mouth, and an examination of the mother's nipple in a case of hæmatemesis will guard you against the other possible source of error.

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* The particulars of his last illness are given in Lecture IV. p. 42.

LECTURE XXXI.

Icterus of new-born children—generally a trivial affection—not usually dependent on intestinal disorder, but on imperfect performance of function of skin and respiratory organs—sometimes results from absence or closure of hepatic or cystic ducts—is then associated with great tendency to hæmorrhage, and proves speedily fatal. It occasionally occurs in children under the same circumstances as in the adult.

Constipation sometimes results from mechanical obstruction of intestines—which may be congenital—as from impeforate anus, or impervious rectum.—Varieties of these malformations—their general symptoms—special signs of each—their comparative danger, and appropriate treatment.

Obstruction of intestines from causes not congenital,—strangulated hernia very rare in infancy—intussusception of intestines,—its symptoms—usually more characteristic than in the adult—its generally fatal result—but occasional spontaneous cure.

It often happens, that, some two or three days after birth, the skin of a new-born infant assumes more or less of a yellow colour,—that this colour gradually deepens, and becomes apparent in the conjunctiva as well as over the whole surface of the body; but after a day or two the yellow tinge diminishes, and in the course of a week or ten days completely disappears—little if any indisposition having attended any stage of the affection. The general resemblance of its symptoms to those of jaundice in the adult, has led some persons to attribute this *icterus neonatorum* to retention of the meconium, or to gastric or intestinal disorder produced by unsuitable food. On the other hand, the slightness of the constitutional disturbance which attends it, and the occasional absence of all signs of disorder of the general health, have given rise to a different opinion, according to which the occurrence is attributed to physiological rather than to pathological causes. With reference to the first of these views, however, it may be observed, that infantile icterus is often unattended either with retention of the meconium, or with any other form of intestinal disorder; while very serious disturbance of the digestive organs, or even complete retention of the meconium, from an impervious condition of the rectum, may exist without being associated with a yellow tinge of the skin. The assumption that it is a perfectly natural state, in which the skin and other secreting organs are called on for a few days to assist in

disposing of the bile, until the demand for it to minister to the digestive functions becomes equal to its abundant supply, is shown to be erroneous, by the circumstance that jaundice does not affect perfectly healthy children, who have been born at the full time, have been nourished exclusively at the mother's breast, and been sheltered from cold without being overburthened with clothing or confined in a vitiated atmosphere. In the Dublin Lying-in Hospital, where the children are defended by the most watchful care from the evils either of cold or of a vitiated atmosphere, the occurrence of infantile jaundice is rare; while in the Foundling Hospital at Paris jaundice is so common, that comparatively few infants escape it. Almost all the children at the Foundling Hospital have been exposed to the action of cold while being brought to the institution, and suffer from the combined influences of cold and bad air while inmates of it—causes which interfere very seriously with the due performance of the functions of the skin and of the respiratory organs.

The children in whom jaundice is most frequent and most intense, are the immature and the feeble; while in none is it so often met with, or in such an intense degree, as in infants affected with induration of the cellular tissue, in whom the yellow colour is often so deep as to be manifest in the serum infiltrated into their cellular tissue, or poured out into the cavities of their chest or abdomen. Interruption of the function of the skin, and great impairment of that of the lungs, are, as you know, the grand characteristics of that affection; while in many instances of it the fœtal passages are still pervious, and the blood circulates in part through channels which ought to have been closed from the time of birth. These facts seem to substantiate the opinion entertained by many writers of high authority, that the jaundice of young children is not due to any cause *primarily* seated in the liver, but rather to the defective respiration, and the impaired performance of the function of the skin, of which the hepatic disorder and consequent jaundice are but the effects.

As the respiratory function, and that of the skin, increase in activity—which they will do if the cause of their imperfect performance be but slight or temporary—the jaundice disappears of its own accord. Great attention must be paid during its continuance to avoid exposure of the child to cold; while no other food than the mother's milk should be given. If the bowels be at all constipated, a grain of Hyd. c. Cretâ may be given, followed by a small dose of castor oil; and the aperient will often appear to hasten the disappearance of the jaundice; but in a large number of cases even this amount of medical interference is not needed.

Besides these cases, however, in which the jaundice is at most but a very trivial ailment, instances are sometimes met with where it is a very serious affection, dependent on congenital absence of the hepatic or cystic biliary ducts, or on the obstruction of those ducts by inspissated bile. Under these circumstances death takes place sooner or later, though now

and then not for several months; and, as might be expected, the evacuations continue during the whole period destitute of bile. One remarkable phenomenon attending these cases, is the tendency to hæmorrhage by which they are characterized; this hæmorrhage taking place for the most part from the umbilicus, either before or soon after the separation of the funis. In some instances the recurrence of this bleeding proves fatal, while in others the infant sinks into a state of coma, which continues for a day or two before death takes place. It is unusual for the infant to survive its birth longer than a fortnight; and, if its life should be prolonged, a condition of general atrophy comes on, attended with enlargement of the abdomen in both hypochondriac regions; and some intercurrent attack of diarrhœa generally exhausts the feeble powers when only a few months have passed. It may suffice just to have referred to the main features of these unfortunate cases. Happily they are very rare; no instance of them has come under my own notice, but you will find a very interesting history of three cases of this fatal icterus in a paper published by Dr. A. B. Campbell, in the Northern Journal of Medicine for August 1844.

Jaundice may also occur in older children under the same circumstances as in adults, and associated with similar symptoms; the evacuations being white, the urine high coloured, and more or less pain and tenderness being experienced in the hypochondriac region. Such cases are most frequently met with during the summer or autumn, especially at times when diarrhœa is prevalent; the skin sometimes assuming a generally yellow tinge as the purging subsides; while in other instances the jaundice occurs as an idiopathic affection, though apparently due to the same causes as have produced diarrhœa in other children.

In the instances that have come under my notice the skin has never assumed a very deep yellow tinge, and the constitutional symptoms have seldom been severe. Now and then, however, considerable febrile disturbance precedes the appearance of the jaundice for two or three days: the skin is dry, though not very hot; vomiting occurs; and the child complains much of headache and dizziness, and rests ill at night, or awakes in a state of alarm. The resemblance between these symptoms and some of those which occur in cases of real cerebral disease, is almost sure to excite much apprehension in the mind of the parents; and may even render it a difficult task for you to form a correct diagnosis. The following circumstances will, however, usually suffice to preserve you from error:— The attack has not, in most instances, been preceded by those indications of generally failing health which so often occur during many days before the symptoms of hydrocephalus manifest themselves; and it is not attended either by the anxious expression of countenance, the heat of head, or the intolerance of light, by which cerebral disease is accompanied. Though the sleep may be disturbed, it is usually less so than in hydrocephalus;

the pulse is less frequent; and though the child vomits occasionally, it does not suffer from constant nausea. When to these symptoms tenderness on pressure in the hypochondriac region is superadded, with the appearance in a day or two of high-coloured urine and of white evacuations, and lastly, of the yellow tinge of the skin, no further possibility of error remains.

The treatment of jaundice in the child calls for but very simple remedies. If it be accompanied with much tenderness in the hypochondriac region, a few leeches may be applied in that situation with much advantage. If, however, this be not the case, the employment of small doses of the sulphate of magnesia, in combination with the tincture of rhubarb, every four or every six hours, with three grains of the Hydr. c. Cretâ for a child of five years old, at bed-time, will generally suffice to restore the patient to health in the course of four or five days. Should the appetite continue bad, and the child fretful and languid, after the subsidence of the jaundice, and the return of the evacuations to a more healthy character, the compound infusion of roses, either alone or in combination with small doses of sulphate of magnesia, will be found of much service. In some cases, however, removal to the country, or to the sea-side, appears to be absolutely necessary to the child's complete recovery.

I have nothing to add to what has already been said on the subject of *constipation*,—which is to be regarded as a symptom of various diseases rather than as a special idiopathic affection. To this rule, however, an exception must be made in those cases in which the due action of the bowels is prevented by some mechanical impediment. Such an impediment is, in some rare instances, presented by *congenital malformation of the intestines*, whose calibre has been found greatly diminished, or their canal completely obstructed, or even their continuity altogether interrupted. These occurrences, although of great interest and importance, from their relation to the laws that regulate fœtal development, yet for the most part afford no scope for the interference of medical or surgical skill. But while we pass over, as foreign to our purpose, the general study of these malformations, we must take some notice of one variety of them, in which the obstacle to the escape of the fæces is situated low down in the large intestine, since their diagnosis is often easy, and their cure not always beyond the resources of our art.

The cause of the obstruction in these cases is not always of the same kind, nor is the patient in every instance exposed to the same amount of danger; but *three different classes of the malformation* may be recognised, in each of which our prognosis must somewhat differ, although in almost all it must be doubtful, and in many extremely unfavourable.

To the *first* class may be referred all those cases in which the rectum is perfect, but the canal is closed either by a false membrane obstructing its orifice, or situated higher up in the intestine; or by the cohesion of the opposite sides of the gut.

The *second* class includes cases in which, although the natural aperture is absent, yet the intestine terminates by opening into the urethra, bladder, or vagina.

To the *third* class belong those instances in which the intestinal canal is not merely occluded, but also malformed, or altogether absent for a more or less considerable extent.

The affection in any form is so rare as to render a correct estimate of the comparative frequency of its varieties by no means easy. Dr. Collins observed only one instance of it out of 16,654 children born in the Dublin Lying-in Hospital during his mastership;* and Dr. Zöhrer, of Vienna,† mentions, that he met with it only twice out of 50,000 new-born children. A comparison of 74 cases derived from different sources, yields 17 belonging to the first class, 29 to the second, and 28 to the third; but it is probable that many instances of simple closure of the anus have passed unrecorded, while all the instances of more serious malformation have been described.

Whatever be the seat of the obstruction, its existence is betrayed by much the same train of *symptoms* in all cases. Attention is first excited by the infant not having voided any meconium, although from twelve to twenty-four hours may have elapsed since its birth. A dose of castor oil, or of some other aperient given with the view of exciting the bowels to action, fails of producing this effect, while it is either returned by vomiting, or, if not actually rejected, it causes nausea and retching. Before long, the child shows indications of uneasiness, and has attacks of pain, in which it cries, and seems to suffer much. In some cases it remains quiet in the intervals between these attacks, and seems drowsy; but in other cases it appears to be in a state of constant discomfort, which it betrays by a whimpering cry. The attempt to suck is almost always followed by retching, frequently by actual vomiting, and attacks both of retching and vomiting often come on when the stomach is quite empty. In some cases nothing more is thrown up than a little mucus, which is sometimes of a greenish colour; while in other instances vomiting of meconium takes place: but this occurrence is by no means constant. The abdomen becomes distended and tympanitic, and grows larger and more tense the longer that life continues, while at the same time the child's discomfort is much aggravated by any pressure upon it. The restlessness increases, and the attacks of pain grow more severe, the child often making violent straining efforts during their continuance; but as the powers of life decline, these efforts become more feeble, though the retching and vomiting often continue to the last. The period at which death takes place varies much; for though, in the majority of instances, the child dies within a week from its birth, yet cases are on record in which it has survived for several

* System of Midwifery, p. 509.

† Oesterr. Med. Wochenschr.; and Canstatt's Jahresber. für 1842, Bd. i. S. 456.

weeks; and an instance has been mentioned to me by Mr. Arnott, in which he saw a child live for seven weeks and three days, although the colon terminated in a blind pouch, and the rectum was entirely absent. Death usually occurs under a gradual aggravation of the previous symptoms; but now and then it is ushered in by the sudden supervention of a state of collapse, owing to the over-distended intestine having given way. This is, however, a rare occurrence; for I find mention of it having happened only in three out of the seventy-four cases to which I have referred.

Coupled with the general signs of intestinal obstruction, there are in each case some special indications of the peculiar form of malformation to which the obstruction is due. If the anus be merely closed by a membrane, or by the cohesion of its edges, the collection of the meconium above, may give rise to the formation of a distinct tumor between the buttocks; while sometimes the dark colour of the meconium shews through the thin integument by which its escape is prevented. In other cases the anus itself is well formed, but the introduction of the finger or of a bougie into the rectum detects the existence of some obstruction within the gut. Again, in other instances, there is no trace of an anus, or a small depression is all that marks the situation which it should occupy; the rectum either ending in a blind pouch, or communicating with the vagina, urethra, or bladder.

Although the diagnosis in all cases is sufficiently easy, yet the carrying out the very obvious indication of relieving the patient by providing for the escape of the contents of the intestines, is often very difficult, and, even when accomplished, its result is in many instances extremely uncertain. If the obstruction be situated at the orifice of the anus, a crucial incision through the membrane which closes it, or the introduction of a trocar, will afford immediate relief. Our prognosis also may under these circumstances be very favourable; for of fifteen cases of this kind, all but one had a favourable issue. After the opening has been established, however, some attention must be paid to prevent its becoming closed, or much contracted. For this purpose it has been recommended that a tent should be kept in the anus for some days, though to this it has been objected that a constant straining effort is thereby produced, and the frequent introduction of the finger or of a bougie into the passage is, therefore, recommended as preferable to leaving any body constantly within it.

If the obstacle be occasioned by a membrane seated higher up in the rectum, we may still hope to succeed, though our prognosis must be more guarded, since two out of four cases of this description had a fatal result. In one of the fatal cases it appeared that rupture of the intestine had already taken place before any operation was performed; in the other, the death of the child was accounted for by the discovery of a second septum higher up in the rectum than that which had been divided.

The existence of an anus, and a small extent of gut above it, although a decidedly favourable feature in a case, does not warrant quite so hopeful a prognosis as we might in the first instance feel disposed to adopt. The probabilities, indeed, are, that the distance is not great between the end of the rectum and the cul-de-sac in which the anus terminates; yet a considerable space may intervene between the two, or, as in a case which Mr. Arnott was so good as to communicate to me, the rectum may be found altogether absent, the colon terminating in a blind extremity, and floating loose in the abdominal cavity. In the majority of instances the two blind pouches are connected together by the intervention of an eighth or a quarter of an inch of dense cellular tissue, which sometimes presents an almost ligamentous character; and in some cases the end of the large intestine is situated anterior to the extremity of the cul-de-sac that leads from the anus. Owing to this latter circumstance, the operation for the relief of this condition has sometimes failed; the instrument, although introduced deep enough, yet passing behind the distended bowel. Out of nine cases of this kind, eight had a fatal termination; the bowel on four occasions not having been reached at all, while once the opening made into it was too small to allow of the free escape of the meconium. It may be added, that in three of the fatal cases there existed such contraction of the calibre of different parts of the large intestine as would of itself have opposed a serious obstacle to the child's recovery.

In twelve cases the anus was absent, and in some of these instances no trace of it existed, while the rectum terminated in a cul-de-sac at from one to two inches from the surface. In five of these cases the attempt to open the intestine was successful, and the child eventually did well; while in two other cases, although temporary relief followed the operation, yet symptoms of inflammation of the bowels came on, which terminated fatally in the course of a few days. In three instances it was not found possible to reach the bowel; and in two others, although an opening was made, yet its size was insufficient to afford a free vent to the accumulated meconium, and the fatal issue, though deferred, was not prevented. Failure to reach the intestine seems to have depended either on the trocar not having been introduced sufficiently deep, or on its having been directed too far backwards. The danger of hæmorrhage, or of wounding the bladder, of which some operators seem to have been apprehensive, is not much to be feared; for I find but one instance on record in which the bladder was accidentally wounded, and not one of fatal or even of serious hæmorrhage. Better success also appears to have been obtained in those cases in which a sufficiently deep and free incision was made with a bistoury in the direction of the rectum, than in those in which a trocar was at once introduced. The suggestion of M. Amussat, that in these cases the blind sac of the intestine should be drawn down, and its cut edges attached by sutures to the margin

of the external skin, in order to prevent the infiltration of fæcal matter between the end of the rectum and the wound in the integuments, and to diminish the danger of the aperture closing, is worth bearing in mind. It was adopted with apparent advantage by Mr. Waters in a case of this kind recorded by him in the Dublin Journal for May, 1842, on which he operated with success.

Besides these cases in which the malformation was confined to the rectum, I find mention of three others in which the rectum was entirely absent, and the intestine terminated in a cul-de-sac as high up as the colon. In two other cases in which the attempts to discover the rectum failed, the life of the child was preserved by the establishment of an artificial anus. M. Amussat has of late recommended, that, in all cases in which fluctuation cannot be detected through the skin, an artificial anus should at once be formed in the left lumbar region, as being a safer proceeding than the attempt to open the bowel from the perineum. When we consider, however, the loathsome nature of the infirmity to which a person is condemned in whom an artificial anus exists, we shall probably be disposed still to regard the operation for its formation as a last resource, to be employed only in the event of our failing to discover the rectum by an operation instituted on the perineum.

In some cases, although the anus is absent, yet the intestine is not imperforate, but opens either into the vagina in the female, or into the bladder or urethra in the male subject. In either case the malformation is due to a similar cause—namely, an arrest of development, whereby the separation between the bowel and the sinus uro-genitalis has never been completed. The malformation in the female subject is not attended with immediate danger to life, and fortunately it admits of cure in the great majority of instances. I find, indeed, that in seven out of ten cases of this description, an operation was attempted, and that in every instance it proved successful. In some cases the mere establishment of the natural opening of the anus, with the introduction of a tube into the rectum, was sufficient to effect a cure; but a more complex operation was in general necessary, the principle of which consisted in dividing all the parts from the vagina into the rectum; though the details of the proceeding, and the means whereby a re-union of the two canals was prevented, varied in different cases.

The result is very much more unfavourable when a communication subsists between the intestine, and the bladder or urethra in the male; for eight out of ten cases of the former kind, and the same number out of nine of the latter kind, ended in the death of the infant. The connection with the bladder is generally established by means of a very slender canal which enters that viscus at or near its neck; but in one instance in which the rectum was wanting, the colon terminated by opening with a wide

aperture into the upper part of the bladder. A slender duct is likewise the usual channel of communication between the rectum and the urethra, and this duct generally enters the membranous portion of the urethra just in front of the prostate. Cruveilhier, however, met with an instance in which the rectum opened under the glans penis, and a somewhat similar case, in which there was a small aperture through which meconium passed in front of the scrotum, came under the notice of Mr. South, and is mentioned by him in his edition of Chelius's Surgery.

The existence of a communication between the rectum and the urethra, or bladder, is generally indicated by the urine voided being tinged with meconium, but it seldom happens that the contents of the intestines are discharged by the urethra with freedom sufficient to preserve the child from the suffering and danger that attend upon an imperforate state of the rectum. Even when life has been prolonged for some time, yet the infant's death is merely deferred, for the symptoms of obstruction appear, and at length prove fatal, after the fæces have acquired a firmer consistence than they possessed during the first few months of existence. These cases, too, do not appear to be favourable for an operation, since the rectum usually terminates high up, and in five out of ten cases in which it is stated that the attempt was made to puncture the intestine, this attempt was unsuccessful. In Mr. South's case the rectum was punctured by a trocar introduced an inch deep, and though much difficulty was experienced in keeping the passage free, yet the child survived, and grew up to manhood. Of the other two successful cases, one of which is recorded by Mr. Miller,* and the other by Mr. Fergusson,† both were cured only with much trouble and difficulty. For a full account of the difficulties these gentlemen had to contend with, and the means by which they overcame them, I must refer you to the history of the cases in the Edinburgh Medical Journal.

An insuperable obstacle to the action of the bowels may occur in children, just as it sometimes does in older persons, either from the *strangulation of an external hernia*, or from the *invagination of a portion of intestine*. Although hernia is by no means an uncommon affection in early life, yet it is, I believe, a very rare occurrence for the intestine to become strangulated. Such an accident, however, may take place, even in very young infants, of which the case related by Mr. Fergusson, in which he operated for strangulated inguinal hernia on an infant only seventeen days old, may be mentioned as a striking illustration. Bearing in mind its possibility, therefore, you would examine any infant or child, in whom abdominal pain, vomiting, and obstinate constipation came on, just as carefully as you would an adult under similar circumstances, lest it should be

* Edinburgh Medical and Surgical Journal, No. 98, p. 61.

† Ibid. vol. xxxvi. p. 363.

found out when too late that the symptoms had been due to some unsuspected external hernia.

The strangulation of an external rupture is a much rarer accident in early life, than the occurrence of *intussusception* of one or more portions of the intestines. This condition, indeed, is frequently met with in the bodies of children who have died of various diseases, and wholly independent of any symptoms of disorder of the bowels during the patient's life-time. Sometimes a single intussusception exists, but oftener there are several; ten, twelve, and even more have occasionally been observed in the same subject. They are most numerous in the ileum, and though seldom involving more than three or four inches, have been found to include more than double that extent of intestine. Their great frequency, the absence of any symptom of them during life, and of any indication of inflammation about the intestines after death, all confirm the general opinion, that they take place during the act of dying.

It happens, however, now and then, that an infant previously well, is suddenly, and apparently causelessly, seized with abdominal pain, vomiting, and obstinate constipation, attended with tenesmus, and the discharge by the anus of small quantities of blood or bloody mucus, and that death having taken place under an aggravation of these symptoms, an intussusception of some portion of the intestine is discovered on making a post-mortem examination. In other cases, after these symptoms have continued for some hours, and after medicine has seemed altogether unable to relieve them, the pain and the vomiting cease: the child has one or more fæcal evacuations, and regains its usual health without the recurrence of any accident calculated to renew our anxiety. It has been suggested, and with great probability, that in cases of this latter kind an invagination had existed, which nature had succeeded in removing, and had thus preserved the infant's life. Be this as it may, neither occurrence is at all frequent, for it has never happened to me to meet with a case of fatal intussusception, and the cases recorded in medical journals are not numerous; whilst I have observed only one instance in which the symptoms of intussusception having existed in a marked degree, at length spontaneously ceased, and were followed by the restoration of the infant to perfect health.

Children in whom intussusception takes place are generally infants under a year, often under six months old. Their previous history does not in general display any liability either to constipation or to diarrhœa, nor in the greater number of instances has the manifestation of the symptoms followed the administration of any aperient medicine. Sudden and violent vomiting, followed by loud cries, and other indications of uneasiness, which ceasing for a time return at uncertain intervals, and are accompanied by violent straining, and efforts to empty the bowels, are the earliest symptoms of the accident. At first some fæces are voided during these efforts,

but afterwards the matters discharged from the bowels are either mucus tinged with blood,* or else pure blood, and that sometimes in considerable quantities. If an enema be given, the fluid thrown up is immediately returned, it appearing not properly to enter the intestine, while on one or two occasions the existence of an obstruction has been discovered on introducing the finger into the rectum. The vomiting is almost immediately renewed whenever either food or medicine is given, but fæcal matters are seldom if ever discharged by the mouth. The child has intervals of quiet, from which it is roused by the returns of pain; it is often thirsty, and though the sickness continues unabated, yet it seems eager for the breast, and sucks frequently. The condition of the abdomen is variable, and though a distinct tumor is said to have been detected in some cases, at a spot which was found afterwards to correspond to the situation of the intussusception, yet it has happened in at least as large a number of instances, that the most careful examination has failed to detect any thing unnatural in its state, and that it has continued uniformly soft up to the time of the patient's death. The continuance of the intussusception leads to the exhaustion of the infant's strength; its pulse grows more and more feeble, its face becomes anxious and sunken, and it falls in the intervals between its attacks of pain into a quiet, half comatose condition. In the majority of cases convulsions come on a few hours before death, which always takes place within a week, oftener in from forty-eight to seventy-two hours.

A portion of the ileum, the cæcum, and sometimes a portion of the ascending colon, are the parts usually invaginated. In many, though not in all instances, these parts display more or less evidence of inflammation, which sometimes is found to have extended to the peritoneum. The presence of inflammation, and its amount, are, as might be expected, mainly dependent on the duration of the infant's life.

On comparing the history of several cases of this affection, there appears to be such an uniformity in their symptoms as would, I should imagine, render it in general tolerably easy to form a correct diagnosis. I do not dwell upon the treatment, for that must be the same in the infant as in the adult; and my own experience does not enable me to say any thing that could be of use in diminishing the difficulties by which the subject is attended. I would only observe, that as the symptoms enable you in the infant earlier than in the adult, to arrive at a tolerably certain knowledge of the nature of the case, you will have absolutely no excuse for persevering in the use of active purgatives, in order to overcome the constipation. It

* The credit of drawing attention to the value of the intestinal hæmorrhage in these cases as a sign of intussusception, belongs to Mr. Gorham, whose essay on this affection, in No. 7 of the Guy's Hospital Reports, may be consulted with profit.

was during the suspension of the active remedies which had been previously employed, that the case which I saw took a favourable turn, and I should regard the use of powerful cathartics as less warrantable in the child than in the grown person. The same objection could not attach to the use of large enemata, nor to the inflation of the intestine with air, which has once or twice been followed by the subsidence of the symptoms, and which I had proposed employing in the case above referred to, had I not had the pleasure of finding that nature had effected the patient's cure.

LECTURE XXXII.

Diarrhœa—its two forms, the simple and inflammatory—causes of the affection—influence of age—of process of dentition—of temperature, and season of the year.

Symptoms of simple diarrhœa—not usually a dangerous affection—occasional hazard from great exhaustion that it produces—cessation of purging sometimes independent of real amendment—danger of secondary diarrhœa.

Inflammatory diarrhœa—occasional want of correspondence between the symptoms and morbid appearances—latter observed chiefly in large intestine—very similar to those discovered in dysentery of the adult.

Symptoms of inflammatory diarrhœa—occasional disturbance of nervous system at the outset—progress of the disease—its tendency to a chronic course.—Life sometimes cut short by intercurrent bronchitis—by head symptoms—by relapse after temporary amendment.

In a systematic course of lectures like the present, subjects of very various interest and importance come successively before us. We were engaged yesterday in the study of some affections, which fortunately are of very rare occurrence; but to-day we pass to the examination of one of the most common, and at the same time one of the most serious, disorders of infancy and childhood. The importance of *diarrhœa* in early life, indeed, is not to be estimated merely by the number of deaths which our tables of mortality represent it to have occasioned; for the figures that they display would warrant our dismissing it with a comparatively short notice.* But we shall come to a very different conclusion, if we consider the frequency of the affection, and the slight causes which often suffice to induce it: the dangers to health which result from its long continuance; and the greatly increased hazard to which its supervention in the course of some other disease exposes the patient.

Under the common name of diarrhœa, many of the older writers on the diseases of children have included all cases, without distinction, in which

* According to the Fifth Report of the Registrar-General, the deaths in London from diarrhœa, dysentery, and cholera, as compared with the total deaths from all ascertained causes, were, in children under one year old, in the proportion of 3·9 per cent.; between one and three, 2·3 per cent.; from three to five, ·6 per cent.; from five to ten, 1·1 per cent.; and from ten to fifteen, 1· per cent.

there is an unnatural increase of the alvine discharges. On the other hand, some among the moderns, rejecting the word diarrhœa from their medical nomenclature, have treated only of certain inflammatory affections of the intestines of which they believe the flux to be symptomatic. Neither of these arrangements, however, is free from objection, for while the former draws no adequate distinction between cases in which the disorder of the functions of the bowels is the result of some accidental and temporary cause, and others in which it is the consequence of organic disease; the latter involves an attempt to distinguish, on purely anatomical grounds, between affections which present the same symptoms and require the same treatment.

In the present state of our knowledge, it will perhaps be the safer way to attempt no further subdivision than into the two grand classes of *simple diarrhœa*, or *catarrhal diarrhœa*, as it has been termed by some writers, and *inflammatory diarrhœa*, or *dysentery*. Even in this arrangement it must be confessed that there is something arbitrary, for the two affections are closely allied to each other. In the child, as in the adult, they often prevail at the same time,—they are to a considerable degree dependent on the same causes, and are in a measure amenable to the same remedies; while the milder complaint not infrequently passes into the more severe. Before we proceed, therefore, to the study of the special characters of either affection, it may be well to examine into some of those conditions which are alike favourable to the production of both.

The following table, deduced from 1344 cases of diarrhœa or dysentery that came under my notice at the Children's Infirmary, shows that the *age* of the child has much to do with the occurrence of the affection:—

Cases of diarrhœa in children at the following ages:—	Were to all cases of diarrhœa in children under 15 in the proportion of	Were to all other diseases at the same age in the proportion of
Under 6 months	7·8 per cent.	12·6 per cent.
Between 6 " and 12 months	16·6 "	17·5 "
" 12 " " 18 "	21·6 "	23·2 "
" 18 " " 2 years	15·0 "	23·7 "
" 2 years " 3 "	12·0 "	13·9 "
" 3 " " 5 "	11·5 "	8·6 "
" 5 " " 10 "	11·2 "	7·0 "
" 10 " " 15 "	4·8 "	7·6 "

You will observe that the period of the greatest prevalence of diarrhœa coincides exactly with that time during which the *process of dentition* is going on most actively, and that more than half of all cases of diarrhœa occurred in children between the ages of six months and two years. So close, indeed, is the connection between teething and diarrhœa, that a French physician, M. Bouchut,* found that only 26 out of 110 children,

* Manuel Pratique des Maladies des Nouveaux-Nés, 12mo. p. 196. Paris, 1845.

entirely escaped its attack during the period of their first dentition, while 46 suffered from it very severely. The older writers on medicine, whose notice this fact did not escape, attributed the disturbance of the bowels to a sort of sympathy between the intestinal canal and the gums, swollen and irritated by the approach of the teeth to their surface. The frequent observation of cases in which an attack of diarrhœa attends the irruption of each fresh tooth, and ceases when it has cut through the gum, shows that such an hypothesis is not altogether without foundation. But besides the influence of nervous irritation in quickening for a time the peristaltic action of the bowels, and thus inducing diarrhœa, it must be borne in mind, that there exists during the period of teething a more abiding cause, which strongly predisposes to its occurrence. All parts of the digestive canal, and of its dependencies, are now undergoing an active evolution to fit them for the proper assimilation of the varied food on which the young being will soon have to subsist. Just as the salivary glands are now developed, and pour out saliva in abundance, so the whole glandular system of the intestines assumes a rapidity of growth, and an activity of function, which, under the influence of comparatively slight exciting causes, may pass the just limits of health. In too many instances, causes fully adequate to excite diarrhœa are abundantly supplied in the excessive quantity or unsuitable quality of the food with which the infant is furnished; for it is forgotten that its condition is one of transition, in which something more than ordinary care is needed, while in accordance with that mistaken humoral pathology so popular among the vulgar, the profuse secretion from the irritated glands is regarded as the result of a kind of safety-valve arrangement whereby nature seeks to moderate the constitutional excitement attendant upon teething.

But, besides those conditions seated within the organism which predispose to diarrhœa, and those occasions furnished from without by the food with which the child is supplied, *atmospheric influences* constitute a third, and a very important class of causes, which at one time render diarrhœa very frequent, and at another greatly check its prevalence.

On a comparison of the results of five years' observation at the Children's Infirmary, I find that

In the 3 months,	Nov., Dec., and Jan.,	diarrhœa formed	7·2	per cent.	of all cases of disease.
"	Feb., March, and April,	"	8·3	"	"
"	May, June, and July,	"	13·0	"	"
"	Aug., Sept., and Oct.,	"	24·4	"	"

The above mentioned causes dispose alike to diarrhœa and dysentery; but among the dwellings of the poor in this metropolis, and especially in that district of it where most of my observations have been made, conditions abound which often stamp on the disease the characters of the more serious malady. Before investigating them, however, we may first study the

symptoms of the milder affection, which, though much the more frequent, yet, if uncomplicated, is seldom or never fatal.

When the attack comes on in perfectly healthy children, it often sets in quite suddenly, with vomiting of the contents of the stomach, and afterwards of mucus, which sometimes has a yellow or greenish colour. The sickness does not in general continue, though exceptions are met with in some of the more severe cases, in which the stomach remains very irritable during the whole period that the affection lasts. In either case, the vomiting is almost immediately succeeded by increased action of the bowels, the matters discharged being at first the healthy fæces; but they soon assume a bright yellow colour, like that of the yolk of egg, and are often intermixed with slime; or in other cases they present a frothy appearance. The bright yellow colour of the evacuations, often, though by no means always, changes to green under exposure to the air; while, if the diarrhœa should continue, the fæces present in many instances a green colour when voided, similar to that which is frequently produced by the administration of mercury. In other cases the green and yellow colours appear intermixed in the evacuations, while the presence in them of numerous white specks, the casein of the undigested milk, shows that the function of the stomach is interfered with by the same cause as produces the over-action of the bowels. The source of the green colour of the evacuations has not yet been quite satisfactorily determined. In some cases it probably depends on the action of the acids of the alimentary canal upon the colouring matter of the bile; but Dr. Golding Bird's investigations have proved it not to be always due to this cause, and have rendered it probable that, in many instances, it results from the presence of altered blood in the evacuations. As the child returns to health the fæces become less watery, and then resume their yellow colour; or stools of a natural character alternate with others of a green colour and unhealthy aspect, or in which a very large quantity of mucus is present. The action of the bowels, too, becomes less frequent, and the child often regains its usual health in four or five days, though sometimes a disposition to diarrhœa is left behind, and the disorder is liable to be re-excited by very slight causes.

In the majority of cases this over-action of the bowels is not attended with much fever or constitutional disturbance, though, if it should come on during teething, the general feverishness of the child is often somewhat aggravated. The appetite is usually much impaired, while the thirst is often considerably increased, and the child seems very desirous of cold water. The tongue is moist, in general thinly covered with mucus, through which the papillæ appear of a brighter red than natural; but the tongue is neither very red, nor much coated. The abdomen is soft, seldom either full or painful; and the pain which attends the diarrhœa is very variable,—sometimes it is completely absent, the stools being expelled without either effort or suffering; while in other cases pain comes on severely at intervals,

and then ceases so soon as the bowels have acted. Although there is seldom much tenesmus, yet a slight degree of it attends upon simple diarrhœa in the child much more frequently than in the adult. There is, as might be anticipated, a loss of the natural look of health,—the face grows pale, the eyes appear sunken, and the child becomes fretful and languid,—while, if the attack set in severely, a day or two sometimes suffices to reduce the child to a state of extreme weakness and exhaustion; and in young infants, I have now and then observed all the symptoms of spurious hydrocephalus make their appearance.

The *diarrhœa* that occurs in connection with the irritation *occasioned by teething* is in general more gradual in its onset, and slower in its progress, than that which depends on some more transient cause. It is likewise often associated with catarrhal symptoms; and both the catarrh and diarrhœa frequently continue, until the tooth, having pierced the gum, the irritation of the mucous membranes subsides; but to be renewed when a fresh tooth approaches the surface.

Although the dangers attendant on simple diarrhœa, especially when it occurs in healthy children, are not considerable, yet the affection is one which it is never wise to make light of. On more than one occasion I have seen an infant reduced by it to a state of such *extreme exhaustion* as seriously to endanger life. Diarrhœa, indeed, is the exciting cause of the greater number of cases of that spurious hydrocephalus,* in which cerebral disturbance from debility simulates real inflammatory disease of the brain. Under such circumstances, too, the diarrhœa has not infrequently ceased for some time before the other more alarming symptoms made their appearance. The cessation of diarrhœa may be due, not so much to the quieting of irritation, as to the exhaustion of the nervous energy which is essential to the performance of their secretory function by the glands of the intestines, or to the due maintenance of the peristaltic movements of the bowels. In infants prematurely weaned, or improperly fed after being taken from the breast, we often see this fact exemplified in the cessation some twelve or twenty-four hours before death, of the diarrhœa, from which they have been suffering for weeks together. Nor must we ever make too sure that, because purging has ceased, therefore danger is over; or venture to relax our watchful care until the continuance of amendment, for twenty-four hours or more, shews that there is indeed no longer anything to fear.

This, however, is not the only danger to which previously healthy children are exposed by an attack of simple diarrhœa; for if not quickly checked, it sometimes assumes the more serious characters of dysentery, and occasions severe and long-continued suffering. When diarrhœa super-

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* See Lecture x. p. 104.

venes in children who are recovering from some disease, such as measles, in which a tendency to relaxation of the bowels often marks the period of convalescence, or who have been suffering from a protracted ailment, such as hooping-cough, it sometimes occasions the patient's death, although it may leave behind in the intestinal canal no traces of serious mischief. Still more frequently is this the case with infants who have been brought up by hand, or who have thriven badly at the breast. A troublesome purging, continuing for weeks together, exhausts the strength of such infants, and at length occasions their death; but yet the intestinal canal in many instances presents no trace of more serious mischief than an unusual degree of distinctness of the follicles of the small intestines, and of the solitary glands of the colon and rectum.

In proposing, at the commencement of this lecture, to distinguish between simple and *inflammatory diarrhœa*, I yet was forced to acknowledge that the distinction was one rather of degree than of kind; or, perhaps it would be more correct to say, that our observation has not hitherto been minute enough to enable us to draw the line of demarcation strictly between the two affections. Even MM. Rilliet and Barthez,* whose opportunities have been so extensive, and whose industry is so untiring, confess their inability to refer the symptoms that attend upon the different varieties of diarrhœa to any distinct and invariable anatomical lesions. They remark, that not merely are exceedingly different appearances discovered after death in cases where the same symptoms have been observed during life, but that likewise there is often no proportion between the intensity of the two; and that sometimes no morbid appearances are found, even where well-marked symptoms had existed. Usually, indeed, in cases where the morbid appearances are slight, the symptoms during life have not been severe. Occasionally, however, the reverse has occurred; and the diarrhœa has been intense, the pain considerable, and the abdomen tense and tympanitic. MM. Rilliet and Barthez state, that out of 127 children who died of different diseases, 84 had presented the symptoms of inflammatory diarrhœa, or entero-colitis, and the characteristic appearances of that affection were manifest on an examination of their intestines after death; in 24, though no symptoms had existed during life, similar changes were discovered; while in 19, the signs of disease were present during life, but its morbid appearances were absent. It is true that these observations refer to children above two years of age, and to cases in which diarrhœa had occurred as a secondary affection; but my own observation would lead me to believe that a similar statement might be made with reference to younger children, and to cases of idiopathic diarrhœa.

These circumstances prevent our deducing from the *results of anatomical*

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* Op. cit. tome i. p. 509-12.

investigation those practical conclusions which we should otherwise be inclined to draw from them; but they do not warrant us in altogether omitting to inquire what changes we shall be most likely to meet with in cases of fatal diarrhœa.

These *changes* will be found chiefly, though not exclusively, *in the large intestine;* and though usually much less serious than those which are observed in cases of fatal dysentery in the adult, they yet present very similar characters. In those cases in which the structural alterations have been least considerable, the attention is arrested less by any great increase of vascularity in the intestine, than by the remarkable distinctness of the orifices of the solitary glands, which appear like almost innumerable dark spots upon the surface of the mucous membrane. In many cases, and especially in those in which the diarrhœa was profuse at the time of the patient's death, not merely are the openings of these follicles unusually distinct, but the glands themselves are enlarged, and project like small millet-seeds, or small pins' heads, beyond the level of the surrounding tissue. This enlargement of the solitary glands is usually associated with increased vascularity of the mucous membrane, which does not, however, assume the characters of a general erythematous redness, but is confined to that part of the membrane which covers each gland, or which surrounds its base. If the disease advance further, ulceration succeeds to this inflammation of the glands. A small, circular, or slightly oval spot, appears upon their summit, and increases in size and depth until it has destroyed the glandular structure and the mucous membrane, and has produced a deep cup-like depression or ulceration, the base of which is formed by the muscular coat of the intestine. On one occasion I observed, in the midst of enlarged and ulcerated glands, some others equally large, but on which the excavated ulcer had not yet formed; their summit presenting a small, round or oval spot, of a yellowish colour—most probably a minute slough not yet detached from the surface. Besides that loss of substance which results from the ulceration or sloughing of the glands themselves, a process of thinning and destruction likewise affects other parts of the mucous membrane, especially in those situations which correspond to the edges of the intestinal rugæ. In some parts the membrane appears to be merely attenuated, while in others it seems to have entirely disappeared, though the limits of its destruction are not marked by the same well-defined edges as circumscribe the ulcers of the glands; nor is the loss of substance so deep. On the inner surface of an intestine thus affected may be seen a number of narrow, white, lines, enclosing between them islets of mucous membrane; and often having such an arrangement as to give to those portions of the membrane the form of irregular parallelograms. This superficial destruction of the mucous coat of the intestine is often much more complete in the rectum, and in the sigmoid flexure of

the colon, than elsewhere; and when this is the case, the surface of the bowel presents an uniformly rough appearance. It is also in the lower part of the large intestine that the ulcerative process is most frequent and most extensive; and if care be not taken to examine the last few inches of the rectum, we may come to the mistaken conclusion that ulceration is altogether absent, in cases where more careful investigation would have easily convinced us of its existence. On one occasion, I found the disease in the lower part of the large intestine to be so far advanced, that the interior of the sigmoid flexure of the colon and of the rectum presented an irregular tuberculated surface, of an ash-grey colour, which appeared eaten into holes by a number of small, circular, pits, or ulcers, with sharply cut edges. Besides these changes in the interior of the large intestine, a thickening of its submucous coat is almost always observable, whenever the diarrhœa has continued for any considerable length of time. It is in the rectum and sigmoid flexure of the colon that this thickening is most perceptible; and in this situation a gelatinous-looking matter is sometimes deposited in such abundance beneath the mucous membrane, as to prevent the intestine from becoming collapsed when it is divided.

But it is not merely in the morbid appearances presented by the large intestines, but also in the *subsidiary changes* observed *in other parts of the intestinal canal,* that the close relation is manifested between the diarrhœa of the infant and dysentery in the adult. The changes in the small intestine are almost always confined to the lower part of the ileum, and become more striking the nearer we approach to the ileo-cœcal valve. They consist in a more or less intense redness of the mucous membrane, which sometimes appears thickened, and presents something of a velvety appearance, studded over with numerous dark spots—the orifices of the solitary glands. In other instances, the surface of the reddened mucous membrane appears slightly roughened, as if sprinkled over with fine sand; while near to the cæcum this roughening is often greater, the membrane appearing elevated into rough, orange-coloured prominences, separated by narrow lines of a dead white colour, which mark the situations, where, by the destruction of the mucous membrane, the subjacent tissue is exposed. Both of these changes are well represented in this drawing of the intestine of an infant, six months old, who died of a relapse of diarrhœa, from which she had seemed to be in course of recovery. Besides this affection of the mucous membrane of the ileum, Peyer's glands are not infrequently very well marked in the lower part of the small intestine; and their surface presents a punctated appearance, due to the unusual distinctness of the orifices of the sacculi which compose each gland. Occasionally a few of them are congested and swollen; and once or twice I have observed one or two spots of ulceration on that cluster of Peyer's glands which is situated close to the ileo-cæcal valve; but in every instance, the affection of the

small intestine has appeared to be secondary, and quite subsidiary, to the disease in the colon.* Lastly, I may observe that the mesenteric glands, even in the vicinity of the diseased large intestine, deviate but little from a state of health, being at most a little larger, and of a somewhat redder colour, than usual—a condition which contrasts remarkably with their serious affection in cases of typhoid fever in childhood, where yet the intestinal lesion is often much less considerable.

The *symptoms of inflammatory diarrhœa* sometimes become developed very gradually out of what had seemed at first to be nothing more than a simple looseness of the bowels; but, in the majority of cases, they present, almost from the outset, a graver character than those of simple diarrhœa, and are associated with more serious constitutional disturbance. When the attack comes on suddenly, it often commences with vomiting; and though in many instances the sickness does not recur frequently, yet sometimes the irritability of the stomach continues, for twenty-four or forty-eight hours, to be so extreme, that every drop of fluid taken is immediately rejected; and that frequent efforts at vomiting are made even when the smomach is empty. Violent relaxation of the bowels occurs almost simultaneously with the vomiting; and the child sometimes has as many as twenty or thirty evacuations, or even more, in the course of twenty-four hours. The motions are at first fæcal; but they soon lose their natural character, and become intermixed with slime, often streaked with blood. At first they are abundant, and are often expelled with violence; but before long they become scanty, though sometimes they still gush out without much effort on the part of the child. The character of the evacuations again changes: in the severest cases, they not only lose their fæcal appearance, but become like dirty-green water, with which neither blood nor intestinal mucus is intermingled. Usually, however, when the first violence of the purging has a little abated, although some

* In Vol. V. of the Zeitschrift für rationelle Medicin, Heidelberg, 1846, is a very interesting essay, by MM. Friedleben and Fleisch, on some points in the pathology of the intestinal mucous membrane in infants. Their observations are founded on fifteen infants, all of whom were under one year old, who were brought up either exclusively, or in great measure, on artificial food, and who died, after long-continued illness, in a state of atrophy, or else sank rapidly under profuse watery diarrhœa. In cases of the former class, a state regarded by the writers as the result of chronic inflammation of Peyer's glands was the chief morbid appearance; while in those instances where death took place rapidly, a swollen and congested condition of the same bodies, betokening, as they believe, their recent inflammation, was almost always present. They found, too, that in all these cases the disease of the colon was comparatively slight, and was evidently secondary to the more serious changes in the small intestine.

I am unacquainted with any observations of more recent date on this very important subject; and, though at present engaged in its investigation, my opportunities have not yet been sufficient to enable me to arrive at any satisfactory conclusion with reference to it.

serous stools may still be voided, yet the evacuations consist chiefly of intestinal mucus, intermixed with a little fæces, and more or less streaked with blood. These scanty mucous stools are generally expelled with much straining and difficulty; a few drops of blood sometimes follow them; and once or twice, at an early period of the attack, I have known an infant void as much as a table-spoonful of pure blood.

The constitutional symptoms which accompany an attack of this description are usually very severe: the skin becomes dry and very hot, though unequally so; the pulse is quickened, often very much so; the head is heavy; the child fretful and irritable if disturbed, though otherwise it lies drowsily in its nurse's lap, with its eyes half open, and scarcely closing the lids even when they are touched with the finger. Now and then, too, the disturbance of the nervous system at the commencement of one of these attacks of diarrhœa is so considerable, that a state of excitement alternates with one of stupor, that convulsions seem impending, and that there are distinct carpo-pedal contractions, or startings of the tendons of the wrist or forearm. The abdomen is usually full, and rather tympanitic, but seldom very tender; nor does the child seem to suffer much pain, though sometimes a degree of tormina appears to precede each action of the bowels. The tongue at first is moist, coated slightly with mucous fur; its papillæ are often of a bright red, as are also its tip and edges; while, if the disease continue, the redness becomes more general, and the tongue grows dry, though it is not often much coated. The thirst is generally intense, the child craving for cold water, and crying out for more the moment that the cup is taken from its lips; and the thirst is quite as urgent even in those cases where the stomach is so irritable that it immediately rejects whatever is swallowed.

There is scarcely any affection in which the loss of strength and of flesh is so rapid as in the severer forms of diarrhœa; and a period of twenty-four hours will in some cases suffice to reduce a previously healthy infant to a condition in which its eyes are sunken, its features sharp, its limbs shrunken, and its strength so impaired, that, though I have never seen an instance of it myself, I can yet well understand that death may sometimes take place in the course of a few hours from the commencement of the attack; and this rapidly fatal termination is far from unusual in some of the Southern States of America.

A rapidly fatal termination, however, is not that which is in general observed in this country; but, how urgent soever the symptoms may have been, there is in most instances a spontaneous subsidence of them in the course of forty-eight hours at furthest; or a measure of abatement of their severity follows the use of remedies. The sickness entirely ceases; the bowels act much less frequently, probably not above ten or twelve times in the twenty-four hours; but they act irregularly, five or six evacuations

being passed within an hour or two, and then no action of the bowels occurring for four or five hours together. The appearance of the motions likewise varies, and apparently without cause, being mucous, green, watery, intermingled with blood, all in the course of a single day, and with no accompanying modification in the infant's symptoms. The tenesmus in general continues; and in weakly children, or in those who have previously suffered from diarrhœa, prolapsus ani not infrequently occurs; though this accident happens less commonly in infants than in children of two or three years old.

There is much uncertainty in the further course of the affection, and in the way in which it tends in one instance towards recovery, and in another to a fatal issue. Many fluctuations generally interrupt the progress of those cases which terminate favourably; while, when it eventually proves fatal, the affection often assumes a chronic character, and does not end in death until after the lapse of several weeks.

In such *chronic cases*, the patient's condition, though progressively tending from bad to worse, presents but little difference from day to day. The loss of flesh goes on until the child is reduced to a degree of emaciation as great as is ever witnessed even in the most advanced stage of mesenteric disease or pulmonary consumption, though its extreme attenuation is sometimes concealed by the anasarcous swelling of its face and hands. The appetite fails completely, or becomes very capricious; and the child refuses to-day the food which yesterday it took with eagerness. In course of time, the desire for drink is lost, too; for though there may be no return of vomiting, yet nausea is excited by every thing which the child takes. The tongue grows red and dry, coated with brown or yellow fur towards its root, or aphthæ appear upon its tip and edges, or the whole inside of the mouth becomes coated with muguet. The diarrhœa continues much as it was before, except that the action of the bowels is now almost immediately excited by either food or drink. The evacuations are usually of a green colour, often particoloured, and though generally watery, yet they vary both in their consistence and in their other characters, without apparent cause. Slime, blood, and pus, are sometimes present in the stools, at other times absent; and it does not often happen that purulent matter is present in large quantity in the evacuations, or for many days together, though I have observed this in some cases that recovered, as well as in others which had a fatal termination. The body is no longer able to maintain its proper temperature, but the extremities are almost invariably cold; small indolent abscesses occasionally form about the buttocks; and on one occasion I saw an eruption of large vesicles, like those of pemphigus, make their appearance on the hands, arms, and neck of an infant eight months old, about ten days before her death. In the condition of weakness to which the child is now reduced, a slight

aggravation of the diarrhœa, or a return of vomiting, suffices to put out its feeble life; or, even should no such accident occur, death takes place from pure exhaustion.

But various causes may abridge this protracted course of the affection; and hence it results that death not infrequently takes place before the mischief in the intestines has become so serious as it is usually found to be in cases of fatal dysentery in the adult. Bronchitis is one of the most frequent of these intercurrent maladies, while the symptoms that attend it are often so slight that danger to the patient from this source is very frequently overlooked. It happens, indeed, in many cases, that almost from the outset of an attack of diarrhœa, the mucous membrane of the respiratory organs sympathises with the irritation of the intestinal canal, and from the very commencement of its illness the child has slight cough, the continuance or even the aggravation of which attracts but little notice. Unless, therefore, auscultation is carefully practised, and often repeated, there is little in such cases to call attention to the state of the respiratory organs until the accumulated secretions in the bronchi have already seriously interfered with the entrance of air into the pulmonary vesicles, and have occasioned the collapse of a considerable extent of the substance of the lungs.

Life is sometimes cut short by other causes in the course of infantile diarrhœa. The disturbance of the nervous system that attends the attack issues now and then in convulsions, and these convulsions end in a state of stupor which terminates in death – an occurrence fortunately rare, but of which instances may be observed during those hot seasons of the year when bowel complaints are usually epidemic. Less rare than a fatal termination of this kind is the infant's death under symptoms of a gradually deepening coma, which may have supervened on the suppression of the diarrhœa, or on its great mitigation. Many of the symptoms by which this condition is accompanied are such as to indicate the exhaustion of the infant's powers; but it happens in many instances that there is an occasional flush of the face, or a temporary heat of skin, or some other passing sign of an attempt at reaction, just sufficient to mislead the practitioner, and to betray him into a vacillating line of practice that proves fatal to his patient.

Lastly, there are cases, and these by no means few, in which the onset of a severe attack of diarrhœa has been promptly met and judiciously treated, in which the symptoms have yielded, and the child has appeared convalescent. Some slight error in diet, however, a variation in the temperature, or the too early withdrawal of medicine, is followed by a return of the vomiting and purging; or the *relapse* may take place without our being able to assign for it any adequate cause. The active symptoms which attended the original seizure are absent now; the evacuations,

though very watery, generally contain neither blood nor slime; but medicine is often wholly unable to check them. The vital powers fail speedily, and death often takes place in three or four days from this exacerbation of the symptoms, while an examination of the body after death shows no evidence of recent mischief in the intestines, but only the traces left by the first attack, and these manifestly in course of disappearance.

We must postpone until the next lecture the very important subject of the treatment appropriate to all the varieties of diarrhœa and its different complications.

LECTURE XXXIII.

Diarrhœa, continued.—Close resemblance between inflammatory diarrhœa and the dysentery of the adult—local conditions favouring its occurrence, as damp, want of drainage, &c.
Treatment of simple diarrhœa—of diarrhœa in connection with teething—use of astringents.
Treatment of inflammatory diarrhœa—in its acute stage—treatment of certain symptoms—as the irritability of the stomach, the cerebral symptoms—indications for the use of stimulants—of astringents—management of the chronic stage—use of enemata—diet in this stage.
Management of intertrigo excited by diarrhœa—and of prolapsus ani.

Those of you who were present at yesterday's lecture, could hardly fail to be struck by the close resemblance which exists between the severer forms of infantile diarrhœa and the true dysentery of the adult. In both cases similar morbid appearances are discovered, occupying the same parts of the intestinal canal; in both the symptoms during life are almost identical, their resemblance being disturbed mainly by the greater excitability of the nervous system in early life, whence it arises that convulsions and other signs of serious cerebral disturbance are often observed in the infant affected with diarrhœa, while they are but seldom noticed in the adult suffering even from severe dysentery. But this difference is one of degree rather than of kind, since the morbid poison, whatever be its nature, to which dysentery is due in the adult, produces under favourable circumstances disorders of the nervous system analogous to those which we may have frequent opportunities of observing in the infant. If dysentery, for instance, break out epidemically in a large prison, the inmates of which have had the excitability of their nervous system increased by the debilitating influence of long confinement, tremors, cramps, spasms, convulsions or stupor, may attend upon the affection, and death may take place under symptoms that betoken disorder of the brain or spinal cord. You will find ample proof of this in Dr. Latham's account of the Disease at the Penitentiary in the year 1823; and in Dr. Baly's Gulstonian Lectures on Dysentery, which are based on observations at the same establishment. Among the striking examples of this complication related by those writers, some are recorded in which, though

death took place, neither the brain nor the spinal cord presented any sign of disease. Just of the same kind, and equally independent of any appreciable change of structure, are the nervous symptoms that often come on in the course of infantile diarrhœa. I shall have presently to refer to the important practical bearings of this fact, when we come to consider the treatment of diarrhœa and its complications.

Before we pass to that subject, however, we must inquire whether there are any *special conditions that tend to engender* the severer forms of bowel complaint in childhood, over and above those general causes of diarrhœa to which your attention was directed in the last lecture. I believe that such special conditions do exist—that they abound in the locality where most of my observations have been made—and that they are precisely the same as prevailed far more extensively in this metropolis at the time that the bloody flux annually carried off large numbers of its inhabitants.

In almost every country and climate, and under circumstances in many respects very different, dysentery has been known to occur, but in each instance it has been possible to connect the prevalence of the disease with some source or other of malaria. Although, while I was physician to the Finsbury Dispensary, a large amount of disease among children as well as among adults came under my notice, yet my acquaintance with those severer forms of infantile diarrhœa which approach to the characters of dysentery, and which give rise to similar lesions, has been derived almost exclusively from observations made in Lambeth and the adjoining parishes. The children in both districts are alike subjected to the evils of improper and insufficient food, and of close and ill-ventilated dwellings; but in the latter there are superadded certain very important influences of a local character. A considerable portion of the district on the Surrey side of the Thames lies below high-water mark; and the kitchens and cellars of some of the houses near the river become flooded at unusually high tides. The sewerage throughout is very defective; in many parts it is effected entirely by open drains, while in some places there are mere cesspools, which have no communication with any drain whatever. Cases of infantile dysentery do not occur with the same frequency in all parts of this district, but they are most numerous and most severe wherever these noxious influences are most abundant. Proof, too, of the intimate connection that subsists between these conditions and the occurrence of infantile dysentery is afforded by cases such as the following:—

With the return of every spring, a poor woman brought to me her younger children suffering from diarrhœa, which they seemed to outgrow when about three years old. This diarrhœa was always obstinate, very apt to assume a dysenteric character, and was almost sure to return if medicines were discontinued before the return of the cold season. On one occasion, her infant, aged about fifteen months, who had had diarrhœa

severely in the previous autumn, suffered a return of it with the returning warmth of spring. The infant's symptoms were very alarming, and the child had frequent convulsions, on which account I visited her at home. I then found that the infant spent the whole of the day in a back room on the ground floor which looked out upon a little yard, at the bottom of which there was a large cesspool, whence there came a most offensive smell during the whole of the warm weather. I urged the mother to remove her infant from this room, and to occupy instead a front room on the first floor in the same house, which looked upon the street. When this had been done, the convulsions ceased almost at once, and the diarrhœa was not long before it disappeared. I have attended this woman's children since for other affections, but it is now nearly eighteen months that they have occupied the more wholesome room, and during this time I have heard nothing of their suffering from diarrhœa. I may just add, that, under similar circumstances, I have met with a few instances of the sudden and apparently causeless occurrence of convulsions in two or three children of the same family. It is not long since a little girl, five years old, was seized with convulsions, which recurred frequently for between two and three days, leaving her in a state of stupor. By degrees the symptoms of very severe typhoid fever developed themselves out of this disturbance of the nervous system. The disease during the whole of its course presented an adynamic character, and required the free employment of wine and stimulants. While she was convalescent, the health of her elder sister, who was eight years old, began to fail, and before long she experienced convulsive attacks of an anomalous character not unlike fits of hysteria, which returned at intervals of two or three days for several weeks together,—three or four fits sometimes occurring in the course of a single day. These seizures were accompanied with much debility, and they disappeared by degrees under the use of preparations of iron, and a generally tonic plan of treatment.

In studying the *treatment* of diarrhœa and dysentery in early life, we will pass successively in review the different forms of the disease; beginning with the simplest and least dangerous, and passing to the more formidable varieties of the affection, and to those complications which add so greatly to its hazard.

In a large proportion of cases of *simple infantile diarrhœa*, the ailment tends to subside in a day or two, and finally to cease of its own accord. While, therefore, in consideration of the tender years of the patient, no such case can be regarded as altogether trivial, yet in many instances but little medical interference is needed. Great care, however, is required in this, as well as in the more serious forms of diarrhœa, to prevent the affection being aggravated by any error of diet, or even by the infant being allowed to partake too freely of food otherwise suitable for it. If, therefore, the sickness with which the attack sets in have not altogether

subsided, the child should be taken completely from the breast for a few hours, and should have nothing more than a few spoonfuls of water or barley-water, till the irritability of the stomach has abated. If the disposition to vomit have completely ceased, it will yet be right to put the infant less frequently to the breast; while it is supplied, if thirsty, with water or barley-water, in small quantities at a time. In children already weaned, a similar plan must be carried out; solid food being for a time withdrawn, and thin arrow-root, or barley-water and milk, in equal parts, being substituted for it. If the attack be clearly traceable to some improper article of food, a dose of castor oil will sometimes get rid of the irritant cause and of the diarrhœa together. Unless this be the case, however, it is better not to give the aperient, since its action, under these circumstances, is somewhat uncertain; and instead of relieving, it may aggravate the diarrhœa. Provided there be neither much pain nor much tenesmus, and the evacuations, though watery, are fæcal, and contain little mucus and no blood, very small doses of the sulphate of magnesia and tincture of rhubarb have seemed to me more useful than any other remedy. To a child of a year old I am accustomed to give, every eight or every six hours, a teaspoonful of an ounce and a half mixture, containing one drachm of the sulphate of magnesia, and two drachms of the tincture of rhubarb, diffused in caraway water; and I seldom fail to observe from it a speedy diminution in the frequency of the action of the bowels, and a return of the natural character of the evacuations.

In the *diarrhœa that comes on in connection with teething*, it has seemed to be better to pursue a somewhat different plan. It is usually attended by a greater amount of constitutional disturbance than is observed in the diarrhœa of younger infants, and by some degree of febrile excitement. There is likewise, in many instances, a considerable disposition to catarrhal affection of the respiratory mucous membrane, which needs to be carefully watched, lest by its increase it should become a source of serious danger to the child. The diarrhœa in the majority of these cases comes on gradually, and its subsidence takes place gradually too. Now and then the gum may appear at one spot so tense and swollen, as to induce us to scarify it; and if the tooth be very near the surface, this proceeding may sometimes greatly diminish the diarrhœa, by relieving the irritation which excited it. Any such marked benefit, however, is quite an exceptional occurrence; and unless the state of the gums be such as of itself to indicate the propriety of scarifying them, it would be a cruel and useless piece of empiricism to subject the child to the distress of the operation. Instead of the saline and rhubarb mixture which I have just mentioned, I usually employ in these cases small doses of ipecacuanha in combination with an alkali; and think that I have found great benefit from this plan. Three or four drops of liquor potassæ, and the same quantity of vinum ipecacuanhæ, mixed with mucilage, and given in a little milk about every

four hours, is a suitable dose for an infant a twelvemonth old. At the same time the child should be placed in a tepid bath every night; and a powder of one grain of Dover's powder, and one of mercury with chalk, given to it afterwards, will often be found to procure for the little patient, previously restless and fretful, some hours of quiet repose. If the child should appear much exhausted, a slight stimulant, such as four or five drops of the spirit of nitrous ether, may be advantageously combined with each dose of the mixture; and in all cases of simple diarrhœa it behoves us to watch most carefully against the powers becoming too much depressed, either by the profuseness of the purging or by its continuance.

Supposing in any case that a considerable degree of looseness of the bowels should continue after the lapse of two or three days, astringents must be resorted to; and I know of none better than the extract of logwood, in combination with tincture of catechu. Five grains of the former, and ten minims of the latter, three times a day, in some sweetened aromatic water, is a suitable dose for an infant a year old. The logwood, moreover, is something besides a mere astringent; it is a very valuable tonic in all cases where gastro-intestinal disorder has existed; and it is one which children take readily. It is, however, not very popular in the nursery, because it imparts to the evacuations a deep pink colour, which leaves an indelible stain upon the napkins: a circumstance which it is as well to mention when you prescribe the medicine. The mercury and chalk and Dover's powder may be still continued at bed-time, if the evacuations, though less frequent, be still slimy and unhealthy. If either the evacuations or the infant's breath have a sour smell, three grains of the sesquicarbonate of soda may be added to each dose of the mixture; or, if the child be not wholly fed at the breast, a drachm of prepared chalk may be stirred up with each pint of milk given to it; and after the powder has been allowed to settle, enough will still remain suspended in the fluid to counteract any slight acidity in the alimentary canal. If, after the bowels have become quite regular, some tonic should still be required, the extract of bark, with small doses of the tincture, will be one of the best that can be given. You will observe that all the remedies mentioned occupy but a very small compass,—a point the importance of which is never to be forgotten in prescribing for children.

But there are cases which wear a much more serious aspect than those the treatment of which we have hitherto considered. Even in true *inflammatory diarrhœa*, however, depletion is but seldom needed; for either the abdominal tenderness is inconsiderable, or, if the attack set in with great severity, it will be generally found to have occasioned so much depression, as to contra-indicate the abstraction of blood. Still, in cases of recent date, if the abdominal tenderness be considerable, and if it be associated with much heat of skin and febrile disturbance, a few leeches may be applied in either iliac region. The child should be carefully watched for

some hours afterwards, in order to prevent any excessive loss of blood; since considerable hæmorrhage not infrequently follows the application of leeches to the abdomen, and it is not always very easily arrested. In the majority of instances the pain and tenderness of the abdomen are much relieved by the application of a large hot bran poultice; the frequent renewal of which often affords great comfort to the child.

If the irritability of the stomach be not so great as to prevent its administration, no medicine is of such general application, or of such essential service in these cases, as a mixture containing a small quantity of castor oil diffused in mucilage, with the addition of a few drops of tincture of opium. I was led to use this medicine in the inflammatory diarrhœa of children from observing the great benefit which followed its employment by my friend Dr. Baly in the treatment of dysentery among the prisoners in Millbank Penitentiary. The following is the form in which I should prescribe it for an infant a year old, and in which it is taken by most children very readily:—

℞ Ol. Ricini, ʒj.; Pulv. Acaciæ, ℈j.; Syrupi Simpl. ʒj.; Træ. Opii, ♏iv.; Aquæ Flor. Aurant. ʒvij. M. ft. mist. A tea-spoonful to be given every four hours.

Although this medicine may relieve all the symptoms considerably, and although the general state of the child may be much improved, yet it sometimes happens that a considerable degree both of tenesmus and of purging continue. These symptoms will now be more effectually relieved by an opiate enema than by any other means. Four drops of laudanum will form an enema of sufficient strength for an infant a year old; and this should be given suspended in half an ounce of mucilage, since a more bulky injection is almost sure to be immediately expelled. Supposing the symptoms not to yield to these means, or that the case presented from the first a great degree of severity, small doses of Hyd. c. Cretâ and Dover's powder may be given every four hours, in addition to the castor oil mixture, which, however, should now be given without the laudanum.

In some cases the *irritability of the stomach* is so great, that almost every thing taken is speedily rejected; and when this condition is present, none of the medicines already mentioned can be borne. Under these circumstances a small mustard poultice should at once be applied to the epigastrium, the child should be taken from the breast, a tea-spoonful of cold water, or cold barley-water, should be given at intervals, and a powder of a third of a grain of calomel, and a twelfth of a grain of opium, should be laid upon its tongue every three hours. The sickness will generally subside in four or five hours, though the stomach often remains too irritable to bear any change in the remedies, and the greatest caution will be needed in restoring the infant to the breast. It may be necessary, indeed, to confine the child for twenty-four or thirty-six hours to cold barley-water, cold water thickened with isinglass, the

white decoction of Sydenham, or equal parts of cold milk and water; and when the child has been seen early in the disease, I have never observed any evil to follow the perseverance for this short period in a rigorous diet.

The tepid bath, employed twice a day, or even more frequently, will be found of great service in soothing that general *irritability of the nervous system* which often continues through the whole course of the affection, and which sometimes issues in convulsive seizures, or in other symptoms that are occasionally mistaken for the indications of real cerebral disease. It cannot be necessary to reiterate here the often-repeated caution against regarding the symptoms of disturbance of the nervous system as being always the signs of active cerebral disorder, calling for depletion to relieve the congestion of the vessels of the brain, and for antiphlogistic measures to moderate the excited state of the circulation. At the very commencement of this course of lectures* I endeavoured to set before you the various circumstances under which convulsions come on in early life; and some days ago† I tried to delineate the characteristic features of spurious hydrocephalus. On that occasion I related the history of two children, both of whom had been attacked by severe diarrhœa. In one case the child passed every few minutes from a state of listless drowsiness to a condition of extreme restlessness and alarm; the tendons of the forearm were in a state of subsultus, and general convulsions seemed impending. In the other case, the irritability of the nervous system was rapidly subsiding under the general exhaustion of the vital powers, and probably in a few hours more the infant would have sunk into a profound coma, from which no means would have been adequate to rouse it. The tepid bath and an opiate enema in the first-mentioned case, and the free employment of stimulants in combination with small doses of Dover's powder in the second, speedily averted dangers that had seemed so threatening. I need not, however, tread again over all the ground we have already passed, but will content myself with repeating the remark I then made,—that if, in cases of this kind, you fall into the error of regarding the cerebral symptoms as the signs of active disease, and withhold the Dover's powder or the opiate enema, that might have checked the diarrhœa and soothed the irritability, while you apply cold lotions to the head, and give the child nothing more nutritious than barley-water in small quantities, because the irritability of the stomach which results from weakness seems to you to be the indication of disease in the brain, the restlessness will before long alternate with coma, and the child will die either comatose or in convulsions.

As to the time when *stimulants* are to be given, or the quantity in which they are to be employed, no definite rule can be laid down. Each case must be treated for itself; and to be treated successfully it must be watched most closely. The necessity for stimulants may arise suddenly, or the

* Lecture II. p. 16. † Lecture X. p. 104.

need of their administration may be but temporary; while the infant's state in the morning affords, in cases of severe diarrhœa, no sure criterion by which to judge what its condition will be at night. In general it is not until the active symptoms have begun to decline that stimulants are needed, nor even then are they required in a large number of instances. I have, however, met with some instances in which they were absolutely necessary as early as the second or third day of the disease. This has occurred in cases in which there was great irritability of the stomach, as well as violent action of the bowels; in which no medicine could be borne except the calomel and opium powders, nor any drinks except such as were given cold. Under such circumstances a state of extreme debility is sometimes very rapidly induced, and the vomiting, which at first was a sign of the gastric disorder, continues when it is nothing else than an effect of the general exhaustion. About half a drachm of brandy given every two or three hours, to a child of a year old, in a quantity of a few drops at a time, mixed with the cold milk and water, or the thin arrow-root with which it is fed, will often have the effect of arresting the sickness, as well as of rallying the sunken energies of the system. No stimulant has appeared to answer the required ends better than brandy; and, when sufficiently diluted, children take it very readily. Sometimes, however, when it has been necessary to continue it for some time, it has seemed to occasion pain in the stomach, and even to nauseate the child; and in this case the compound tincture of bark, or the aromatic spirits of ammonia, or the two together, may be substituted for it; and there is seldom much difficulty in administering them, if they be mixed with milk and sufficiently sweetened.

The proper time forthe employment of *aromatics* and *astringents* is no during the acute stage of the affection; but, when the disease has already begun to decline, these remedies will be found of most essential service in checking that looseness of the bowels which otherwise is very apt to degenerate into a state of chronic diarrhœa. Under these circumstances the logwood and catechu mixture, mentioned at an earlier part of this lecture, is a very valuable medicine. If, notwithstanding its employment, the bowels still continue to act with excessive frequency, small doses of the compound powder of chalk and opium may be given twice a day, or the use of the opiate enema may be continued if there be much tenesmus. By these means, coupled with the most sedulous attention to the child's diet, and the greatest care in allowing either animal broths or meat or other solid food, a complete cure will usually be brought about in the course of two, or at the latest of three weeks.

There are some cases in which, after the disease has passed its acute stage, it still retains much of its dysenteric character; the bowels not merely acting with undue frequency, but the evacuations containing mucus, pus, or blood, and their expulsion being attended with very considerable tenesmus. The strength in such *chronic* cases is very greatly reduced, and

emaciation goes on to a greater degree than in almost any other affection, with the exception of phthisis and mesenteric disease; while the bowels are excited to almost immediate action by even the simplest food. The treatment of these cases is attended with considerable difficulty; recovery, when it does take place (and it is consolatory to know that it often does, even from a condition apparently desperate), is brought about very slowly, and each remedy employed seems speedily to become ineffectual. Throughout their course two objects are to be borne in mind,—one being to check the diarrhœa; the other to support the child's strength during the time required for nature to effect the cicatrization of the ulcerated mucous membrane, and to restore it to a state of health. The utility of mercurial preparations has appeared to me to be almost exclusively confined to the early stage of dysentery, and to cease when the disease has passed into the chronic form. On the other hand, astringents may now be employed with the most marked benefit, and, when one fails, another may be substituted for it. In cases where the stomach has been very irritable, so that almost everything taken has been speedily rejected, I have sometimes employed the gallic acid in combination with laudanum, and have seen much benefit follow from its use. At other times I have given the acetate of lead with opium—a combination which retains its efficacy, when given in the form of mixture, notwithstanding the decomposition that takes place. The sulphate of iron combined with opium is another highly useful remedy in these cases, and appears to have the advantage over the sulphate of zinc, which has likewise been used in similar cases, of not exciting the same irritability of the stomach.

Our remedies are not to be confined to those administered by the mouth; for much may be done towards relieving the symptoms and curing the disease by suitable enemata. In some cases of unmanageable diarrhœa, M. Trousseau employs an enema of nitrate of silver in the proportion of a grain to an ounce of distilled water, with very good effect. I have not yet tried it, but have sometimes used the gallic acid as an enema, though not sufficiently often to be able to form any very decided opinion as to its efficacy. In the majority of instances I have been content with clysters of laudanum diffused in mucilage, or in a small quantity of starch; occasionally, in protracted cases, where the tenesmus was very distressing, I have used the black wash as a vehicle for the laudanum; and, on one occasion, in which a copious discharge of pus continued for several days in a little boy two years old, this symptom was greatly relieved by the administration, twice a day, of an enema containing two grains of sulphate of zinc.

The support of the child's strength is a matter of no less importance in chronic dysentery, than the suppression of the diarrhœa. The great weakness of the patient, and the manifest distaste for nourishment of all kinds, often render it necessary to continue the use of brandy for several

days, or even for several weeks. For an infant not weaned, there can be no better food than that which is furnished by the breast of a healthy nurse. In the majority of cases, however, the child has been either in great measure or altogether weaned before the affection came on, and, consequently, it is a less easy matter to supply it with suitable food. Farinaceous articles, such as arrow-root, sago, &c. are less easily assimilated in early life than in adult age, and, in cases of this kind, they not infrequently pass through the alimentary canal unchanged. Milk, too, does not always agree, and is sometimes rejected almost at once, unless it be given in a state of extreme dilution. Under these circumstances we must not hesitate to give strong beef or veal tea in small quantities, but at short intervals, to the patient; for though it be true that the bowels are often excited to increased action, in cases of chronic diarrhœa or dysentery, by animal broths, yet this is a smaller hazard than that of the child dying for want of sufficient nutriment. I may add, that, when prepared with care, and quite free from salt or any seasoning, and when given cold, I have seldom observed any serious increase of the diarrhœa to follow their use under these circumstances.

Two accidents are occasionally met with in connection with protracted diarrhœa in infants and young children, concerning each of which a few words must be said. It is not unusual to observe a general erythematous redness of the buttocks and nates in infants suffering from severe diarrhœa, and sometimes the irritation of the acrid fæces produces an *attack of intertrigo,* and a serous fluid exudes abundantly from the inflamed skin. This condition, which is the occasion of very considerable suffering to the child, almost always depends upon a neglect of that most scrupulous cleanliness which is of such essential importance in early life. In order to prevent its occurrence, the nates and buttocks must be sponged with warm water immediately after each evacuation; the surface may afterwards be smeared with a little zinc ointment, while any part at which the skin seems disposed to crack, should be dusted over with the oxide of zinc in powder. These simple precautions will usually suffice to prevent a condition which, in some of the hospitals of Paris, where such sedulous care is almost impossible, degenerates into a state of unhealthy ulceration that exhausts the infant's powers, and sometimes contributes to its destruction quite as much as the diarrhœa in the course of which it came on.

Prolapsus of the anus is another troublesome accident which sometimes takes place in the course of protracted diarrhœa. It abates, however, almost always as the diarrhœa diminishes, and generally ceases altogether as the child regains its strength. When there is a disposition to it during the acute stage of the affection, this may often be controlled if the nurse be instructed to support the margin of the anus during each evacuation, and thus to prevent the descent of the bowel, while the opiate enema which relieves the tenesmus is of most essential service, by thus removing

the cause of the prolapse. The child's attendant should also be taught how to return the bowel if it should come down; and this is best effected by means of gentle pressure with a napkin wrung out of cold water. If, as the diarrhœa abates, the prolapse should still continue, and especially if the gut should come down independent of efforts at defecation, it may be necessary to make the child wear a compress and bandage to prevent its descent. In such cases, too, an enema consisting of a small quantity of some astringent, such as the decoction of tormentilla, should be administered cold once or twice a day; and no instance has come under my notice in which these measures, persevered in for a few weeks, have not sufficed to remove this troublesome ailment.

LECTURE XXXIV.

Peritonitis—sometimes occurs during fœtal existence, or in very early infancy—is then possibly dependent on syphilitic taint—when epidemic in large institutions, is often connected with infantile erysipelas.

Peritonitis in after childhood—a rare occurrence—generally secondary to some febrile attack—case illustrative of its symptoms, which are much the same as in the adult—occasional escape of the fluids effused, through the abdominal walls, and recovery of the patient.—Inflammation sometimes circumscribed, especially in connection with disease about the appendix cæci—illustrative case.—Treatment of peritonitis.

Chronic peritonitis—almost always a tubercular disease.—Morbid appearances—symptoms—their vagueness—pauses in the advance of the disease—close analogy between its symptoms and those referred to tubercular disease of the mesenteric glands.

Tabes mesenterica—rarity of extensive disease of the glands—slightness of its symptoms when uncomplicated.—Treatment of it, and of tubercular peritonitis.

From the study of the affections of the mucous lining of the intestinal canal, we pass by a natural transition to that of the diseases of its serous investment. *Peritonitis,* however, which is not very common as an idiopathic affection at any period of life, is still more rare during the greater number of the years of childhood; while its symptoms do not deviate in any important respect from those which characterize it in the adult. It would be idle to spend our time in speculating on the reasons for the rarity of inflammation of the peritoneum in early life. The tendency of inflammatory disease in childhood appears, indeed, to be to attack the mucous rather than the serous membranes; a fact of which we have another illustration in the comparative rarity of acute pleurisy in the child. Some connection may perhaps be thought to subsist between the great irritability of the intestinal mucous membrane, and its proneness to disease during the greater part of childhood on the one hand; and the immunity from disease which the peritoneum exhibits during the same period. At any rate, it is certain that in the new-born infant, in whom the former peculiarity has not yet become developed, inflammation of the peritoneum is of more common occurrence than in subsequent childhood.

Inflammation of the peritoneum, giving rise to adhesions between the intestines, and to the effusion of lymph and serum into the cavity of the abdomen, occurs sometimes even *during intra-uterine life*, and occasions the death of the fœtus. It is not possible to say with certainty to what cause the disease should be attributed, at a time when the being is sheltered from all those influences from without which may excite inflammation after birth; but it is worthy of notice that in many instances of peritonitis in the fœtus, traces of syphilitic disease are observed upon it; or there is clear evidence of the existence of venereal taint in the mother. In such cases, the inflammation of the serous lining of the abdomen is probably due to the altered state of the circulating fluid—a cause to which, in after life, inflammation of the serous membranes is frequently owing. In the only instance of non-congenital *peritoneal inflammation* that has come under my notice *in early infancy*, there was no other cause than this to which it could be attributed.

In this case, a little boy, five weeks old (whose mother had twice before been confined prematurely with still-born children), began to have snuffles at the age of three weeks. In the course of the next week a few copper-coloured spots appeared about his face, his scrotum next grew sore, then his voice became hoarse and his lips cracked; and at the end of the fourth week he grew sick, and his abdomen enlarged and became tender. When brought to me the child was extremely small; he was greatly emaciated; the skin of his face wrinkled; his appearance distressed; his chin covered with copper-coloured blotches; the angles of his mouth were ulcerated; his lips cracked; and small sores beset his scrotum. His abdomen likewise was very large: it was remarkably prominent about the umbilicus, and its superficial veins were much enlarged. It was extremely tense; somewhat tympanitic; and though dull in places, it yet did not yield the impression of distinct fluctuation anywhere. The abdomen was exceedingly tender to the touch, but the child seemed in pain also at other times; he had been very sick for nearly a week, and vomited almost immediately after sucking, besides which he threw up a yellow fluid at other times. His bowels were purged several times a day. His mother, who did not suffer at that time from any syphilitic symptom, was put upon a mild mercurial course, with idiode of potassium and sarsaparilla; and the mercury with chalk was likewise administered to the child. By degrees, as the syphilitic spots faded, the abdomen grew less tender and less swollen, it became soft; and in the course of time the infant regained perfect health.

The symptoms in this case ran a chronic course; but peritonitis of an acute character, and tending to a rapidly fatal termination, is sometimes observed to occur among very young infants when collected together in large numbers, and under conditions unfavourable to health. A French

physician, M. Thore,* during a year's observation at the Hospice des Enfans Trouvés at Paris, found that acute peritonitis existed in about six per cent. of the infants who died at that institution. The disease, such as he observed it, seems to be exclusively an affection of early infancy, since, though the hospice contains children of all ages, yet no child above the age of ten weeks was attacked by it, while thirty-five out of fifty-nine were less than a fortnight old. The previous health of the children had in some instances been good, but in many cases the peritonitis appeared as a consequence or complication of some other affection. A sudden tympanitic swelling of the abdomen was often the first symptom of the disease, and was soon associated with vomiting of a greenish matter; which phenomenon, however, was seldom of long continuance. The bowels were generally constipated throughout, the respiration and pulse soon became accelerated, and the heat of skin increased, while the child evidently suffered pain in the abdomen. With the advance of the disease the countenance altered, the skin grew cold, and the pulse feeble; and in the majority of cases the child died within twenty-four hours, while life was not in any instance prolonged beyond the third day.

The appearances found after death were much the same as those which characterize peritonitis in the fœtus. In none of the sixty-three cases which were examined was there any puriform matter in the abdominal cavity, but only a dirty serous fluid, in which flocculi of lymph were often floating; while the intestines were more or less coated with false membrane, which was especially abundant about the spleen and liver. Pleurisy was found associated with the peritonitis in a third of the cases, and the frequency of this complication is another point of resemblance between the disease as it occurs during fœtal life and in early infancy. Its causes, too, appear to be such as act through the medium of the circulating fluid; for in seventeen out of sixty-three cases the peritonitis followed on erysipelas, and in four on phlebitis of the umbilical vein—affections which, it is known, are immediately dependent on epidemic causes, and are excited by the same atmospheric conditions as induce puerperal fever in lying-in women. The influence of such agencies is still farther shewn by the fact that forty-two per cent. of the cases of peritonitis recorded by M. Thore occurred during the months of April and May, while the others were somewhat unequally distributed over the remainder of the year.

When the child grows older it is no longer so susceptible of noxious influences as before; and when they come in to play, the mucous membrane of the bowels suffers, rather than their serous investment. Hence, acute idiopathic *peritonitis* becomes a very rare disease in *childhood;* and peritoneal inflammation usually occurs as a sequela of some affection which

* De la Péritonite chez les Nouveau-nés, in the Archives Gén. de Méd. for August and September 1846.

has been attended with considerable alteration in the circulating fluid. It sometimes succeeds to an attack of scarlatina; and the possibility of its occurrence should lead us to look with great suspicion upon any complaint of pain in the abdomen made by children during their convalescence from that disease; while, though the danger of its supervention after other febrile affections is less considerable, the risk is by no means to be forgotten.

The *symptoms* and course of the disease appear to be much the same whether it occurs as a primary or as a secondary affection; but there is a great difference between the severity of the symptoms and the amount of danger to which the patient is exposed, in different cases.

I do not recollect ever to have witnessed more intense suffering than was endured by a little boy, nine years old, who, after recovering from fever, yet seemed to regain his health by but slow degrees, and had almost habitual constipation. He came under my notice on May 25, and was much benefited by alterative and slightly aperient medicines; when he was suddenly, and without any known cause, seized on the 3d of June with profuse diarrhœa, and severe pain in the abdomen. On the following day, when I saw him, his face was haggard and anxious, and his abdomen excessively tender; while the diarrhœa continued even more profusely than before. Some leeches were applied to the abdomen, and calomel and Dover's powder were given every four hours; but the leeches drew but little blood, and though the purging ceased, the pain in the abdomen increased in severity. On the 5th of June I found the boy lying on his back, with his legs stretched straight out; while the slightest movement, or any attempt to sit up, produced excruciating pain. The abdomen was tympanitic, very tender to the touch, and especially so just below the umbilicus. The pulse was frequent and sharp; the tongue moist, and uniformly coated with yellow fur. Leeches were again applied, in greater numbers than before; and the mercurial was given every three instead of every four hours. Towards evening he was rather better, but the pain, which was referred especially to the neighbourhood of the umbilicus, came on severely in the night, and was aggravated in paroxysms. He had passed no urine for many hours, but only half a pint was drawn off by the catheter, and this was dark coloured, and had a very strong smell. The bowels had acted only once, and then scantily. The same remedies were continued, but the child's condition continued to grow worse; and during the night he was in such pain that he frequently shrieked aloud so as to alarm the neighbours. On the morning of the 7th he had turned round upon his right side, and lay with his knees drawn up towards his abdomen, his head supported in his mother's lap; his face expressed the most intense suffering, and he shrieked frequently with pain. The abdomen was much distended, and so tender that it could not endure the slightest touch. The pulse had become frequent and thready. He had made water twice of his own accord. The abdomen was now covered with a large blister;

beef-tea and brandy were given to support the vital powers; and while the mercurial was continued, an endeavour was made, by a full dose of opium, to procure a temporary abatement of the child's sufferings. When seen at 6 P. M. he had vomited frequently a dark-green fluid, and had passed three natural liquid evacuations. He was lying in the same attitude as before, dozing with half-closed eyes, his forehead wrinkled, the corners of his mouth drawn down, terror and pain stamped on his countenance,—seeming as if dying, till roused by a return of pain, when he called with loud and piteous cries on his mother for help. His pulse was now smaller, and more thready. During the night his sufferings were unceasing; towards morning he became quieter, and died quietly at 9 A. M., on June the 8th.

On opening the abdomen, thin pus, unmixed with lymph, poured forth in great abundance. It quite concealed the intestines from view, and must have amounted to at least a quart. The peritoneum lining the abdominal walls was highly vascular, especially in the hypogastric region; that covering the intestines had lost its natural transparency, was softer, and seemed thicker, but was not much injected. There was no lymph effused on any part of the parietal peritoneum, nor were there any adhesions between the intestines; but the spleen and liver, the latter especially on its convex surface, were coated with lymph. The whole tract of the intestines was examined with great care, and was found to be quite healthy; the mucous membrane being rather pale. There was some crude tuberculous matter in the mesenteric glands. The right side of the chest contained a pint of pus, similar to that in the abdomen; the right pleura was intensely vascular, and this condition was especially remarkable in that part of it which lined the diaphragm: a patch of lymph, of small extent, formed a connection between the two surfaces of the lung, while the right lung generally had a rather thick coating of false membrane. Some tubercles in the bronchial glands, and a compressed state of the substance of the right lung, formed the rest of the morbid appearances.

There can be no doubt but that, in the early stages of this case, a more active plan of treatment ought to have been adopted. It is related, however, not as an illustration of the therapeutical principles by which you should be guided, but as affording a remarkably good specimen of the symptoms of acute peritonitis. The inflammation of the pleura was doubtless secondary to that of the peritoneum, and the effusion into the cavity of the chest probably coincided with the time when the child assumed the position on his right side. We learn from this case, that pain, coming on suddenly, referred particularly to one part of the abdomen, but extending over the whole, greatly aggravated on pressure, or on the slightest movement, so as to compel the patient to remain in the recumbent posture, with the legs extended and motionless, characterize the

disease. The abdomen before long becomes tympanitic, and this tympanites, if considerable, greatly aggravates the patient's sufferings. The state of the bowels varies: frequently they are relaxed at the outset of the illness; sometimes they continue so throughout, while they are but rarely constipated. Vomiting is not a constant symptom; and when it does occur, the irritability of the stomach varies, both in its degree as well as in the time at which it appears. The symptoms sometimes continue to increase in severity until death takes place; at other times they undergo a sudden diminution, or even cease altogether, though this seeming amendment is attended, or rapidly followed, by sinking of the vital powers, and soon afterwards by the patient's death.

General peritonitis is fortunately very rare in childhood, and still rarer is its termination by the effusion of pus into the cavity of the abdomen. Even under these apparently hopeless circumstances, however, nature does sometimes make an effort at cure. The active symptoms diminish in intensity; the abdominal parietes grow thin at some spot, where a passage at length is formed through which the pus is discharged, and recovery sometimes slowly follows; the result of a process precisely analogous to that which nature has recourse to in pleurisy, when she brings about the evacuation of the fluid through an opening spontaneously formed in the parietes of the thorax. An instance of this mode of cure of peritonitis, in a child seven years old, was related by Dr. Aldis, at a meeting of the Medico-Chirurgical Society, in November 1846.* A few similar cases may be found in medical journals;† and one has come under my own observation, in the person of a little girl, whose history I formerly related,‡ as affording an illustration of that rare affection, inflammation of the sinuses of the dura mater.

The peritoneal inflammation which comes on during scarlatinal dropsy is not in general of a very active character, and seldom produces any morbid appearance of greater gravity than numerous slight adhesions between the intestines. It generally succeeds to ascites; and the abdominal affection seldom exists alone, but is usually associated with pleurisy, and abundant serous effusion into the chest; and the symptoms of disease of the respiratory organs very often mask those of the abdominal inflammation, which latter, indeed, seems in many instances to have but a very subsidiary share in bringing about the patient's death.

Besides those cases in which the peritonitis is general, there are others in which the *inflammation is circumscribed to a part*, and sometimes but a small part, of the *peritoneum*. Now and then, peritonitis affecting only a

* Reported in the London Medical Gazette, November 1846.

† For instance, Bernhardi, in Preuss. Med. Zeitung, 1842, No. 10; and Beyer, Casper's Wochenschr. 1842, No. 5.

‡ See Lecture VII. p. 81.

very small extent of surface proves rapidly fatal, (though no such instance has come under my own notice); but usually there is a correspondence between the severity of the symptoms, and the extent of the disease. I imagine the inflammation to have been circumscribed in some cases, in which the principal pain was referred to one part of the abdomen, while the tenderness was almost limited to that situation, in which, moreover, the abdomen did not become generally tense or tympanitic, and all the symptoms yielded with tolerable readiness to the employment of remedies, though the disposition to pain and tenderness in one spot was some time before it wholly disappeared.

Lastly, some notice must be taken of a highly dangerous form of *peritonitis*, circumscribed in some cases, but general in others, which *succeeds to inflammation of the cæcum, or of its vermiform appendix*. This affection, however, is not so common in early life as in adult age, while the same symptoms characterize it in either case; so that no lengthened description of it will be necessary. It has only once come under my observation, and, in that instance, although the inflammation had produced gangrene of the mucous membrane of the appendix, and a sloughing opening of communication between it and an abscess in the cellular tissue behind the cæcum, yet no intestinal concretion or other foreign body was discovered, to the lodgment of which, in the appendix, the disease could be attributed. All the viscera in the right half of the abdomen were thickly coated with lymph, but the inflammation had not at all involved the parietal peritoneum, nor extended to the intestines on the left of the mesial line. Acute pleurisy, however, existed on the right side, and had given rise to the effusion of nearly three pints of milky serum. The patient was a little boy, only seven years old, whose health had been habitually good, till he began to complain, on the 5th of July, of pain in the abdomen, and was attacked at the same time with violent purging and vomiting. The purging ceased in the course of a few hours, but the vomiting continued at the time of my seeing him on July 8, when he likewise complained of great pain, and of exquisite tenderness in the right hypochondriac region. Leeches were twice applied in that situation, with manifest relief, and calomel and opium were given every three hours. In the night of the 10th an aggravation of the symptoms took place, and auscultation detected a friction sound in the right side of the chest. Cupping beneath the right scapula was followed by very marked improvement: he rested well on the night of the 11th; and on the 12th, he not only breathed without difficulty, but was free from pain in the hypochondrium, except on pressure, and the sickness had completely ceased. An aggravation of his symptoms, however, occurred during the night: on the 13th, he changed his attitude, and lay on his right side, instead of on his back, and retained this posture till his death. A marked fulness was now apparent on the right side, extending from the crest of the ilium to the ribs. On the ensuing day this part was

not merely full and tender, but exceedingly firm to the touch,—a condition which existed throughout the whole lumbar region, and extended forward to about two inches to the right of the linea alba. The bowels were at no time much constipated, and after the administration of an aperient on the 12th, they acted several times each day, the motions being relaxed, but otherwise natural. Sickness returned on the 13th, and during the last two days of the child's life it was almost constant; while the great thirst that existed during the whole course of the illness rendered this symptom the more distressing. On the 12th, there were physical signs of some effusion into the chest, which had increased so much before death that the right half of the chest was manifestly enlarged, and the intercostal spaces on that side were very prominent. Auscultation of the back of the chest was however impossible for some days, owing to the acute pain produced by any movement. The breath grew very short; the flesh wasted rapidly; the face was habitually expressive of distress, and at night delirium came on. On the 16th, after a most wretched night, his pulse became very feeble, and his extremities cold, while the vomiting was incessant. Convulsions came on, and lasted for six hours, when they ceased, and two hours afterwards the child died tranquilly, on the 11th day from the first sign of indisposition. The mercurial treatment had been continued all along, the opium being increased as the intensity of the child's sufferings seemed to require, and four days before death the inunction of a drachm of strong mercurial ointment every four hours was begun; but no effect seemed to be produced by the remedies.

The indications for *treatment* in cases of acute peritonitis, are so clear, that it would be superfluous to occupy much time in laying down rules for your guidance. You have to deal with the active inflammation of parts in which acute disease cannot go on long without destroying life. Depletion, both general and local, and the employment of mercury, combined with opium or Dover's powder, in order to mitigate the suffering which attends on the disease, are the remedies to which you must have recourse, and which you must employ with an unsparing hand. When the abdominal tenderness has been mitigated by bleeding, a warm poultice frequently renewed will often afford considerable comfort; and in some cases of local peritonitis I have seen the warm hip-bath give much relief. The error into which you are likely to fall in the management of these cases is not that of pursuing a wrong course, but of following the right one with too little vigour.

In the peritonitis that follows scarlatina, the symptoms are often less urgent than under other circumstances; but you will bear in mind, that when the function of the kidneys is disturbed, and urea is circulating in the blood, the serous membranes are very apt to become inflamed, and you will, therefore, keep on the look-out for any indication of their suffering. I shall hereafter have to point out to you, that in this, as well as in so

many other cases, prevention is not only better, but easier than cure; and that if on the first appearance of the dropsy consecutive on scarlet fever, you have recourse to active antiphlogistic measures, you will, in the large majority of cases, escape the risk of these secondary inflammations.

Acute peritonitis, like the acute inflammation of any other tissue, may subside, but not altogether cease; it may pass into a chronic state, and the patient may suffer from the consequences of the disease long after the disease in its original form has disappeared. But it is not to an affection of this kind that I wish to call your attention in speaking of *chronic peritonitis;* but to a disease, the progress of which is slow from its commencement, which is weeks or months in running its course, but which yet demands our closest attention, since in a very large number of cases that course is to a fatal issue.

It is not, however, its tardy progress which alone distinguishes the chronic from the acute inflammation of the peritoneum, but the former is almost invariably associated with the tuberculous cachexia, and, indeed, generally succeeds to the deposit of tubercle upon the serous membrane of the abdomen. The occasional recovery of a child in whom the symptoms of chronic peritonitis have existed, by no means disproves that connection between it and phthisical disease, of which dissection in fatal cases affords such convincing proof.

The *bodies of children who have died of this affection* are usually found to be exceedingly emaciated; and their face retains after death the suffering expression which it had worn during their protracted illness. The lungs and bronchial glands contain tubercle in greater or less abundance, and the pulmonary disease is sometimes so far advanced as to have obviously had no small share in bringing about the fatal event. On dividing the abdominal parietes, long, slender, cellular, adhesions, are often found connecting the peritoneum to the subjacent viscera. The intestines, too, are connected by adhesions, some of which are very easily broken down, while others are so firm that the coats of the bowels give way in the attempt to separate them. This difference does not depend on the age of the adhesions (although in this respect they vary greatly, some being apparently of very recent date, others of long standing), so much as on their nature. Those connections which are formed by the mere effusion of lymph, even when from age they have acquired considerable firmness, can generally be broken down without much difficulty; and at any rate the attempt will not produce rupture of the intestines. When, however, different portions of the bowels are matted together so inseparably that it is easier to lacerate than to detach them from each other, it will be found that something more than the mere effusion of lymph has produced this union. It will be seen to have been effected by means of a yellow, granular matter, like that which connects the opposite surfaces of the arachnoid in a case of tubercular hydrocephalus, and made

up like it in part of lymph, in part of tubercular deposits. Adhesions are thus formed between the opposite surfaces of peritoneum, at first of small extent, but fresh deposits of tubercle soon take place in the vicinity, and the attendant inflammatory process unites together a still greater extent of intestine. Nor is this all; but in time, the tubercle thus deposited undergoes a process of softening, in the course of which the muscular tissue of the intestines becomes destroyed, and their mucous membrane may thus eventually be perforated, so that distant parts of the intestinal canal, which at first were merely adherent together, are sometimes brought by this means into direct communication with each other. The abdomen generally contains a small quantity of transparent serum; but if, as sometimes happens, life should have been cut short by the supervention of acute peritonitis upon the old disease, the effusion may be of a puriform or sero-purulent character.

In addition to the evidences of inflammatory action presented by the peritoneum, that membrane and the various abdominal viscera are the seat of a more or less generally diffused tubercular deposit. The surface of the peritoneum lining the abdominal walls is sometimes abundantly beset with small, grey, semi-transparent granulations; but in the majority of cases the tuberculization is less general, and the parietal peritoneum is less affected than other parts of the membrane. That part of the peritoneum which lines the diaphragm, or the abdominal walls in the immediate vicinity of the spleen, is one of the favourite seats of tubercular deposit, which in these situations generally puts on the form of small, yellow, miliary tubercles, not that of grey granulations. In some instances the omentum is the seat of the chief tubercular deposit; and though it usually assumes the miliary form, yet now and then masses of crude tubercle of considerable size are met with in this situation. The peritoneum covering the liver and spleen seldom fails to shew an abundant deposit of tubercle; and tubercles usually abound in the substance of the latter organ. The mesenteric glands likewise are tuberculous, though the degree of their degeneration, and the size which they have in consequence attained, vary much in different cases. The same remark holds good with reference to the amount of tubercular disease in the interior of the intestines, which, though in many cases very considerable, yet bears no invariable relation either to the degree of the affection of the peritoneum, or to that of the mesenteric glands.

In cases of this affection, those vague indications of decaying health which characterise the early stages of the tuberculous cachexia often precede any *symptom* of special disorder of the abdominal viscera. But this is not always the case; for in some instances the child begins, without any previous indisposition, to complain of occasional pains in the abdomen, which last but for a moment, and which cause the less anxiety, from the appetite being good, the bowels regular, and the general cheerfulness

undisturbed. In the course of a short time, however, the appetite fails, or becomes capricious; the bowels begin to act irregularly, being alternately constipated and relaxed, while the motions, always abundant, are usually unnatural in character—dark, loose, and slimy. The child now grows restless and feverish at night, its thirst is considerable, and the abdominal pain becomes both more severe and more frequent in its recurrence. Sometimes the stomach grows very irritable, and food taken is occasionally vomited; but this symptom is often absent; while the tongue, throughout the early stages of the affection, continues for the most part clean and moist, and deviates but little from its appearance in health. The symptoms just enumerated seldom continue long without being accompanied with a marked change in the size of the abdomen; and sometimes the alteration in the abdomen takes place rather suddenly, and is one of the earliest signs of the affection from which the child is suffering. The abdomen becomes large, tense, and tympanitic, while its parietes often seem glued to the subjacent viscera; and that manipulation which causes no discomfort, even when practised somewhat roughly on the big abdomen of a rickety child, is sure to occasion uneasiness, often even considerable pain, when tried with ever so much gentleness in the child suffering from chronic peritonitis.

In this as in other forms of tubercular disease, the progress from bad to worse seldom goes on uninterruptedly. Pauses take place in its course, though each time they become shorter; and signs of amendment now and then appear, but they, too, promise less and less with each return. The child loses flesh; the face grows pale and sallow, and anxious; the skin becomes habitually dry, and hotter than natural, and the pulse is permanently accelerated. The abdomen does not grow progressively larger, but it becomes more and more tense, although its tension varies without any evident cause, and sometimes it disappears for a day or two, to return again as causelessly as it disappeared. When the tension is diminished, the abdomen yields a solid and doughy sensation, and the union between the contents of the abdomen and the abdominal walls becomes very perceptible. The superficial abdominal veins now become enlarged in many instances, and the skin grows rough, and looks as if it were dirty. The pain in the bowels retains the same colicky character as before, but it returns very frequently, and is sometimes exceedingly severe, while the child is never free from a sense of uneasiness. The tenderness of the abdomen, however, but seldom increases in proportion to the increase of pain. The bowels are in general habitually relaxed, though the degree of the diarrhœa, as well as the severity of the abdominal pain, vary much in different cases. As the disease advances, the child becomes confined to bed, and is at length reduced to a state of extreme weakness and emaciation. Death is often hastened by the concomitant affection of the lungs; but, should this not be the case, the patient may continue for many weeks in

the same condition, till life is destroyed, after a day or two of increased suffering, by some renewed attack of peritoneal inflammation.

Some of you have probably been struck by the many points of resemblance between the symptoms that have just been described, and those which are often enumerated as characteristic of mesenteric disease. Nor is it at all surprising that a very close analogy should subsist between chronic peritonitis and *tabes mesenterica*, since not only are both affections the results of the tubercular cachexia, but in both the abdominal viscera are chiefly involved in the disease, and both are in consequence characterised by a remarkable impairment of the functions of nutrition. It was natural, too, that in former times, when morbid anatomy was less carefully cultivated than at present, the attention of the observer should have been chiefly drawn to the increased size and altered structure of the mesenteric glands—appearances which must have been often discovered on an examination of the bodies of children who had died after a slow wasting of their flesh, attended with more or less enlargement of the abdomen and disturbance of the bowels. The physiology of those days, too, knew of no means whereby the absorption of the chyle could be effected except through the medium of the mesenteric glands; and the coarse appliances which then subserved the purposes of anatomical investigation did not suffice to shew that, even when these glands outwardly present a considerable degree of tuberculization, their lymphatics in many instances are still pervious.

We know that the nutrition of children is often much impaired from other causes besides tubercular disease; and that, when the digestive organs perform their functions ill, nothing is more common than for the abdomen greatly to exceed its natural size. Our predecessors had observed similar facts; but, from the imperfection of their physiological knowledge, they drew from them erroneous conclusions. Disease of the mesenteric glands was in their eyes the almost exclusive cause of the atrophy of children, and a preternatural enlargement of the belly was looked upon by them as an almost infallible sign that such disease had already begun. Tabes mesenterica was consequently regarded as a very common affection; and though its frequency is now well known to have been much overrated, yet the appearance of those symptoms that were once supposed to be characteristic of it, still excites much needless alarm among non-professional persons.

The mere presence of tubercle in the mesentery is, it must be owned, of very common occurrence, since MM. Rilliet and Barthez met with it in nearly half of all children in whom that morbid deposit existed in some or other of their viscera. But though the existence of tubercle in the glands be thus frequent, its presence in any considerable quantity is extremely rare, since, according to the same authorities, it was found in abundance only in one out of every sixteen children, some of whose organs contained tubercle.

The general character of tuberculous mesenteric glands is much the same with that of tuberculous bronchial glands, but the former are usually surrounded by a more delicate cyst; and although their size seldom exceeds that of a chesnut, yet they occasionally undergo a degree of development which far exceeds that of tuberculous bronchial glands, and three or four of them coalescing together, sometimes form a mass as big as the fist, or even bigger.

The effects produced even by an advanced degree of tuberculization of the mesenteric glands are smaller than might be anticipated, and much smaller than those which result from a considerably less amount of disease of the bronchial glands. Nor will this at all surprise us, if we bear in mind the difference between their anatomical relations. The bronchial glands are not merely situated in a cavity which is bounded by comparatively unyielding parietes, but the viscera with which they are in contact are solid and resisting, and they are, moreover, adherent to the trachea and the larger air-tubes, so that any increase of their size is sure to produce compression of parts whose functions are of vital importance. The mesenteric glands, on the contrary, are contained in a cavity whose yielding walls allow them to increase readily in size, while the loose attachments of the mesentery still further permit them to attain even to considerable dimensions, without pressing upon any viscus; so that it is an exceedingly unusual occurrence for them to cause the perforation of any part of the intestines, or even for them to contract adhesions to their exterior.

To these causes it must be attributed that there is no *symptom* pathognomonic of tubercle of the mesenteric glands, except their being perceptible through the abdominal parietes. This, however, they never are during the early stage of the affection; and though on one or two occasions I have felt a tumor in the abdomen, which, from its being associated with the evidences of tuberculous disease in other organs, I have been led to attribute to the enlarged mesenteric glands, yet in these cases I have not had the opportunity of confirming the diagnosis by an examination after death. There can, however, be no doubt but that they do become perceptible through the abdominal walls, though at a season when, their cure being hopeless, little practical use can be made of the certainty of our diagnosis. In its earlier stages no symptoms at all are present, or only the indications of that general tuberculous disease of which the affection of the mesentery is usually but a subordinate part. At a later period, when the disorder of the digestive organs attracts attention, the symptoms are generally much the same with those of chronic peritonitis, save that, if the peritoneum be free from disease, the abdomen is in most cases both less tense and less tender.

I the less regret that so little time remains for the consideration of the *treatment of chronic peritonitis and of tabes mesenterica*, since the subject

may be dismissed in a few words. In each of these affections two periods may be distinguished. During the first, while our diagnosis is still uncertain, general principles guide our conduct, and lead us to subject the child to the same dietetic and hygienic management as we should adopt if we feared the approach of any other form of phthisis. In the second the advancing mischief has removed all doubt from our minds, but at the same time has chased all hope from our spirits ; and we now minister to symptoms as they arise, and try to mitigate sufferings which we cannot cure.

The dyspeptic symptoms, the unhealthy appearance of the evacuations, and the frequency with which diarrhœa occurs, enforce the necessity for the diet being as mild and unstimulating as possible. The abdominal pain which is experienced in tubercular peritonitis is almost always relieved by the application of a few leeches ; but even local depletion must not be practised without absolute necessity ; and in many instances a large poultice to the abdomen, frequently renewed, will remove pain, the severity of which had at first seemed to call for the abstraction of blood. The logwood and catechu mixture mentioned in the last lecture, is one of the best astringents that can be employed to check the over-action of the bowels. Sulphate of iron and opium, in the form either of pills or mixture, may be used if the diarrhœa be very obstinate, though we may be compelled to abandon their use, from finding that they aggravate the patient's symptoms ; but I have not observed the mere suppression of the diarrhœa by astringents to be followed by any exacerbation of the other abdominal symptoms. Astringents, however, are far from being the only remedies to be employed ; but mercurials in a mild form, and continued for a long period, have often seemed to be of much service. When the tenderness of the abdomen has been sufficiently relieved to admit of it, I generally direct the use of a liniment twice a day, consisting of the Linimentum Hydrargyri, soap liniment, and olive oil, in equal parts, which has seemed useful as a counter-irritant even independent of the mercury which enters into its composition. Besides this I usually give equal parts of the Hydr. c. Cretâ and Dover's powder once or twice a day. The Dover's powder prevents the mercurial from irritating the bowels, and also allays the restlessness and feverishness at night—an end to which the use of the tepid bath every evening likewise conduces, often in an eminent degree. The comfort of the child is frequently much promoted by wearing a well-adapted flannel bandage over the abdomen both by night as well as by day, and the support this affords may be increased with advantage by a piece of thin whalebone at either side.

If diarrhœa be absent, or if, though it be present in a slight degree, the skin be very hot and dry, and the child very thirsty and feverish, the tepid bath, the mercurial with Dover's powder, and small doses of liquor potassæ and ipecacuanha, are the remedies on which I chiefly rely, and to this the extract of dandelion may often be added with advantage. If it seem

likely that a mild tonic will be borne, a mixture containing the extract of dandelion, extract of sarsaparilla, and sesquicarbonate of soda, may be given; or the liquor cinchonæ or the infusion of calumba may be employed for the same purpose. It is only with much caution that we can administer chalybeates in these cases, and after having found that the milder vegetable tonics are well borne. The ferro-citrate of quinine, or the citrate of iron, are the preparations which it will generally be desirable to employ in the first instance, and even their effect should be watched attentively. In conclusion, I need hardly mention the importance of change of air, and the benefits likely to result from a sojourn on the sea-coast; for you know how much more powerful nature's remedies are in diseases of this kind, than the remedies of man's devising.

LECTURE XXXV.

Intestinal worms—their varieties, symptoms, and treatment.

Diseases of the urinary organs—Inflammation of the kidneys—Albuminous nephritis—generally follows one of the eruptive fevers, oftenest scarlatina—its symptoms—condition of the urine—appearances after death—essential nature of the changes in the kidneys.—Treatment.

Calculous disorders—frequent in early life—deposits in the urine in childhood almost always consist of the lithates.—Other causes of dysuria besides gravel and calculus.—Treatment of dysuria in early life.

Diabetes—true saccharine diabetes very rare in early life—simple diuresis less uncommon—symptoms of disordered health that attend both affections.—Treatment.

Incontinence of urine—circumstances under which it occurs.—Treatment.

Our study of the diseases of the digestive organs would be incomplete if we took no notice of those parasitic animals which frequently inhabit the alimentary canal in children. It will not, indeed, be necessary to say much respecting them: for we know that the older medical writers greatly overrated their frequency and importance, when they saw the proofs of their existence in almost every variety of gastric and intestinal disorder, and even attributed to their presence many forms of serious disturbance of the nervous system. Still, they are in many instances the occasion of considerable discomfort; they often aggravate, and sometimes even give rise to disorder of the digestive organs, while now and then the irritation excited by their presence being propagated to the spinal cord, produces convulsions or other formidable nervous symptoms.

Although *intestinal worms* are much more common in early life than in adult age, yet no species of them is peculiar to the child, but they belong to one or other of the five sorts ordinarily met with in the grown person.

The *ascaris vermicularis*, or small thread-worm, which lives principally in the rectum, is by far the most common of all these entozoa, and is very troublesome, trom the local irritation which it excites. The long thread-worm, the *tricocephalus dispar*, appears much less frequently in the evacuations: it inhabits the upper end of the large intestines, and in some

cases coexists with the presence of ascarides in the rectum. When it is present alone, I am not aware that it gives rise to any unpleasant symptoms. The *ascaris lumbricoides* is of much less common occurrence than the small thread-worm, though observed more frequently than the tricocephalus: it dwells in the small intestines, and, sometimes entering the stomach, is rejected by vomiting. Occasionally only one of these worms is present, and though there are oftener several, yet it is but seldom that they exist in the child in very considerable numbers. The tape-worm, of which there are two kinds, the *tænia solium* and *tænia lata,* is much the rarest of these entozoa in early life, and is seldom met with in children under seven years of age.

Various *symptoms* have been said to indicate the presence of worms in the intestines, but most of them are of small value: and nothing short of actually seing the worms can be regarded as affording conclusive evidence of their existence. No one who is at all familiar with the disorders of early life will be disposed to attach much weight to symptoms such as the altered hue of the face, the appearance of a livid circle around the eyes, the loss of appetite, or its becoming irregular or capricious. Many causes besides the presence of worms give rise to a tumid state of the abdomen, to colicky pains, and to occasional sickness and vomiting; and itching of the nose or anus, though often present when the intestinal canal is infested with worms, yet is sometimes the occasion of much annoyance independently of their existence. An irregular or intermittent pulse, widely dilated pupils, occasional drowsiness, with uneasy rest at night, and starting during sleep, are evidences of disturbance of the nervous system, but do not specially indicate the presence of worms as the cause of such irritation.

In any case, however, where symptoms such as those above mentioned make their appearance, and, though fluctuating in severity, continue for weeks together, there exists, in the absence of any obvious cause of nervous irritation, reasonable ground for suspecting the presence of worms; and the evacuations should be examined, in order to ascertain whether or no that suspicion is well founded. Even though for a season none should be discovered, yet fortunately the *treatment* which the general symptoms would lead us to adopt will be in great measure such as, if worms exist, will prove most efficacious in producing their expulsion. The capricious appetite will induce us to regulate the diet with care; the disordered and generally constipated state of the bowels will lead to the employment of alteratives, and to the occasional administration of brisk cathartics; while the absence of febrile symptoms will probably seem to warrant the employment of some of the preparations of iron. These remedies will in many instances not have been continued long before the appearance of worms in the motions encourages us to persevere in the same treatment. The combination of ferruginous preparations with active purgatives is a plan especially effective in cases where the lumbricoid entozoa are present, and

is likewise of much service in getting rid of the ascarides which inhabit the rectum, and in preventing their reproduction. The latter worms, however, need to be assailed in their habitation; and, from the circumstance of their living in the lower end of the rectum, this is a sufficiently easy task. Enemata of lime-water usually answer the purpose of destroying them; but, should they fail, the addition of some two drachms of the muriated tincture of iron to the clyster is tolerably sure to make it effective. In young children these ascarides sometimes not merely occasion much itching and distressing irritation about the anus, but even produce a troublesome diarrhœa, attended with considerable tenesmus. Under such circumstances, the lime-water injection should be administered daily for two or three days together; while, at the same time, small doses of the castor-oil mixture every six or eight hours will soothe the irritation of the bowels. In female children these ascarides sometimes creep up the vulva, and not merely cause much irritation there, but excite a leucorrhœal discharge which ceases on the expulsion of the worms.

The alarming symptoms of cerebral disturbance which are occasionally produced by worms in the intestinal canal, result more frequently from the presence of the round worm than of other varieties of these entozoa. This, however, is not always the case; and in the only instance that has come under my observation in which the occurrence of serious convulsions seemed clearly traceable to the presence of worms in the intestines, the small thread-worms were the cause of the symptoms. Apart from the knowledge which we have in many of these cases that the child had previously been afflicted with worms, there is nothing in the symptoms which could enable us at once to distinguish between convulsions from this cause and those which result from some other source of irritation of the nervous system. In most instances, however, the child has passed worms frequently before the cerebral symptoms made their appearance, and not improbably was under treatment for the destruction of these parasites at the time when the nervous symptoms supervened. Even though this be not the case, the constipated state of the bowels which is almost sure to have preceded the occurrence of the convulsions, indicates the employment of active purgatives—remedies which in most instances remove together these symptoms and their cause, although convulsions apparently induced by the presence of worms have sometimes had a fatal termination.

The tænia is, as was stated, much less common in childhood than after puberty; and in the few cases in which I have met with it during early life, I have been reluctant to try that heroic remedy, turpentine and castor oil, which is so serviceable in procuring the expulsion of tape-worm in the adult. I have been accustomed to employ the decoction of the bark of the pomegranate root in doses of an ounce three times a day for a child of seven years old, interrupting its administration twice in the week, in

order to give a purgative of scammony and calomel. Under this plan, pursued for several weeks together, large quantities of the worm have been voided, and the children have appeared entirely freed from this very troublesome parasite. I have not yet made trial of the administration of a dose of the decoction or powder of the pomegranate bark every hour for four or five successive hours, as recommended by Mr. Breton,* who brought the remedy into notice in this country. I purpose, however, making a trial of this method on the next occasion that may offer, since the effects of the remedy, when thus administered, appear to be surer, as well as more speedy, than when it is given at longer intervals.

Closely connected with the disorders of the digestive organs are those *affections to which the urinary apparatus is liable.* Unfortunately, special difficulties attend their investigation in early life, and difficulties which it is least easy to overcome in dispensary practice: hence the information which it is in my power to give you with reference to these diseases is less complete than I could have desired.

Nephritis, or acute inflammation of the substance of the kidney, is exceedingly rare as an idiopathic affection in early life. MM. Rilliet and Barthez,† decline attemping to give any description of its symptoms, on account of the very few instances of it that have come under their observation, although they refer to some cases in which the congested, swollen, and indurated state of the kidneys after death seemed to indicate that those organs had been the seat of acute inflammatory action. M. Rayer‡ relates an instance or two where the presence of purulent deposits in the kidneys of infants a few days old gave positive evidence of their inflammation; but no symptoms observed during the lifetime of these children had called attention to their urinary organs. He mentions it moreover, as a disease of very unusual occurrence in early life, and adds, that though he has seen cystitis follow the application of a blister in early life, yet even in those cases there was no sign of the irritation having extended to the kidneys.

Albuminous nephritis, or that form of inflammation of the kidney which is usually met with in connection with general dropsy, is rather less uncommon as a primary disease, though in by far the greater number of cases it is met with as a sequela of one of the eruptive fevers, generally of scarlatina. It is under these latter circumstances only that it has presented itself to my notice, and the description which I will endeavour to give you of it applies to the characters that it then assumes. It sometimes sets in with symptoms of considerable severity, but even then it has a great tendency to pass into a chronic state, while in by far the majority of

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* Medico-Chirurgical Transactions, vol. xi. p. 301.

† Op. cit. vol. i. chap. xvi.

‡ Traité des Maladies des Reins, 8vo, vol. i. p. 417. Paris, 1839.

cases its attack is gradual, and its advance is slow. The dropsical symptoms by which it is almost always attended generally show themselves within a fortnight or three weeks from the appearance of the rash; the face, hands, and feet, being affected in succession, and fluid being likewise sometimes effused into the cavity of the abdomen. The dropsical symptoms are generally preceded for a day or two by the indications of constitutional disturbance. The child who had passed through the attack of fever perhaps with less than the average amount of suffering, and who for a few days had seemed rapidly advancing to convalescence, begins to droop, grows languid, feverish, and restless. The skin becomes dry and hot; the process of desquamation is arrested while still incomplete; the appetite is lost, though the thirst is often considerable; the bowels become constipated, and the urine diminished in quantity, although the desire for voiding it is very frequent. After these signs of interrupted convalescence have continued for two or three days, or even longer, the face becomes slightly swollen, a puffiness appearing about the eyelids in the morning, which probably disappears later in the day; so that in many instances the attention of the parents is not particularly directed to the child's condition until œdema has extended to the hands and feet. The degree of anasarca varies much in different cases, and likewise fluctuates at different periods in the same patient. Usually, though not invariably, there is a distinct relation between the degree of swelling and the severity of the general symptoms; and few cases terminate fatally in which there is not considerable serous effusion into the different cavities of the body. In very mild cases, the febrile disturbance is inconsiderable; the anasarca slight, and confined to the face; and after a few days of poorliness, the kidneys resume their proper functions, the anasarca disappears, and the child's health returns. In severe cases the symptoms persist for a longer time, and complaints of pain in the back, and evident tenderness in the lumbar region, are usually associated with them, while the swelling extends to the cellular tissue of most parts of the body; but unless some complication should exist, improvement generally becomes apparent in the course of a week or ten days, and recovery takes place slowly. In the worst cases, the swelling, after having undergone many apparently causeless fluctuations, becomes extreme, as well as universal; the features are disfigured by the dropsy, the legs greatly swollen, and the abdominal parietes much infiltrated, while the skin remains dry and hot. The quantity of water voided is very small indeed, and the pain in the back is often very severe. The chief suffering, however, is referred to the chest; the respiration is laboured and accelerated, and the child is frequently unable to assume the recumbent posture, and is moreover distressed by a frequent, short, hacking cough. Under these circumstances, life is sometimes prolonged for several days, though in a state of extreme suffering, remedies proving unable either to increase the action of the kidneys, or to relieve the dropsy. Death is

sometimes preceded by a sudden aggravation of the signs of disorder of the respiratory organs, which assumes all the painful characteristics of œdema of the lungs; and in other cases a comatose condition comes on, such as often precedes death from Bright's disease in the adult. Sometimes a temporary improvement takes place, the anasarca abates, and the kidneys resume their functions, but the patient dies not long afterwards from the effects of the pleurisy or pericarditis, which had come on almost unnoticed during the acute stage of the affection.

These symptoms of constitutional disturbance, which you recognize as the characteristics of inflammatory dropsy, are associated with changes in the *composition of the urine*, as well as with a diminution in the quantity of the secretion. In the milder cases it is transparent when passed, though of a deeper colour than natural, and becomes turbid on cooling, when it deposits a more or less abundant precipitate. It has a strong acid reaction, somewhat exceeds the usual specific gravity of healthy urine, is at first rendered clear by the application of heat, but again becomes cloudy as the albumen which it contains is coagulated, and falls down in a flocculent precipitate. If the attack be more severe, the urine, which is very scanty, is of a brown or smoke colour, deep red, or coffee-coloured, and throws down a deposit chiefly of a reddish brown colour, which, however, does not entirely disappear when heated, while albumen is present in it in extreme abundance. An examination under the microscope of the deposit that takes place spontaneously in the urine in these cases, discovers not merely crystals of the lithate of ammonia, but blood globules, often very little altered, mucus corpuscles, and epithelium scales. These matters, however, disappear by degrees as the urine regains its natural appearance, even though it may still be shewn by chemical reagents not to be entirely free from albumen.

In cases where death takes place during the progress of this disease, if the dropsical symptoms had not been very severe, and the child had been carried off less by them than by some sudden cerebral symptoms, or some intercurrent serous inflammation, the kidneys appear to the naked eye no otherwise altered than in being generally darker and more congested than natural. In severer cases, however, in which death has resulted from the disease itself, and not from any casual complication, the capsule of the kidneys strips off more easily than natural, and their surface presents a pale colour and a mottled appearance. On a section being made, a marked contrast is observable between the pale, fawn-coloured, cortical structure of the organs, and their deeply injected tubular part, coupled with which their pelvis and infundibula generally display a greatly increased vascularity.

The use of the microscope has of late enabled us to advance a step further than we otherwise could have done towards understanding the

pathology of this disease.* It has shewn us that the morbid process begins in the cortical parts of the inflamed kidney, the urinary tubules of which are stimulated to an increased production of their epithelial lining, or even to a pouring out of solid fibrinous matter into their cavities. The urine carries away with it some of these matters, and thus frees the tubules for a time; but as their contents are reproduced in quantities too large to be thus eliminated, some of the tubules become plugged and impervious, sometimes even so over-distended that they give way, and are completely destroyed. Nor is this all, but the capillaries of the organ necessarily bear a part in the mischief. At first, from over-congestion, they become dilated and varicose, and afterwards, (in part probably from the formation of fibrinous clots within them, in part as the result of a process of adhesive inflammation), they become obstructed or even obliterated. Supposing this morbid process to have gone on to any considerable extent, the kidney must be left by it permanently and irreparably injured, while even in its slighter degrees it must for a time seriously disturb the functions of the organ. In the earlier stages of the disease, the presence of albumen in the urine is in part due to the actual escape of blood from the over-loaded capillaries of the kidney, in part to the temporary suspension of its functions. If at a later period, when the urine has lost its preternaturally deep colour, and has regained much of its healthy appearance, albumen should still exist in any quantity, there will be reason for apprehending that some abiding injury has been inflicted on the organ.

In the case of the dropsy that succeeds to scarlatina, although the convalescence is often very tedious, there fortunately does not appear to be much tendency to the production of any serious permanent injury to the kidney. The danger to the patient in the acute stage of the affection is, however, often very considerable, if the attack be severe, for the function of the kidney is almost entirely suspended, while at the same time the action of the skin, that other great emunctory of the system, is completely arrested. Chemical reagents show that the blood which circulates through the vessels is laden with urea, which the system, unable to eliminate by its natural outlets, tries to get rid of by pouring it out abundantly in the serous effusions that take place into the different cavities of the body. These efforts of nature to relieve herself not only prove unsuccessful, but the effused fluid often seriously interferes with the due performance of their functions by the different viscera; inflammation of the serous membranes of the chest or abdomen very frequently supervenes, and though this should not be the case, still the continuance of life

* On this subject it is almost needless to refer to the papers of Dr. Johnson, Mr. Busk, and Mr. Toynbee, in vol. xxix. of the Medico-Chirurgical Transactions, or to those by Dr. Johnson and Mr. Simon, in vol. xxx.; together with the note appended to the latter volume by the editors, respecting the labours of continental observers in this field of inquiry.

is not compatible with the circulation through the body of blood loaded with urea.

When this affection occurs as a sequela of scarlatina, it may very often be traced to exposure to cold while the process of desquamation was going on, whereby the activity of the skin has been checked or altogether suppressed, or to the injudicious adoption of a tonic or stimulant plan of treatment, at a very early period of the patient's convalescence. The opinion that it more frequently follows a mild than a severe attack of scarlatina, does not appear to have any better foundation than the circumstance that premature exposure to the air, and errors of diet, are exciting causes much more likely to occur after slight than after severe cases. Something, moreover, is unquestionably due to the epidemic constitution of the year, as Sydenham calls it, since the occurrence of the consecutive dropsy is common after the scarlet fever of one year, comparatively rare after the same disease in another year.

The *treatment* of this affection is on the whole that of inflammatory dropsy, from what cause soever it may arise. If it have set in with severity, the urine being very high coloured, extremely scanty, and loaded with albumen, the abstraction of blood is almost indispensable, and from four to six ounces may be taken from the arm of a child of five or six years old. It will, I believe, seldom, if ever, be necessary to repeat the general depletion, though if no improvement follow, and especially if there be pain or tenderness in the loins, cupping, or the application of leeches in that situation, should be resorted to. At the same time, the child must be put on a low diet: he must be kept in bed, and must be placed in a hot bath every night, in order, if possible, to excite the skin to action. The bowels must be kept freely open; but I have not found as much advantage from the employment of cathartics as from the use of diaphoretic medicines. The tartar emetic is in these cases a very valuable remedy, and may be given in nauseating doses every three or four hours, combined with the solution of the acetate of ammonia. If, as sometimes happens, the child complain of headache, or appear heavy and drowsy, or if the bowels be constipated, Dover's powder is inadmissible, though otherwise it may be advantageously combined with the medicine, or be given in a rather larger dose at bed-time. When by the employment of these means the skin has been excited to action, and the swelling, if not actually diminished, has at least ceased to increase, some of the milder diuretics may be combined with the mixture—as the acetate of potash, the extract of taraxacum, or the spirits of nitrous ether, while at the same time the dose of the tartar emetic may be reduced; but the change of the urine to a darker colour, or the increase of albumen in it, should be regarded as indicating the propriety of discontinuing their use, and of returning to the previous strictly antiphlogistic treatment.

In cases where little or no fever is present, and where the urine, though still albuminous, is neither so scanty nor so high coloured as in the instances just referred to, while the œdema is comparatively slight, a less vigorous plan of treatment may be adopted. The child should still be kept on low diet, and confined at first to bed, and for a considerable time afterwards to its nursery, while the warm bath should still be employed every night. Bleeding, however, is unnecessary; the tartar emetic need not be administered, but saline aperients, so given as to keep up a somewhat free action of the bowels for several days, will generally suffice to effect a cure. When, after the nearly complete disappearance of the œdema, and the return of the urine almost or altogether to a healthy state, the child still continues pale and languid and feeble, the tincture of the sesquichloride of iron is the best tonic that can be administered, and under its use any traces of albumen that previously existed in the urine will be altogether removed. Much care is required in restoring the child to its usual diet, and it should not be allowed to go abroad without wearing flannel next its skin; but no case has come under my observation in which the continuance of a morbid state of the urine after apparent convalescence from this affection has warranted the apprehension that actual degeneration of the kidney had been produced.

Before leaving this subject, I must just observe, that a slight degree of anasarca occasionally follows an attack of scarlet fever in a weakly child as a mere effect and indication of its feebleness; and also that an affection is now and then met with having all the characters of inflammatory dropsy, except that the urine is free from albumen. This was observed in the dropsy which followed a recent epidemic of scarlatina at Berlin,* and is likewise mentioned by Dr. Henry Kennedy as having been the case in some instances of the secondary dropsy which occurred during the Dublin epidemic of the disease.† With few exceptions, however, it has been found that the affection is slight when there is no albumen: its absence being probably due to the congestion of the kidney not having been so considerable as to lead to the rupture of its capillaries, and the admixture of blood with the urine.

Although most diseases of the urinary organs are less common in children than in grown persons, yet *calculous disorders* are far more frequent in early life than in adult age. It appears, indeed, from some statistical data furnished by Dr. Prout, that out of 1256 patients received into the Bristol, Leeds, and Norwich Hospitals, for the purpose of being operated on for stone, 500, or nearly 40 per cent., were under ten years of

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* Described by Dr. Philip, in Casper's Wochenschr. August 29, 1840.

† In his excellent Account of the Epidemic of Scarlatina in Dublin, from 1834 to 1842. 12mo. Dublin, 1842.

age. If we bear in mind the intimate connection that subsists between the assimilative and the excretory functions, it will not surprise us that in early life, when the former, though so active, are so readily disturbed, the latter should likewise be often thrown into disorder.

Very slight and very temporary causes, indeed, often suffice to occasion abundant deposits in the urine of children, and these deposits almost always consist either of the amorphous lithate of ammonia, or of the small reddish brown crystals of lithic acid. A trifling cold, or the slight feverishness and general irritation which sometimes attend upon dentition, not infrequently produce them, while they disappear as soon as the brief constitutional disturbance subsides. While it lasts, however, the condition of the child is often one of very considerable suffering, each attempt to make water being attended with much pain, the patient crying and drawing up its legs towards its abdomen; while frequently a few drops only of urine are voided at each time. Now and then, the suppression of urine is complete for twelve, eighteen, or twenty-four hours; but this seldom happens, except in children previously much out of health, and in whom, under these circumstances, the febrile symptoms and the constitutional disturbance are very severe, the bowels usually constipated, and the evacuations very unnatural in appearance. But besides cases of this acute kind, which occur almost exclusively in infants in whom the process of dentition is not yet complete, similar symptoms are often observed in older children, and though at first of a much less urgent character, they are yet of more serious import, since they frequently indicate the existence of a calculus in the bladder, instead of betokening a merely temporary excess of lithic acid deposits in the urine.

In many instances, the formation of lithic acid in the kidneys goes on without giving rise to any very obvious symptoms; and I have but rarely seen a child suffer from pain of that severe character which in the adult not infrequently accompanies the descent of a calculus from the kidney to the bladder. Sometimes, however, after frequent attacks resembling seizures of ordinary colic, a child begins to manifest the symptoms of stone in the badder; and, under these circumstances, it is probable that the previous attacks of abdominal pain were due to the disordered function of the kidneys, rather than to any primary affection of the intestinal canal. The occurrence of colic in children of three or four years old, indeed, should always direct our most sedulous attention to the state of the urine, which will very often be found to deviate widely from a healthy condition,—frequently to abound in lithic acid gravel.

The *symptoms* of stone in the bladder are much the same at all ages: the pain in voiding urine, and immediately afterwards, the frequent desire to pass water, the occasional abrupt stoppage of the stream of urine, and the irritation about the penis, owing to which the child keeps its hand

almost constantly on its genitals, can hardly fail to awaken suspicion as to the nature of the case. Before subjecting the child, however, to the fright and pain which the introduction of a sound into its bladder is sure to occasion, it should first be ascertained that the patient's sufferings are not due to the prepuce being extremely long and its orifice very narrow. The existence of that malformation sometimes prevents the ready escape of the urine; while the edges of the foreskin becoming irritated and sore, any attempt to make water is rendered exceedingly painful, and the symptoms present a most deceptive resemblance to those of stone in the bladder. The presence of ascarides in the rectum likewise sometimes produces a degree of irritation about the bladder, which is by no means unlike that produced by calculus; and against this possible source of error it behoves us to be likewise on the watch.

The *treatment* of dysuria in early life, connected, as the affection almost always is, with an excess of lithic acid in the urine, is sufficiently simple. Those acute attacks which come on during infancy, and for the most part during the period of teething, and which are attended with much fever, with a constipated or otherwise disordered condition of the bowels, and with severe suffering, obviously call for antiphlogistic and soothing measures. The warm bath is often very serviceable in these cases in relieving the febrile symptoms; besides which, the occasional immersion of the child in hot water, as high as the hips, soothes the pain which is so apt to attend upon every attempt to empty the bladder. The bowels should be acted on freely by castor oil; and afterwards, no medicine has appeared to me to afford so much relief to pain, or so effectually to excite the kidneys to action, as the castor-oil mixture which I have already mentioned to you, in combination with small doses of liquor potassæ, laudanum, and nitrous ether. Barley water, milk and water, and thin arrow-root, should constitute the child's nourishment during the severity of its attack; and even when the symptoms are on the decline, much prudence must still be exercised in keeping to a very mild and unstimulating diet. It is generally wise to continue the use of alkalies for some time after the active symptoms have subsided; and small doses of liquor potassæ, either alone or in combination with the vinum ipecacuanhæ, may be given three or four times a day in a little milk. Once or twice, I have seen a sudden suppression of urine, attended with great aggravation of the child's sufferings, follow after the existence of severe dysuria for two or three days; and have found this occurrence to be due to the mechanical obstruction of the urethra by a small calculus which had become impacted in its canal. The dysuria which is produced by the excessive length of the prepuce can be relieved only by the removal of a portion of the superfluous foreskin; while, when it is excited by ascarides, an enema of liquor calcis, with a dose or two of castor oil,

will often produce an immediate cure of symptoms which had been very troublesome.

The treatment of calculus in the bladder hardly requires special notice here; but you will bear in mind that the calculi which form in childhood are just of that kind on which medicinal agents are best calculated to act; and that we have but little reason for dreading those changes in the precipitate thrown down from the urine which take place in later life. The deposits that take place, and the calculi that form in childhood, consist almost invariably of the lithates, and hence we may employ the alkaline carbonates without apprehension; and under their continued use I have seen very copious sediments completely and permanently disappear from the urine. Their action, however, is far too slow to be relied on in any case where unequivocal signs are present of the existence of a stone of considerable dimensions; while, fortunately, the anæsthetic agents which we now possess, by depriving the operation of lithotomy of the pain that once attended it, have robbed it of many of its terrors.

An unnaturally profuse flow of urine occurs at all ages as a temporary symptom in the course of many disorders. Its permanent increase when associated with certain changes in the composition of the fluid, and the presence of saccharine matters among its elements, constitutes *diabetes*. This disease, although not common at any period of life, yet occurs in the adult sufficiently often for us to become familiar with its characters, and to dread it as one of the most formidable results of disorder of the assimilative processes. In the child, however, it would seem to be an exceedingly rare affection, for not only has no instance of it come under my notice at the Children's Infirmary, but Dr. Prout, out of his immense experience in diseases of the urinary organs, states that he has seen but one instance of it in a child of five years old, and only twelve in young persons between the ages of eight, and twenty years, out of a total of 700 cases of diabetes.* *Simple diuresis*, indeed, is less rare than true saccharine diabetes; and I have seen some instances in which, coupled with serious gastric and intestinal disturbance, there was so considerable an increase in the secretion of urine as to constitute a prominent symptom of disease. In these cases, however, considerable disorder of the digestive organs had for some time preceded the excessive flow of urine; and Dr. Prout states, that in the earlier stages of infantile diuresis, the urine is loaded with lithates and diminished in quantity, though as the disease advances the quantity of urine becomes considerably increased; and it sometimes contains albumen, or in rarer cases yields signs of sugar. So far as my observation goes,

* On Stomach and Renal Diseases, 5th edit. 8vo. p. 36, note.

indeed, the disturbance of the functions of the kidney is in these cases purely secondary and subsidiary to the gastric and intestinal disorder. The quantity of urine has either been speedily diminished under a due attention to diet and the regulation of the digestive organs, or the symptoms have become merged by degrees in those of phthisis, which has gradually developed itself. My experience concerning these affections amounts, in short, to this—that whenever the processes of digestion and assimilation are seriously disturbed for any considerable time in early life, the functions of the kidney are very apt to become excessive in degree as well as disordered in kind. Further, such disorder is especially likely to occur just at that period when the simple but highly animalized food of the suckling is exchanged for the more varied diet of the infant after weaning. And, lastly, its existence may be suspected, whenever, coupled with more or less marked indications of gastro-intestinal disorder, there is a rapidly increasing emaciation, for which no adequate cause appears. It will, however, often happen, even when the amount of urine greatly exceeds the healthy average, that the parents of an infant take no notice of the circumstance, imagining it to be either an accidental and unimportant occurrence, or accounting for it as the natural result of the thirst, which induces the child to drink very abundantly. Hence, unless you make special inquiries with reference to this point, you may remain in ignorance of a very important symptom.

When once you have become aware of the existence of this affection, its *treatment* is attended by no particular difficulty, and, if undertaken sufficiently early, will often prove successful. The state of the bowels requires most careful attention: mild alteratives are frequently serviceable, but drastic purgatives are very unsuitable. The Hydr. c. Cretâ, in combination with Dover's powder, is often very useful in promoting a healthy condition of the evacuations; while the Dover's powder alone is also beneficial in calming the child's excessive irritability, as well as in diminishing the amount of urine secreted. Dr. Prout adds a caution, however, with reference to the use of opiates in these cases, as well as to the sudden withdrawal of fluids, since a suppression of urine may follow the incautious adoption of these measures, and that condition is almost sure to end in coma and death. Change of air to a dry and temperate situation, especially on the sea-coast, is of much importance, and the tepid or warm sea-water bath is often beneficial; while tonics of various kinds are generally of service. The different preparations of iron appear to have advantages over other medicines; and Dr. Venables, who was the first to call the attention of the profession to this affection, bestows high commendation on the phosphate of iron. Dr. Prout insists, moreover, on the importance of a suitable diet, into which albuminous matters should enter freely, in preference, though not to the entire exclusion, of those which contain

gelatine. Milk should form a chief element in the diet; while of farinaceous matters, those are to be preferred which have not undergone the fermentative process. These precautions, too, must be observed, not for a short period only, but until the child has for some time regained its health, since a slight error is very likely to be followed by a serious relapse.

Incontinence of urine is a very distressing infirmity from which children sometimes suffer, and which in many instances it is found very difficult to cure. In most cases this inability to command the flow of urine exists only in the night-time, but sometimes it is present also by day; and both forms of the affection are met with in children of both sexes and of all ages, even up to the period of puberty. The nocturnal incontinence of urine is often associated with the presence of an excess of lithic acid in the secretion; and in such cases the first step towards remedying the infirmity consists in correcting the morbid state of the fluid. Now and then it appears to be dependent on the irritation produced by ascarides in the rectum, while in the majority of cases, so long as the affection is recent, a connection may be clearly traced between it and gastro-intestinal disorder. If not remedied, however, all the other functions of the body may return to a healthy state, while yet the incontinence is perpetuated by a kind of habit, which it is found very difficult to break through.

The involuntary discharge of urine by day-time as well as at night is a still more troublesome affection. Sometimes there is an absolute want of control over the bladder, so that the urine is almost constantly dribbling away; while in other cases the desire to pass water is distinctly felt at certain short intervals: but the patient is unable to resist this desire even for a minute. This affection, too, is sometimes associated with a morbid condition of the urine; in other instances it seems to depend on a state of general weakness; while in some cases there is no apparent cause, either general or local, to which it is possible to ascribe it. Cases of this last kind are of all the most troublesome; they are sometimes met with in several members of the same family, especially in girls, though, according to my experience, the other more curable forms of incontinence are much more common in male children.

In the cure of nocturnal incontinence of urine much may often be gained by attention to certain precautionary measures; such as limiting the quantity of drink taken at the last meal, preventing the child from lying on his back when in bed (a position which seems greatly to favour the occurrence of the accident), and rousing him from bed to empty his bladder two or three times in the night. If the urine be loaded with lithates, the diet must be most carefully regulated, and medicines must be given to restore the urine to a healthy state, and to ensure the due performance of the functions of the digestive organs. Tonics are often extremely useful

afterwards, and there is none from which I have seen so much benefit as from the tincture of the sesquichloride of iron. At the same time, cold sponging to the back and loins is often decidedly serviceable; and if the case resist these milder measures, the frequent application of a blister to the sacrum seldom fails to do great good. In very obstinate cases the tincture of cantharides is of service; and once or twice I have employed with advantage large doses of the nitrate of potash, according to the recommendation of Dr. Young, of Chester; but, as a general rule, the employment of these stimulant diuretics is not desirable.

LECTURE XXXVI.

Abdominal tumors.—Enlargement of abdomen not always the result of actual disease—causes to which it may be due.—Abdominal tumors—from enlargement of the liver, by simple hypertrophy, by hydatid growths, by malignant disease—from malignant disease of the kidney—from enlargement of the spleen—from psoas abscess.—Cases in illustration.

Infantile syphilis—its symptoms—characters of the syphilitic cachexia—tendency of the symptoms to return after apparent cure.—Treatment.

Among the anatomical peculiarities of early life, none is more remarkable than the great size of the abdomen, as contrasted with the undeveloped state of the thorax, on the one hand, and of the lower extremities, on the other. Though most striking in the new-born infant, it still continues to a great degree during the whole of the first years of childhood; nor does it altogether disappear until, with advancing age, the pelvis enlarges, the spinal column acquires its proper curvature, the limbs gain their due development, and the chest expands in a measure commensurate with the demands made upon the thoracic viscera for the vigorous performance of their functions.

The anxiety of non-professional persons is often needlessly excited by the large size of the abdomen in childhood, while those even who are conversant with medicine do not always bear in mind the very different causes to which an increase of its bulk may be due. It will, therefore, I think, be no waste of time to notice briefly the circumstances under which *enlargement of the abdomen* may occur in childhood, and to give you what little information I may be able to furnish with reference to those diseases which occasion distinct *abdominal tumors*.

The abdomen sometimes appears preternaturally large, wholly independent of any disorder of the general health, but as the result of the child's growth and development having gone on slowly, so that its body retains its infantile proportions but little altered at the age of two or three years. If, as often happens, this tardy development should be associated with feeble health, with a somewhat impaired performance of the digestive functions, and with a constipated condition of the bowels, flatus is almost

sure to collect in the intestines, and the enlargement of the abdomen is thus rendered still more considerable. With such a state of health, too, some of the minor degrees of rickets are often associated; and even though no serious deformity mark the existence of the disorder, yet to its influence are due the undeveloped chest and the small pelvis; while the contracted and misshapen thorax, which is produced by the advance of the disease, makes the abdominal enlargement appear still more striking, and causes the child, according to MM. Rilliet and Barthez' apt comparison, to resemble the toy tumblers which Italian image boys sell about the streets.

In cases such as have been referred to, you will save yourselves and your patient's friends much needless anxiety, if you bear in mind that tabes mesenterica is exceedingly rare before five years of age, while this condition of general abdominal enlargement is met with chiefly between the commencement and the end of the first dentition. Further, you will find that, under these circumstances, the abdomen is perfectly soft and painless; you will learn that no symptom of tubercle has shewn itself; while, if you strip the child, which in doubtful cases you ought to do, you will probably see more or less distinct indications of the action of rickets, either in deforming the skeleton, or in disordering its proportions.

Enlargement of the abdomen is a much more frequent attendant on tubercular peritonitis than on mesenteric disease. The tense, and tympanitic, and painful, state of the abdomen, the sensation of adhesion between the abdominal walls and the subjacent viscera, the loss of flesh, the frequently recurring diarrhœa, the febrile symptoms, and the more or less well-marked indications of tubercular disease which attend it, usually stamp the nature of that affection too clearly for the attentive observer to fall into error.

But besides these cases, in which there is a general enlargement of the abdomen, there are others in which its increase of size is mainly due to the presence of a distinct and well-defined *tumor*. A good many instances of this sort have come under my notice at different times, though, as often happens in Dispensary practice, the number of those is but small in which I have had the opportunity of watching the affection to its close, and of confirming or correcting by an examination after death the diagnosis formed during the life-time of the patient.

One not very uncommon cause of abdominal tumor is *enlargement of the liver*, which sometimes undergoes a very great increase of its bulk, without any obvious reason, and even unattended with any serious disturbance of the general health. I remember a little girl, about ten years old, who was received into St. Bartholomew's Hospital on account of very great enlargement of her abdomen. She looked very pale, and the distension of the superficial veins of her chest and abdomen, and the livid

congestion of her face, shewed that there existed some serious obstacle to the circulation. Her abdomen had been gradually enlarging for many months, and at the time of her admission into the hospital the margin of the liver was distinctly traceable below the umbilicus; her bowels were habitually constipated, but the evacuations were natural in appearance, and the child was well-nourished, cheerful, and active, being but little annoyed by her great size. I saw her again two years afterwards, and her condition was then quite unaltered. Similar cases, of what I believe to have been simple hypertrophy of the liver, have since come under my notice. For the most part they were associated with very obvious indications of a scrofulous habit, but on one occasion only was there any serious disturbance of the general health; the child in that instance suffering from very severe diarrhœa, which had succeeded to a state of somewhat obstinate constipation.

I once met with a *hydatid tumor of the liver* in a girl aged 13½ years, in whom, two years and a half previously, a swelling had begun to form at her right side, without any sign of general indisposition, though the subsequent increase of the growth had been attended with occasional attacks of severe pain. At the time of my seeing her she had gone through a variety of treatment, which consisted chiefly in leeching and the inunction of iodine ointment, without any benefit; but her general health was good, although she was small for her age. On removing her dress, the lower part of her chest and the upper part of her abdomen were seen to be much enlarged by a growth the lower margin of which could be felt a little above the umbilicus, and which seemed larger on the right than on the left side. At this time the circumference of her chest, on a level with the nipple, was 25½ inches, and 25 inches, four inches lower down; but three years and a half later, and a short time before her death, she measured 32 inches at the former, and 33 at the latter point. Even when I first saw her, the respiratory murmur ceased to be audible on a level with the nipple, and the cavity of the chest became still more encroached on with the advance of the disease. Fluctuation was distinctly perceptible over nearly the whole of the tumor in the chest as well as in the abdomen, and continued so during the whole of the patient's life. It was in May 1840 that the patient first came under my notice, and no change whatever took place in her condition until February 1842. At that time, after severe pain in the tumor had been experienced for several days, a fresh growth made its appearance, of about the size of a breakfast-cup, to the left of the umbilicus, and a little above it. In July following, the patient began to lose flesh, her appetite failed, and she began to suffer frequent attacks of palpitation. At this time, and often subsequently, the child complained of pain and numbness, extending down the right arm. Notwithstanding the progressive increase of the tumor, the patient's health continued tolerably good for the succeeding seventeen months, though she grew but little, and no

signs of approaching puberty appeared. In the middle of December 1843, symptoms of gastric disorder showed themselves: the child suffered much from flatulence, had occasional diarrhœa, severe pain in her abdomen, great feverishness, and her mind wandered a little at night. The skin grew jaundiced, and the water became very high coloured; while the attacks of pain, chiefly referred to the epigastrium, sometimes were so severe that the patient fainted from their intensity. Slight cough came on, and for three weeks before death she was unable for a moment to assume the recumbent posture. Her strength gradually failed, and she died on Jan. 28, 1844, during an unusually severe attack of pain.

On opening the abdomen, from which a gallon and a half of transparent yellow serum escaped, the enormously large liver was brought into view. It reached down to somewhat below the false ribs on the left side, not quite so low on the right, and extended upwards on the left, pushing the diaphragm before it to rather above the upper margin of the second rib, and on the right side to a little above the level of the third. This enlargement seemed made up of the left lobe, for the right lobe, rather dark but otherwise healthy, was found pushed downwards by it into the right flank. The surface of the enormously enlarged left lobe was of a pale colour: on making an incision into it, it was found to have formed a sac, the parietes of which were about a third of an inch thick, containing a gallon of viscid yellow fluid, and a number of hydatids of a large size. The sac itself appeared to be formed by the parent hydatid, the parietes of which were firmly adherent to the substance of the liver. At the anterior edge of the right lobe of the liver, just to the right of the gall-bladder, was a yellowish white tumor of the size of a walnut, which, on being cut into, was seen to be composed of dead and shrivelled hydatids; they were folded together, one within the other, like the coats of an onion, except that, in order to reduce the space they occupied as much as possible, they were plicated. The two or three outer layers had begun to be the seat of cretaceous deposits. The gall-bladder contained a little pale, fluid, bile.

The lungs were healthy, though much compressed. The valves of the heart were quite healthy, but the pericardium was universally, and in some parts very firmly, adherent to its substance; the result, doubtless, of inflammation, which most likely came on at the time when the child began to complain of palpitation of the heart. The other viscera were quite healthy.

I have once seen *the liver* in the child *the seat of malignant disease* of the fungoid kind, in the progress of which the organ acquired a very large size. The affection was attended by vague indications of abdominal disease, in which there was nothing that pointed especially to any one viscus, while the morbid growth, having originated from the under surface of the right lobe of the liver, was supposed, from the relations which it presented, to be due to the enlargement of the mesenteric glands. The patient was a little boy, who was eight months old when the first indication of disordered

health appeared, in diarrhœa, fretfulness, and loss of flesh and appetite; and at the age of nine months his mother noticed some solid masses in the abdomen, though from the commencement of his illness his belly had been hard and rather tender. The child lived to the age of one year; and for the last six weeks of his life, during which tim e I had the opportunity of watching him, he suffered from diarrhœa, which was occasionally very profuse. He became extremely emaciated, and his skin assumed an exceedingly sallow colour; but the evacuations, though relaxed, were otherwise natural. No hæmorrhage took place from the intestines, and the urine was found to be perfectly natural whenever it was tested. During the last month of his life he had a slight cough and wheezing respiration; but death seemed due to the constant diarrhœa and the severe pain which the child suffered; his exhaustion being doubtless in great measure the consequence of the blood which should have nourished his body being diverted to supply the enormous mass of fungoid disease of the liver.

During the six weeks that the child was under my observation, his abdomen increased from twenty-one to twenty-five inches in circumference, and the tumor, the surface of which was uneven, was always much larger on the left than on the right side. It turned out, however, on an examination after death, that the left lobe of the liver was almost completely healthy, but that it had been driven up under the ribs by the enlarged right lobe: that part of the organ was converted into a soft, white, brain-like matter, intermingled with which were portions of a firmer, highly vascular, fibro-cellular substance. The disease, in short, consisted of a mixture of carcinoma medullare, and carcinoma fasciculatum. A few deposits of medullary cancer, one of them as big as a walnut, existed also in the right lung, but the other viscera were healthy.

Malignant disease of the kidney is another occasional cause of abdominal tumor in children, and of this I have met with two instances. The first occurred in a boy, who died at the age of two years and ten months; and the second in a girl, who was fourteen months old at death. In the former case, at the same time that the child became languid and fretful, his abdomen was observed to be enlarging. For a few days in the early part of his illness he was reported to have passed bloody urine; but this symptom did not recur during the subsequent progress of the disease. In proportion as his abdomen increased in size, he became more and more emaciated: he had occasional attacks of diarrhœa, but nevertheless his appetite continued craving; and it was not till ten months after the first symptom had been noticed that the child died, exhausted. In the case of the girl, the disease ran a much more rapid course, and death took place in ten weeks from the appearance of the first symptom. She was attacked with feverishness, gastric disorder, and occasional vomiting, which had not continued more than a week when her mother noticed a tumor in the abdomen. When these symptoms came on, the child was well nourished,

but she lost flesh rapidly in proportion as her abdomen increased in size; her evacuations were often very unnatural, but at no time was there either diarrhœa or hæmaturia. Towards the end of her life she became very fretful, and seemed occasionally to suffer severe pain in the abdomen; but her death took place suddenly, and without any sign of her health being worse than it had appeared to be for some days before. In one case the left, in the other the right kidney, was the seat of the disease: the local symptoms were very similar in both instances, and consisted in the presence of a solid tumor occupying the lumbar region, and extending from the spine across the abdomen towards the opposite side, and reaching upwards beneath the ribs, and downwards towards, and in the first case even into, the pelvis. On examining the body after death, the nature of the disease was seen in both instances to be precisely the same, being a mixture of cerebriform matter and of the peculiar structure of fungus hæmatodes, while in both the kidney was considerably bigger than the head of an adult.

In this country, and especially in the neighbourhood of London, where the severer forms of intermittent fever seldom occur, we do not often meet with instances of that *enlargement of the spleen*, which is common enough even among children in malarious districts. The only instance of it which I have had the opportunity of observing was presented by a little girl, six years and a half old, who had lived at Fernando Po from the age of two years and a half, having had dysentery at three years old, and frequent attacks of fever subsequently. The enlargement of her spleen had first become apparent at five years of age; and when I first saw her, a few weeks after her return from Africa, it had attained so considerable a size that her abdomen measured twenty-one inches and a half in circumference. The spleen in this case reached from under the ribs quite down into the pelvis, and forwards as far as the mesial line of the abdomen. Independently of the patient's history, which in a case of this kind would be of itself sufficient to prevent an erroneous diagnosis, the relations of the swelling were characteristic; for, although situated at the side of the abdomen, it did not extend backwards into the lumbar region so as to fill it up completely, as an enlarged kidney would do, but a considerable interval existed between the posterior margin of the tumor and the vertebral column.

Lastly, before dismissing the subject of abdominal tumors, I must warn you of the possibility of mistaking the swelling formed by a *psoas abscess* for that produced by enlargement of the kidney. When psoas abscess occurs in young children, its early stages may readily be overlooked, partly because the patient is unable to describe those vague sensations of uneasiness in the loins by which it is attended,—partly because impairment or loss of the power of walking is so common a result of indisposition of any kind in early life that it seems scarcely neceseary to seek for any

special cause to explain its occurrence. The gradual failure of the health, the loss of flesh and the occasional disturbance of the bowels, are symptoms that attend upon various disorders of the abdominal viscera, and that present nothing pathognomonic of any. The tumor, like that formed by enlargement of the kidney, occupies the lumbar region, projecting forwards into the abdomen; while fluctuation in the abscess is often so obscure, as to be scarcely, if at all, perceptible. The tumor of psoas abscess, however, reaches less high up in the abdomen than that formed by enlargement of the kidney: its contour is usually more circular, less oval, and the tenderness over it is in general greater, than in cases of malignant disease of the kidney. As the affection advances, and the matter gravitates into the thigh, or points in the lumbar region, its nature becomes clearly manifest; but though, as far as the final issue of the case is concerned, an error of diagnosis is of but little import, it is yet very desirable for your own reputation that you should not, at any period, have fallen into a mistake as to its nature.

According to the plan which we proposed to follow in this course of lectures, there remains for us now to study, in conclusion, the febrile disease of infancy and childhood. There is one affection, however, too important to be passed over in silence, although it cannot be assigned to any of those classes into which, for convenience sake, we distributed the diseases of early life. I propose, therefore, to devote the remaining half hour of to-day to the study of *infantile syphilis*, and to defer till to-morrow the consideration of the fevers and exanthemata.

Syphilis, as it occurs in the infant, presents many important differences from the characters which it presents in the adult; nor is there in this any thing to excite our surprise, if we bear in mind the very different circumstances under which, in the two cases, the poison infects the organism. In the adult the manifestations of the disease are almost always the result of the direct inoculation of the system with the veneral virus. In the child, infection by that mode seldom occurs. The supposition, once generally entertained, that an infant becomes affected with syphilis in consequence of its body being brought, during the time of its birth, into contact with venereal sores upon the mother's genitals, is now deservedly regarded as altogether erroneous. The infection of a child by sucking the breast of a syphilitic nurse is an unusual occurrence; and in by far the greater number of cases the infant has contracted the disease in the womb, although its indications comparatively seldom shew themselves until at least fourteen days after birth. In many of these cases the mother has, during her pregnancy, been the subject of primary syphilis, or if not, has presented well-marked secondary symptoms; and under either of these conditions we can understand that her infected blood may deteriorate that of her infant, and give rise to consequences more or less analogous to those from which she has recently suffered herself. Cases, however, are now and then met

with, in which the venereal taint appears to have been derived entirely from the father, the mother, as far as can be ascertained, not having suffered at any time either from primary or secondary symptoms, although she has given birth to an infant affected with all the characteristic marks of syphilitic disease.

Through whichever of these media the infant becomes infected with syphilis, *symptoms* of the same kind appear, though there is no invariable order in which they shew themselves; and coryza is its earliest indication in one case, a cutaneous eruption in a second, ulceration about the corners of the mouth in a third. When we consider the frequency with which abortionor premature labour appears to be due to the influence of the syphilitic poison, it might naturally be expected that cases should be by no means unusual in which infants at the moment of their birth should present evidences of the venereal taint. This, however, is very seldom the case,—so seldom, indeed, that I do not remember to have met with an instance of it; neither has any case come under the notice of M. Trousseau, of Paris,* whose appointment at the Hôpital Necker in that city gives him most ample opportunities for observing the diseases of early infancy. Children, although infected with syphilis, and in whom the signs of the disease speedily shew themselves, are yet generally well nourished, and apparently in good health, at the time of birth. This, too, is observed to be the case even where the mother has suffered severely from secondary symptoms, —has already aborted frequently, or has given birth prematurely to dead children whose cuticle was peeling off,—a condition regarded, and probably with justice, as an effect of the venereal poison. When she at length produces a living child, there is nothing for the first two or three weeks after its birth to distinguish it from the offspring of the most healthy parents. After the lapse of that time the first symptom of disease shews itself; and most commonly this is nothing more than the occurrence of a degree of snuffling with the child's breathing, and slight difficulty in sucking,—the signs, in short of ordinary coryza. Now and then, as I stated some days ago,† no other indication of syphilis appears, but nevertheless the coryza does not yield until after the child has been brought under the influence of mercurial remedies,—a fact which would seem to shew that, although unaccompanied with other signs of venereal taint, the snuffles of young infants are sometimes produced by that cause. In the majority of instances, however, the coryza does not continue long without characteristic signs of disease appearing about the nostrils themselves, and without syphilitic eruptions breaking out upon the surface of the body. The mucous membrane of the nostrils secretes a yellow ichorous matter, sometimes slightly streaked with blood, which drying, obstructs the opening of the nostrils, and renders breathing and sucking very

* See his very valuable memoir on Infantile Syphilis, in the Archives Gén. de Médecine for October 1847.

† In Lecture XV. p. 166.

distressing to the child. The voice, too, before long becomes affected, and assumes a peculiar hoarse tone, which has been not inaptly compared to the sound of a child's penny trumpet, and which, when you once have heard, you will at once recognize as almost pathognomonic of syphilis. This change of voice depends no doubt on the affection of the throat, which you will often see, in common with the interior of the mouth, to be red and shining, and to present many superficial ulcerations. The skin of the upper lip over which the discharge from the nostrils runs, often becomes excoriated, or if not, it assumes a peculiar, yellowish brown, colour, like the hue of a faded leaf. Should the disease be unchecked, large patches of the skin upon the face and forehead put on this appearance, which seems due to a kind of staining of the part, and is unaccompanied with any alteration of its texture. Both lips before long become affected: a number of minute, perpendicular, fissures, take place in them, which bleed whenever the infant sucks; and small ulcerations appear at either angle of the mouth. It generally happens, however, before these effects of the disease have become very obvious about the mouth, that the skin in various parts presents appearances equally characteristic. Though not limited to any situation, the eruption of syphilis usually makes its appearance about the buttocks and nates, in the form of small, circular, shining spots of a coppery red colour, having a slightly shining surface, and disposed to become somewhat rough at their centre from the desquamation of the epidermis in that situation. The spots in the neighbourhood of the anus often degenerate into small, soft, spongy ulcerations, with a slightly elevated base; the margins of the anus become fissured; and the skin about the scrotum and along the inside of the thighs grows red, sore, cracked, shining, and denuded of its epidermis. The eyes grow weak, the margins of the eye-lids sore, and a scanty, adhesive, puriform, secretion, is poured out from the Meibomian glands, attended with but little redness of the conjunctiva. Sometimes, too, the hair of the head drops off, as small, red, sometimes slightly elevated spots, extend over the scalp.

The child is generally by this time reduced to the last stage of weakness and attenuation, but even when the disease proves fatal, it does not as in the adult affect the bones. I have chanced, indeed, to see one instance of destruction of the bony palate from this cause in an infant of a few months old, but so rare is the occurrence, that the late Mr. Colles of Dublin,* notwithstanding his immense experience, states that he had never observed it. Should life be prolonged after the disease has reached an advanced stage, its further manifestations consist in the formation of small pustules about the mouth, especially upon the lower lip and chin, which destroy the cutis, and leave the surface after they have healed much scarred by

* Practical Observations on the Venereal Disease, 8vo. p. 271. London, 1837.

their cicatrices. The epidermis, too, in some bad cases peels off the hands and feet: it generally becomes thickened to a kind of crust, like that which forms on the hands in psoriasis palmaria, and then cracking, falls off in patches, leaving the skin fissured, and sometimes deeply ulcerated at the bend of the wrist, or at the flexures of the fingers and toes. The new and delicate epidermis in its turn undergoes a similar thickening, and becomes detached in the same manner, or else it continues white and thin, but shrivelled, and looking like the sodden and wrinkled skin of a washer-woman's hand, and peeling off in little fragments, leaves the cutis, especially at the tips of the fingers and toes, red, and bleeding slightly, even on the gentlest touch.

Although such are the effects that may flow from infantile syphilis when it runs its course unchecked, it yet happens but rarely that we meet in any case with all the symptoms that have just been described. Most serious constitutional disturbance is associated with the local mischief, and the child often falls a victim to the former, when the outward signs of syphilitic disease are yet comparatively slight. It wastes rapidly, it suffers from sickness, or its bowels become much purged: it is constantly fretful and uneasy: the advance of ossification is arrested; the head feels soft, and the anterior fontanelle is large;—circumstances which sometimes lead to the suspicion that chronic hydrocephalus has come on, though if the poison of syphilis should be eradicated from the system, the completeness of the patient's recovery shows that no serious cerebral disease had existed. In children affected by this syphilitic cachexia, not only are the loss of flesh, and that withered aspect which gives to infancy the appearance of old age, very remarkable, but also the bloodless state of the conjunctiva, and the yellow, waxen hue of the skin, like that of a person who has been reduced to the most extreme degree of anæmia. Even in children who have survived their earliest infancy, and in whom the disease, though not completely eradicated, has yet been kept in check, this colour of the skin continues, and seems, indeed, to be an almost pathognomonic sign of the affection from which they are suffering.

When imperfectly cured, other indications of the disease remain besides the impairment of the general health, the loss of flesh, and the peculiar colour of the skin, or at least, if not constantly present, they show themselves from time to time, reappearing at uncertain intervals, without there being any fresh cause for their manifestation. Such symptoms are the return of the small copper-coloured spots, which, however, seldom reappear in considerable numbers; the general loss of hair; the existence of a slight degree of coryza; the appearance of one or two soft, tubercular elevations, with ulcerated summits, about the organs of generation, or the outbreak of a very severe and unmanageable intertrigo. In other instances, there are few local signs of the disease beyond the occurrence of small ulcerations at each angle of the mouth, or the development of

large soft condylomata at the verge of the anus, or in a few instances the formation of exceedingly troublesome ulcerations, having a slightly elevated base, between the fingers and toes, which last appearances seem to belong to the tertiary rather than to the secondary consequences of syphilitic disease.

The duration of the disease, and the mode in which it proves fatal, vary in different cases; for while death sometimes takes place speedily under the first outbreak of its symptoms, life is in other instances prolonged for several months. In cases of this latter kind the more marked signs of the disease recede for a time, either spontaneously or under medical treatment, but the evidences of the syphilitic cachexia continue, the child never regains its health, glandular enlargements take place, and it either dies phthisical, or else drags out a miserable existence until some intercurrent disease, as pneumonia or diarrhœa, supervenes and destroys it.

But though the consequences of infantile syphilis are so serious, if it be either let alone or inefficiently treated, a fatal result seldom takes place if remedies be employed before the syphilitic cachexia has become fully established, and if *treatment*, when once begun, be perseveringly continued for some time after the complete disappearance of every symptom. This, indeed, sometimes implies the continuance of treatment for two or even three months; for so long as any symptoms remain, be it only a slight spot of eruption, or a small condyloma about the anus, the suspension of remedies will be certainly followed by the reappearance of the whole train of symptoms. Even after the apparent cure of the affection, it is not wise hastily to omit all medicines, since, just as in the adult, the symptoms have a great tendency to recur.

Mercury in some form or other appears to be indispensable to the cure of this affection. It has been recommended by some writers not to administer it directly to the child, but to content ourselves with bringing the mother's system gently under the mercurial influence, and to cure the infant through her medium. In some slight cases this may suffice, and in almost all, the cure of the infant is materially expedited by the administration of the remedy to its mother; but I think that, as a general rule, it is expedient to give mercury likewise to the child. I prefer the hydrargyrum cum cretâ to any other form of the remedy, and give it in doses of a grain twice a day to a child of six weeks old, combining it with two or three grains of chalk if the bowels be disturbed at the time of commencing the treatment, or if they become so during its continuance. I have never found it seriously disagree, though sometimes it causes sickness, in which case small doses of calomel, or of the solution of corrosive sublimate, may be substituted for it. In some cases, whatever be the form of mercurial employed, its protracted use occasions such great irritability of the stomach, that we are compelled to discontinue the remedy. Usually, the child becomes able to take it again, after a pause of two or three days;

but if this should not be the case, we must leave it off, and content ourselves with ordering a scruple of mercurial ointment to be rubbed into the thighs or the axillæ twice a day.

As a local application to the sores, the black wash usually agrees better than any thing else, but the large soft condylomata, which form about the anus, often require to be touched with the solid nitrate of silver. It very often happens that as the syphilitic symptoms disappear, the health of the child becomes perfectly restored under the use of no other remedy than mercury. If this be not the case, however, some tonic medicine or other must be given. If the bowels be disordered, the liquor cinchonæ, or the extract of bark given either by itself or combined with the extract of sarsaparilla, will be found very useful. If there be no gastric or intestinal irritation, minute doses of iodide of potass may be given in combination with the extract of sarsaparilla; but if the syphilitic cachexia be well marked, and the child have suffered long from the disease, or have had frequent returns of its symptoms, no remedy has appeared to be so serviceable as the iodide of iron, which may be given in the form of syrup, and is in most cases taken by the child very readily, while it is seldom found to disagree.

LECTURE XXXVII.

Fevers—chiefly belong to the class of the Exanthemata. Mistakes with reference to simple fever in childhood—its identity with fever in the adult.—Simple fever or remittent fever occurs in two degrees—symptoms of its milder form—of its severer form—signs of convalescence—modes of death.—Diagnosis.—Treatment.

We come now to the last part of this course of lectures, namely, to the study of *the febrile diseases incidental to infancy and childhood.* They belong, for the most part, to the class of the Exanthemata,—diseases characterized, as you know, by very well-marked symptoms, by a very definite course, and by usually occurring only once in a person's life. These peculiarities have always obtained for them the notice of practitioners of medicine, and few of the affections of early life have been watched so closely, or described with so much accuracy, as small-pox, measles, and scarlatina. Hence it will be unnecessary to occupy so much of your time with their investigation as we have devoted to the study of other diseases which, though not so important, have yet been less carefully or less completely described.

While the well-marked and unvarying features of the eruptive fevers, however, have forced those diseases on the attention of all observers, the more fluctuating characters of simple continued fever have been so masked by the differences between youth and age, that the affection as it occurs in early life was long almost entirely overlooked, and its nature was, in many respects, still longer misapprehended. Many, indeed, even of the older writers on medicine, have spoken of fevers as occurring among children at all ages; but under this name they confounded together several diseases in which febrile disturbance was merely the effect of the constitution sympathizing with some local disorder. This mistake was committed with especial frequency in the case of various affections of the abdominal viscera; many of which are attended by a considerable degree of sympathetic fever, while their symptoms, in other respects, are often so obscure that the imperfect diagnosis of former days failed to discover their exact nature. As medical knowledge increased, many of these

disorders were referred to their proper place; but, nevertheless, the descriptions given of the so-called *remittent fever*, worm fever, and hectic fever of children, present little of a definite character, and are evidently the result of a blending together of the symptoms of various affections. The disease described under these different names was supposed to be a symptomatic fever, excited by gastric or intestinal disorder, and limited in the period of its occurrence to early life; while the absence of the well-marked shivering which usually attends the onset of fever in the adult, the rarity of any efflorescence on the surface of the body, and the comparatively low rate of mortality which it occasions, led persons altogether to overlook the close connection between it, and the continued fever of the adult.

If, however, we look attentively at the characters of this disease, and compare them, as has been done by MM. Rilliet and Barthez, with those presented by the simple continued fever of the adult, we shall, I think, see so close a correspondence between the two affections as to remove all doubt with reference to their identity. Both diseases occur independently of any unvarying cause, often independently of any cause which we are able to detect; and both, though generally affecting isolated individuals, yet have also their seasons of epidemic prevalence. Though varying in severity, so that in some cases confinement to bed for a few days is scarcely necessary, while in other cases the patient hardly escapes with his life, yet medicine has not been able to cut short the course even of their mildest forms. And, lastly, though the local affections associated with both vary much in different cases, yet in every instance we meet with that assemblage of symptoms which make up our idea of fever. Or if, from the examination of the symptoms during life, we pass to the inquiry into the traces left by the disease on the bodies of those to whom it proves fatal, we shall find still further evidence of the close relation that subsists between the fever of the child and that of the adult. Enlargement, tumefaction, and ulceration of Peyer's glands, constitute one of the most frequent morbid appearances in both diseases, and in both, the changes that these glands are found to have undergone are more advanced and more extensive in proportion to their nearness to the ileo-cæcal valve. In both, too, the mesenteric glands are enlarged, swollen, of a more or less deep red colour, and manifestly increased in vascularity; while the softened state of the spleen, the gorged condition of the lungs, and the congestion of the membranes of the brain, are appearances common to both diseases. There is, however, no more relation between the severity of the intestinal lesion and the intensity of the symptoms in the fever of the child, than in that of the adult; and there is no ground for regarding the disease as the mere effect of the constitution sympathizing with a certain local mischief in the former case, which may not be equally alleged with reference to the latter. The symptoms in both "are the expression of the influence of the disease

on the whole economy, of the disorder which it occasions in the principal functions of the body, and are an essential part of the disease itself, rather than the secondary effects of certain lesions of the bowels."*

There are still many questions that might be proposed with reference to the remittent fever of children, but on which I do not enter now, because I am at present unable to give you what would be, even to my own mind, a thoroughly satisfactory solution of them. We will, therefore, pass at once to a safer and more profitable field for inquiry, and will examine into the *symptoms* that characterise this affection.

The different degrees of severity which a disease may present in different cases do not in general form a good basis on which to found any classification of its varieties; but in the case of the remittent fever of children the differences are so great between its milder and its severer form, as to warrant our adopting them as a ground for a subdivision of the disease into two classes. In *cases of the first or milder kind*, the disease usually comes on very gradually, often so much so that the parents of a child who is attacked by it are unable to name any fixed time as that at which the illness began. The child loses its cheerfulness, the appearance of health leaves it, the appetite fails, and the thirst becomes troublesome; by day-time it is listless and fretful, and drowsy towards evening, but the nights are often restless, or the slumber broken and unrefreshing; while all these symptoms come on without any evident cause, and are not accompanied by any definite illness. When once the attention of the parents has been excited to the condition of the child, it is soon ascertained that the skin is often hotter, and almost always drier than natural, though now and then rather profuse sweats break out causelessly on the surface, and continuing for an hour or two, leave the patient in no respect relieved by their occurrence. The bowels are sometimes loose even at the onset of the disease, or if not, they are in general readily disturbed by medicine; a very mild aperient being not unfrequently followed by three or four actions of the bowels daily for the next two or three days. In a few instances there is a condition of rather obstinate constipation at the onset of the disease, requiring active measures to overcome it; but this is not often the case, and when it does occur, it is, I think, more frequently in the severe than in the milder form of the disease. The appearance of the evacuations is almost always unhealthy, and they are usually relaxed and very offensive. The tongue is generally rather deficient in moisture, red at the tip and edges, thinly coated on the dorsum with white mucus, through which the papillæ appear of a deep red colour. The abdomen is soft, though there is some flatus in the intestines, and pressure is usually borne without pain. These characters often continue through the whole course of the affection, though sometimes, after the second week, pressure in either iliac region,

* Chomel, Leçons de Clinique Médicale: Fièvre Typhoïde, p. 231, 8vo. Paris, 1834.

especially the right, appears to cause suffering. The pulse is generally accelerated from the very commencement of the illness; sometimes it is very much so, but there is by no means a constant relation between the heat of skin and the rapidity of the pulse. Occasionally there is slight cough, but this symptom is very frequently absent in the milder cases of the disease. As the symptoms which constitute this affection come on very gradually, so they often continue for several days with little, if any, change from day to day, though the patient is far from seeming equally ill at all times of the day; and this periodical exacerbation and remission of the symptoms have obtained for the disorder the name of remittent fever. In some instances two distinct exacerbations and remissions of the symptoms may be observed in the course of every twenty-four hours, but in the majority of cases only one is well marked. The child who during the day has been listless and poorly, but yet not incapable of being amused, and has had the appearance of a patient convalescent from illness, rather than of one still suffering from disease, becomes flushed and uneasy and feverish as evening approaches; and sometimes slight horripilation ushers in the evening exacerbation of fever. The child seems drowsy, and begs to be put to bed, where sometimes he sleeps, though seldom tranquilly, till morning. In the second week the nights generally become worse than they were at an earlier stage of the disease; the child's skin is very dry and hot, he sleeps with his eyes half open, talks in his sleep, wakes often to ask for drink, and occasionally has slight delirium. Early in the morning he wakes pale and unrefreshed, but about 9 or 10 o'clock seems to have recovered something of his cheerfulness, and for the succeeding three or four hours appears tolerably well; but as evening approaches he seems weary and drowsy, again the febrile paroxysm occurs, and the succeeding night closely resembles the night before. Sometimes, in addition to the evening exacerbation, there is a second one, though less severe, at about 11 o'clock in the morning; from which the child has hardly recovered before the severe evening attack comes on. As the case advances towards recovery, the morning attack disappears long before the evening paroxysm ceases to recur; and it happens not infrequently that a slight threatening of the evening exacerbation continues to return for some time after the child has seemed in other respects well. It is during the second week of the disease that the typhoid eruption generally makes its appearance, if it appear at all. In the milder cases, it is, I believe, much oftener absent than present, and even in cases of a severe kind, it is, if I may judge from my own experience, much less common in this country than in France. Towards the end of the second, or the beginning of the third week, the symptoms begin to abate, the bowels act more regularly, the appearance of the evacuations becomes more natural, the tongue grows cleaner and uniformly moist, the thirst diminishes, and the evening exacerbations of fever become shorter and less severe; while the

child's cheerfulness by day returns, and its face resumes the aspect of health, Still, after even a mild attack of this disease, the child is in general left extremely weak, and greatly emaciated; the loss of flesh and strength being quite out of proportion to the severity of the illness, and the progress to complete recovery being generally very slow.

It sometimes happens, that, having set in with comparatively mild symptoms, the infantile remittent fever assumes a serious character in the course of the second week. In the majority of instances, however, the *severer* form of the disease gives some earnest of its severity at a very early period. It commonly sets in with vomiting, accompanied, in many cases, by head-ache, or by a remarkable degree of drowsiness and heaviness of the head. Coupled with these symptoms, there are those indications of fever which attend the milder forms of the disease, though in this case with a proportionate increase in their severity; and sometimes distinct rigors may be observed alternating with the heat of the surface, or preceding the evening exacerbations of the fever. In the greater number of instances, the vomiting with which the disease sets in does not return after the second or third day of the patient's illness; but to this there are occasional exceptions; and as the sickness is usually more severe in cases in which constipation is present, there is some risk of mistaking the real nature of the affection, and of regarding the irritability of the stomach as a sign of approaching cerebral disease. Now and then, too, the drowsiness at the onset of the disease is so overwhelming that I have known a child fall asleep three or four times during breakfast, while his dizziness and inability to walk steadily, still further strengthened the impression that he was suffering from some affection of the brain. Either of these occurrences, however, is unusual; and, though listless and drowsy, the child is in general unwilling to keep his bed, while by night he is commonly very restless, waking often in a state of alarm, or talking much in his sleep. The countenance before long begins to wear the peculiar heavy appearance of a fever patient, and by the end of the first or the beginning of the second week the child is often found to have sunk into a state of stupor, from which he seems unwilling to be roused. The skin of the trunk is now almost constantly hot as well as dry; the temperature being often higher than in any other disease, with the exception of scarlatina, and in a few instances ranging as high as 105° Fah. My own observations with reference to the date of the appearance of any eruption on the surface, are neither sufficiently numerous nor sufficiently accurate for me to rely on their authority. MM. Rilliet and Barthez observe that it very seldom appears so early as the fourth day, from the sixth to the tenth being the most common date of its appearance; while both the period during which it remains visible, and the number of spots, are liable to very great variation. In by far the greater number of cases, the eruption, according to their experience, is extremely scanty; it often remains visible for only two or three days, and in not a few instances is

absent altogether. In a few cases of severe remittent fever, profuse sweats take place, but they do not seem to have anything of a critical character. The pulse is very frequent, and I have found it continue at nearly 140 in a minute, for several days together, during the increase of the fever in a child eight years old. A frequent, short, hacking cough often occurs during the first week; and rhonchus, sibilus, and occasional large crepitation, are heard, in many cases, in both lungs. Now and then, too, the respiration continues much accelerated for several days, without any other sign of serious pulmonary disease being present, and gradually regains its proper frequency as the febrile symptoms subside. Tenderness of the abdomen is generally very evident before the first week is passed, but frequently there is no complaint of pain, even in severe cases, except on pressure. Diarrhœa is usually present, though it is not in general severe, the bowels not acting above four or five times in the twenty-four hours. The tongue is usually more thickly coated at the commencement than in the milder forms of the disease; a dry streak soon appears down the centre, and by degrees the tongue becomes uniformly dry, red, and glazed; or less often it is partially covered with sordes. In the course of the second week the patient generally sinks into a more profound stupor, a condition which alternates in many cases with delirium. Sometimes the mind wanders occasionally almost from the commencement of the disease, in other cases delirium is a very temporary symptom, occurring only at night, or when the child, during the day-time, wakes from sleep. Now and then, though not generally, the delirium is of a noisy kind, but the child not infrequently tries to get out of bed; and both the restlessness and delirium, though generally present in bad cases during the day-time, are aggravated in a marked degree at night. Once or twice I have known violent delirium come on towards evening, the child crying and shouting aloud during nearly the whole night, and sinking into a state of stupor by day. The child now seems nearly or quite unconscious of all that goes on around it; its evacuations are passed unconsciously, and it often seems dead to the sensation of thirst, by which, in the early stages of the disease, it was so much distressed; but this stupor of fever is so different from the coma which supervenes in affections of the brain, and the insensibility which characterises it is so much less profound, that one can hardly be mistaken for the other. Even when the disease is most severe, neither subsultus nor floccitation is frequent, though it often happens that during the tedious and fluctuating convalescence the child picks its nose till it bleeds, or makes the tips of its fingers, or different parts of its body, sore by picking them. The patient is by the end of the second week, sometimes earlier, reduced by the continuance of these symptoms to the most extreme degree of emaciation, and to a condition apparently hopeless; but there is no disease from which recovery so often takes place, in spite of even the most unfavourable symptoms, as from

remittent fever. The signs of recovery are, in the main, the same as betoken the recovery of an adult suffering from fever, but the amendment has seemed to me always to be gradual, and in no case the result of any critical occurrence. Moisture begins to reappear upon the edges of the tongue, the pulse loses its frequency, the delirium ceases by degrees, and more quiet rest is enjoyed at night. Such signs of improvement may in general be looked for about the end of the second week, but often the patient's progress is interrupted by many fluctuations: the convalescence is almost always slow, and relapses occur from very slight causes.

In the few cases, and according to my experience they are but few, in which remittent fever terminates fatally, death is seldom the result of complications such as not infrequently supervene in the course of fever in the adult, but the vital powers give way under the severity of the constitutional affection, the symptoms of which assume more and more of a typhoid character. It is towards the end of the second, or at the beginning of the third week, that death under these circumstances is most likely to occur; I have seen it take place as late as the twenty-ninth day in one instance, and at the end of the fifth week in another, but in both of these instances gangrene of the mouth came on after the more alarming general symptoms had begun to subside; and to this the death of the child was chiefly due. Now and then a fatal termination takes place after the lapse of little more than a week from the commencement of the illness, under signs of cerebral disturbance which throw the general febrile symptoms into the shade; great restlessness and agitation, with loud cries, being succeeded by convulsions, and they, in their turn, being followed by a condition of coma, in which the child dies; while an examination after death discovers nothing more serious than a somewhat greater vascularity than natural of the brain and its membranes.

The *diagnosis* of remittent fever has been rendered needlessly difficult by the loose manner in which the name has been applied to a variety of affections; still it must be confessed that there are several diseases between which, and remittent fever, there are, in some parts of their course, points of similarity that may easily deceive the unwary. The resemblance is often very close between the milder varieties of the fever and some of those cases of gastro-intestinal disorder, by no means unusual in young children, which are excited by errors of diet, and are either associated with diarrhœa or preceded by it. Even in such cases, however, the loss of strength, the dry heat of the skin, and its intensity at the time of the exacerbations of the fever, the marked disturbance of the sensorium, and the delirium at night, which is almost always present in children sufficiently old for this symptom to be apparent, are characters by which remittent fever may generally be known. General tubercular disease, running an acute course, may now and then be taken for a short time for remittent fever, but the observation of the case for a few days will usually suffice to correct the

error. In most instances of the former affection, indeed, the possibility of mistake is altogether prevented by the skin being less hot, the sensorium not disturbed, and the abdominal symptoms less severe than they might be expected to be in a case of remittent fever of the same degree of severity. Independently of this, too, auscultation will often show good reason for suspecting the real nature of the case, or the previous history of the child will afford some clue with reference to it. There are two other affections between which and remittent fever it is often far from easy to distinguish, while, unfortunately, the practical evils that follow from a wrong diagnosis are of a very serious nature, When speaking, however, of hydrocephalus and of pneumonia,* I dwelt so fully upon the circumstances that might lead you to mistake either of those diseases for remittent fever, and of the characteristics which belong to the last-named affection, that it will be unnecessary to do more than refer you to the observations made on those occasions. It remains now, therefore, that we notice, in conclusion, the rules that should guide us in the treatment of this disease.

In the *treatment* of remittent fever in the child, just as in that of fever in the adult, the grand object to which our attention ought to be turned, is to carry the patient through an affection which we cannot cut short, with as small an amount of suffering or danger as possible. "*Medicus curat, natura sanat morbum,*" says an old Latin adage ; and in no disease is it of so much importance as in fever that we should assign to our art its proper position as the handmaid of nature. The gradual approach of the disorder in the great majority of instances, of itself points out the propriety of that expectant mode of treatment which is generally the most appropriate during the first week of the child's illness. The languid and listless state of the little patient, his head-ache and drowsiness, often lead him to wish to remain in bed all day long, but there is no reason for confining him to bed, if, during the period of remission of the fever, he should prefer to sit up. The impaired appetite often renders any other directions about the diet unnecessary, than a caution to the parents or nurse not to coax or tempt the child to take food, which it is, and will probably for some days continue to be, entirely unable to digest. The heat of skin and the craving thirst are the two most urgent symptoms in the early stages of the affection. The first of these is generally relieved by the tepid bath at 90° or 92° every morning, and by sponging the surface of the body several times a day with lukewarm water. The desire for cold drinks is often very urgent, and no beverage is half so grateful as cold water to the child. Of this it would, if permitted, take abundant draughts, but it should be explained to the attendants that the thirst is not more effectually relieved by them than by small quantities of fluid, while pain in the abdomen is very likely to be caused by the over distention

* See Lecture VI. p. 62; and Lecture XVII. p. 200.

of the stomach. The cup given to the child should therefore only have a dessert or tablespoonful of water in it, for it irritates the little patient to remove the vessel from its lips unemptied. In the milder forms of the disease, and during the first week, medicine is little needed; but a simple saline may be given, such as the citrate of potass in a mixture to which small doses of vinum ipecacuanhæ may be added, if, as sometimes happens, the cough be troublesome. If the bowels act with due frequency, and the appearance of the evacuations be not extremely unhealthy, it is well to abstain from the employment of any remedy which might act upon them, for fear of occasioning diarrhœa, which is so apt to supervene in the course of this affection. For the same reason, if an aperient be indicated, drastic purgatives are not to be given, but a moderate dose of castor oil should be administered. Now and then, however, cases are met with in which the bowels remain confined during a great part of the affection, and in which such purgatives as senna are not only borne, but absolutely necessary. They, however, are purely exceptional cases; and it will generally suffice, if there exists any tendency to constipation, to give a small dose of the mercury and chalk night and morning, and during the day-time a small quantity of the tartrate of soda or sulphate of magnesia, dissolved in some simple saline mixture, every six or eight hours.

The unhealthy state of the evacuations that exists in a large number of cases, is generally associated with a disposition to diarrhœa, which becomes a more prominent symptom in the second than it was in the first week of the disorder. Equal parts of the hydrargyrum cum cretâ and Dover's powder are the best means of relieving both these morbid conditions; the remedy being given either once or twice a day, or more frequently, according to the urgency of the symptoms. The amount of abdominal pain and tenderness must be ascertained every day; and a few leeches must be applied to either iliac region if the tenderness seem considerable, or if the child appear to suffer much from pain in the abdomen, or if the diarrhœa be severe. If depletion be needed, the application of but a small number of leeches will generally meet the requirements of the case, while copious bleeding is neither useful nor well borne. Even in children of ten years old I never apply above four or six leeches, and it is very seldom that any occasion arises for a repetition of the bleeding. The application of poultices of linseed meal or scalded bran to the abdomen, and their frequent repetition, is a very valuable means of relieving the griping pain which often distresses children, and in most cases it is desirable to make trial of them before having recourse to depletion.

There is but one other class of symptoms likely to occur during the first week of the fever, to the management of which I have not yet referred; namely, those signs of cerebral disturbance which are sometimes so serious as to call for treatment. The early occurrence of delirium, though it generally implies that the disease will assume a rather serious character,

yet does not of itself indicate the necessity for taking blood from the head; but if the child be quiet and generally rational during the day-time, and though dull yet not in a state of stupor, while the delirium at night is of a tranquil kind, it will generally suffice to apply cold to the head, and to keep the apartment cool and absolutely quiet. On the other hand, if there be great restlessness and noisy delirium early in the disease, with heat of head or flushing of the face, local depletion is called for: nor is it less useful in cases which set in with symptoms that bear a close resemblance to those of hydrocephalus, in which vomiting occurs frequently, and the sense of nausea is abiding, while the child either makes a constant low moan as if in pain, or is extremely restless, and complains loudly of head-ache.

In mild cases of the disease, the expectant treatment, usually appropriate during its early stages, may be continued throughout its course; great caution being exercised, as the child begins to improve, to prevent its committing any error in diet. When severe, however, the second week often brings with it a train of symptoms that require many modifications in the plan of treatment. The vital powers need to be supported, and the nervous system requires to be tranquillized; and this is to be attempted by means similar to those which we should employ in the management of fever in the adult. The mere diluents which were given during the previous course of the fever must now be exchanged for beef or veal tea or chicken broth, unless the existence of severe diarrhœa contraindicate their administration; in which case we must substitute arrow-root, milk, and isinglass, for animal broths. In a large proportion of cases nutritious food is all that will be required, but wine is sometimes as essential as in the fevers of the adult; and the indications for giving it are much the same in patients of all ages. Even though wine be not necessary, I generally give some form of stimulant during the second and third weeks of the affection. The prescription which I usually follow is one much praised under such circumstances by Dr. Stieglitz, of St. Petersburgh. For a child of five years old, it consists of four minims of dilute hydrochloric acid, eight of the compound spirit of sulphuric ether, and three drachms of camphor mixture every six hours. It seldom disorders the bowels if they be not much disturbed at the time of commencing its administration; while, if this be the case, a small dose of Dover's powder, as a grain or a grain and a half at bed-time, will be doubly useful, both in checking the tendency to diarrhœa, and in procuring sleep for the child, who, without it, would probably be watchful and delirious all night long. Whilst any severe abdominal symptoms are present, I abstain from the use of the acid mixture, but give the mercury with chalk, and Dover's powder, every four or six hours, to which I occasionally add an opiate enema at bed-time; and support the strength by food and wine as may be necessary.

The only complication that is apt to be troublesome is the bronchitis.

Usually, however, the cough to which this gives rise is an annoying rather than a dangerous symptom; and it is in general more harassing at the commencement of the affection, and again when convalescence is beginning, than during that time when the graver symptoms are present. A little ipecacuanha wine, nitrous ether, and compound tincture of camphor, will usually relieve it, to which it may occasionally be expedient to add the application of a mustard poultice to the chest.

The convalescence is often extremely tedious; the child is left by the disease not only extremely weak and emaciated, but with its digestive powers greatly impaired. It is often many days before the stomach is able to digest any solid food; even a piece of bread will sometimes irritate the intestines, and bring on a return of diarrhœa. The appetite seems sometimes quite lost; tonics either do no good or are actually injurious by rekindling the fever; or symptoms supervene which seem to threaten the development of tubercular disease, a consequence that not very seldom follows severe attacks of remittent fever. Under such circumstances, change of air, and the removal, if possible, to the sea-side, are often the only means of restoring the child to health; a means which you may recommend with the more confidence since it hardly ever fails to be successful.

LECTURE XXXVIII.

Small-pox—checked but not extirpated by vaccination—its chief mortality among children—rate of mortality in cases of the disease undiminished during the last fifty years.—Its symptoms—their early differences from those of the other exanthemata—characters and progress of the eruption—peculiarities of confluent small-pox—dangers attending the maturation of the pustules, and the secondary fever.—Treatment.

Modified small-pox—its low rate of mortality—its peculiarities.—Chicken-pox—its symptoms, and differences from small-pox.

Until the commencement of this century, the disease to which I wish to-day briefly to call your attention, possessed a degree of importance far greater than that which attaches to it at present. Before the introduction of vaccination, the *small-pox* was a disease of almost universal prevalence, causing at the least eight per cent. of the total mortality of this metropolis, and disfiguring for life thousands whom it did not destroy. Its loathsome character, and its formidable symptoms when it attacked the constitution at unawares, led to the adoption of variolous inoculation, by which the disease was communicated in a mild form, and under favourable conditions; and persons having undergone comparatively little suffering, and having been exposed to still less danger, enjoyed by this means almost complete immunity from subsequent attacks of small-pox. But great as its benefits were, variolous inoculation perpetuated at all times, and in all places, a disease which would otherwise have obeyed the general law of epidemics, and would have had its periods of rare occurrence as well as those of wide-spread prevalence. Thus, as has been well observed, while the advantages of the practice were great and obvious to the individual, to the community at large they were very doubtful.

No such drawback exists to detract from the benefits of vaccination, though unfortunately our present experience does not altogether justify the sanguine expectations entertained concerning it by its first promoters. Peculiarities of climate oppose a serious barrier to its successful introduction into some countries,* and even in our own land individuals are

* Dr. Duncan Stewart's valuable Report on Small-Pox in Calcutta, and Vaccination in Bengal, 8vo. Calcutta, 1844, shews conclusively that the peculiarities of the Indian climate present obstacles to vaccination such as greatly to detract from its value; while it is to be feared, that they are of a nature which the greatest care will never wholly overcome.

occasionally met with in whom vaccination altogether fails, or over whom it seems to extend but a partial or a temporary protective power.

But I will not enter on the question of the merits of vaccination, nor of the circumstances that impair its preservative power, or call for its repetition: for though the subject is one important alike to the physician and the philanthropist, I have had no opportunities of forming a judgment concerning it which are not alike open to you all. In the writings of Dr. Gregory, physician to the Small-Pox Hospital, and in the treatise on vaccination by Dr. Steinbrenner, to which the Institute of France adjudged a prize in 1835, you will find everything that either large experience or unwearied research can bring to its elucidation.

One fact, which it behoves us always to bear in mind, is, that albeit the prevalence of the disease has been greatly checked by vaccination, small-pox is still one of the most fatal maladies of this country; and further, that it selects its victims, as heretofore, chiefly from among children and young persons,—nearly three-fourths of the fatal cases of this affection occurring before the age of five, and more than nine-tenths before the age of fifteen years. In spite, too, of the increase of medical knowledge during the past fifty years, the proportion of small-pox cases that terminate fatally, has been estimated by the best authorities to be as great now as it was half a century ago. To some extent, perhaps, the very diminution in the frequency of the disease may have had an unfavourable influence on its issue in individual cases: for practitioners, meeting with it now less often than medical men in former days were wont to do, are not so familiar with the meaning of those minuter variations in its symptoms, from which important practical conclusions might be drawn, by those who knew how to interpret them aright.

Let me therefore urge you to watch every case of this formidable disease that may come under your observation with most minute care, lest you misinterpret the symptoms, or mistake the treatment of some patient affected with it, whose well-being may be dependent on your skill. For my own part, I cannot pretend to give you more than an outline sketch of its characters, and must refer you to the writings of others who have had greater opportunities of watching it than have fallen to my share, to fill up the portrait.

The early *symptoms* of small-pox are those of approaching fever, and if any other febrile disorder be prevalent at the time of their occurrence they may possibly be taken for the indications of an approaching attack of the prevailing epidemic. There are, however, some peculiarities in the mode of onset of small-pox which are sufficiently characteristic of it, even in the child, and which generally distinguish it from either of the other eruptive fevers. The sickness with which it sets in is in general severe, and the disorder of the stomach often continues for forty-eight hours, during which time vomiting recurs frequently. In measles there is com-

paratively little gastric disorder; and the vomiting that often ushers in scarlatina, though frequently severe, is not of such long continuance. In young children we lose those complaints of intense pain in the back which in the case of older patients often awaken our suspicion; but on the other hand, the severity of the cerebral disturbance is an important feature in the early stage of the disease. At the commencement of measles, the brain is in general but little disturbed; in scarlatina, delirium often occurs very early; but in small-pox the condition is one rather of stupor than of delirium, while convulsions sometimes take place, and continue alternating with coma for as long a period as twenty-four or thirty-six hours. Lastly, though the skin in small-pox is hot, it is neither so hot nor so dry as in scarlet fever; the tongue does not present the peculiar redness, nor the prominence of its papillæ, which are observable in scarlatina; neither is there any of the sore-throat which forms so characteristic a symptom of that disease. The early stages of small-pox are not attended with the catarrhal symptoms which accompany measles: the eruption of measles usually appears later, that of scarlet fever always sooner, than the eruption of small-pox; while its papular character is in general sufficiently well marked to distinguish it from the rash of either of those diseases. It never appears in less than forty-eight hours from the first sign of indisposition, often not till after a somewhat longer time. It shews itself in the form of small papulæ, which are first discernible on the face, forehead, and wrists, whence they extend to the trunk and arms, and lastly to the lower extremities. These papulæ are at first slightly red, somewhat acuminated, elevations, so minute that they may be easily overlooked on a hasty examination, but yet conveying a distinct sense of irregularity to the finger when passed over the surface. They increase in size, and in the course of forty-eight hours assume a vesicular character, and contain a whey-like fluid; while, instead of a conical form, they now present a central depression. During another period of forty eight hours or thereabouts, these vesicles go on enlarging, their central depression grows more and more apparent, and their contents become white and opaque: they are no longer vesicles, but have become converted into pustules, each of which, if they be distinct, has an areola of a red hue around its base. As the pustules enlarge, the face, hands, and feet, become swollen, and a general redness of their surface succeeds to the more circumscribed areola which had previously surrounded each separate pustule. As the size of the pustules increases, they lose that central depression which they had presented while vesicles: they assume a spheroidal form, or even become slightly conical. The next change observable in them is an alteration of their colour from a white to a dirty yellow tint, which they continue to retain until the desiccation of the eruption commences. This token of the decline of the disease is first apparent on the face, where, as you will remember, the eruption is earliest observable; while on the hands and

feet, probably owing to the thickness of the epidermis in those situations, this change is longest delayed, and the pustules there attain a greater size than in any other situation. The *maturation* of the pustules usually occupies from the commencement of the fifth to the commencement of the eighth day of the eruption, or from the eighth to the eleventh day of the disease; when the process of *desiccation* begins. A few of the smaller pustules dry up and become converted into crusts, which afterwards drop off; but the greater number of them burst, and the pus which they discharge, together with a very adhesive matter which they continue to secrete for two or three days, contribute to form the scab which incrusts, more or less extensively, the surface of a small-pox patient during the decline of the disease. When this scab falls off, which it does in from three to five or six days, the skin appears stained of a reddish brown colour, which often does not disappear for several weeks: but it is only in cases where the pustule has gone so deep as to destroy a portion of the true skin, that permanent disfigurement, the so-called pitting of the small-pox, is produced.

It is only in cases of *discrete* small-pox, in which the eruption is but moderately abundant, and the pustules consequently run their course without coalescing with each other, that the above-mentioned changes can be distinctly traced. In the *confluent* variety of the disease, in which the pustules are so numerous that they run together as they increase in size, the characteristic alterations in the individual pustules cannot be followed. In those situations where the eruption is confluent, the pustules never attain the size which separate pustules often reach; they do not become so prominent, nor do their contents in general assume the same yellowish colour, but several of them coalesce to form a slighty irregular surface of a whitish hue; while, when the stage of desiccation comes on, each of these patches becomes converted into a moist brown scab, which is many days before it is detached. Nor is it merely at those parts, such as the face, where the eruption is actually confluent, that its character is modified, but, even where the pustules are distinct, their advance goes on more slowly, and the maturative stage is longer in being completed, than in less severe cases of the disease. It is, moreover, in cases of confluent small-pox that the ulceration of the pustules most commonly invades the true skin, and that serious disfigurement is most likely to take place; while further, the degree of danger to life is in almost direct proportion, in every case of small-pox, to the amount of confluence of the eruption.

The appearance of the eruption of small-pox is attended with a great abatement, sometimes with the almost complete disappearance, of those signs of constitutional disturbance with which the disease set in; and in mild cases the child shows few other signs of illness than are furnished by the eruption on the skin. But, with the maturation of the pustules, the *secondary fever*, as it is called, is excited, and the period of the greatest

danger to the patient now comes on. The skin once more grows hot; the pulse rises in frequency; restlessness, thirst, and all the phenomena of inflammatory fever, develop themselves, and continue with more or less intensity for about three days. These symptoms afterwards diminish, and finally disappear as the pustules burst, and the stage of desiccation is accomplished. It is, however, only in cases of a favourable kind, that the secondary fever runs so mild a course. In confluent small-pox, the secondary fever is always more severe than in the discrete form of the disease; though it comes on later, in consequence of the more tardy maturation of the pustules. Often, indeed, it assumes a typhoid character; the pulse becomes extremely frequent and feeble; the tongue dry and brown; and the patient dies delirious. In other instances the maturation of the pustules goes on for a day or two with very slight reaction; and were it not that this extreme mildness of the secondary fever, in cases where the eruption has been abundant, is itself a suspicious circumstance, we should be disposed to express, without hesitation, a most favourable opinion as to the patient's condition. Suddenly, however, the pulse begins to falter; the pustules, which before seemed full, collapse; the extremities grow cold; and in a few hours the patient dies. This fatal change is sometimes ushered in by a fit of convulsions; at other times it is preceded by a condition of extreme restlessness, which contrasts remarkably with the extreme quietude of the child's manner for the two or three previous days: and it is well to bear in mind that the supervention of either of these two symptoms during the maturative stage of small-pox, is the almost certain herald of speedily approaching death. One other not infrequent source of danger during this period, arises from the pustules which have formed on the mucous membrane of the mouth, fauces, and air-passages. In almost every case of small-pox, a few spots of the eruption may be seen upon the tongue and on the interior of the mouth; while an inspection of the bodies of patients to whom it has proved fatal, has shown that the pustules form likewise on the interior of the larynx and trachea: sometimes in considerable numbers. It is to the presence of pustules in these situations that the hoarse or altered voice, and the difficulty of deglutition, which are observed in most cases of severe small-pox, are due; as well as that short hacking cough which sometimes proves a very troublesome symptom. The ptyalism, too, which occurs in many instances, is apparently owing to the salivary glands sympathising with the irritated and inflamed state of the mucous membrane of the mouth. In cases which run a fortunate course, these symptoms, having come on about the third or fourth day of the eruption, and having increased in severity until the eighth or ninth, then progressively decline. Under less favourable circumstances, however, they continue to grow worse: the voice becomes perfectly extinct, and deglutition almost impossible; and the patient dies from the obstacle which the inflammation and swelling of the

lining membrane of the larynx present to the free access of air to the lungs; though the symptoms are seldom or never those of active inflammatory croup.

You will find in the writings of those whose opportunities of observing small-pox have been considerable, the description of many other modes in which it occasionally proves fatal. Thus, it is sometimes associated with a great tendency to hæmorrhage; petechiæ appearing on the surface of the body, and the pustules assuming a black colour, from the extravasation of blood into them. In other instances, gangrene attacks the feet or some other part of the body. But these are occurrences which it has not been my lot to witness, and I will not therefore take up your time by detailing them at second-hand.

Let us now glance for a few minutes at the *treatment* to be pursued in this disease. You know that before the time of Sydenham, physicians adopted a heating regimen in cases of small-pox; excluding fresh air from the chamber, covering the patient with blankets, and administering stimulating medicines and cordial drinks. To this practice the prevalent theory of fermentation, and of nature's efforts in disease being directed to eliminate the peccant matter from the blood, had given occasion. In accordance with these notions it was assumed that the more abundant the eruption, the more complete would be the separation of these noxious matters, and consequently the better the chance of the patient's well doing. The observation of nature, however, taught Sydenham that the very reverse was the case;—that the more abundant the eruption, the greater the danger,—the fewer the pustules, the more favourable the prospect of the patient's recovery. A cooling regimen, therefore, is now universally adopted in the early stage of the disease, and fresh air is freely admitted into the chamber, in order to prevent, if possible, a copious eruption, while the same end is sought to be still further promoted by keeping the bowels gently open, by a spare diet, and by mild antiphlogistic medicines. Depletion, which even in the adult is not to be practised merely with the hope of thereby diminishing the quantity of the eruption, is still less to be resorted to in the child, unless evidently called for by symptoms of severe cerebral disturbance; such as convulsions frequently recurring, or ending in coma. Such occurrences as those, however, demand not merely the abstraction of blood, but its removal with an unsparing hand; for, as I told you at the commencemt of these lectures, the cerebral congestion which attends the onset of the eruptive fevers, if not speedily relieved, may prove very quickly fatal. Cases of an opposite kind are sometimes met with in which the patient before the appearance of the eruption is in a state of depression so great as to call for warmth to the surface, or for the hot bath, for diaphoretic medicines, and sometimes even for stimulants. In this, however, there is nothing more than we may occasionally witness in a patient completely prostrated during the

first stage of typhus fever, and needing perhaps the free administration of wine and ammonia to preserve him from death.

With the outbreak of the eruption there ensues a lull in the symptoms; and a period now succeeds during which we have nothing else to do than to leave nature to her workings undisturbed. Even in cases of confluent small-pox, there is in many instances not a single symptom just at this time which could either excite solicitude or call for treatment, and you must therefore take care not to allow yourself at this moment to be betrayed into the hasty expression of a very favourable prognosis, which the supervention of the secondary fever may perhaps in a day or two most grievously belie. If, however, the number of pustules should be but small, the secondary fever will be slight; our favourable opinion may, under these circumstances, be expressed with some confidence, and most probably no deviation from our previous expectant plan of treatment will be required during the subsequent progress of the disease. If the eruption be more abundant, and the accompanying secondary fever consequently severe, an antiphlogistic plan of treatment must be carried out more strictly, while in all cases the restlessness which is so common a symptom during the maturative stage of small-pox, must be controlled by the administration of Dover's powder, or of some other form of opiate, once or twice a day. In cases of confluent small-pox, the patient needs to be very closely watched during the maturation of the pustules,—for on the second or third day of this process, the vital powers sometimes suddenly fail. The first indications of any such occurrence, which would be furnished by a great aggravation of the previous restlessness, by the subsidence of the swelling of the face and hands, the paleness of the skin in the interval between the pustules, and the collapse of the pustules themselves, attended with a sinking in the temperature of the surface, and a great diminution in the power of the pulse, call at once for the energetic employment of stimulants, for the administration of wine, and the substitution of nutritious food for the previous meagre diet. A similar course must also be pursued whenever the secondary fever shows any disposition to assume a typhoid character, while, irrespective of any unfavourable symptoms, it is not infrequently expedient, if the eruption be abundant, to give beef-tea, and to adopt other means for supporting the strength from the fifth or sixth day of the eruption—a period corresponding, as I hardly need remind you, with the eighth or ninth day of the disease.

Various local means have been recommended to be adopted at an early stage of the disease, with the view of preventing the full development of the pustules, and consequently of preserving the patient from the disfigurement produced by the pitting of the eruption. The cauterization of each individual pock with the nitrate of silver, is a process impracticable from its tediousness, while there is some discrepancy in the results which different

persons allege that they have obtained by applying mercurial ointment or plaster, or by washing the surface which it is wished to defend, with a solution of corrosive sublimate. The weight of evidence appears to me, however, to be in favour of some proceeding of this kind, and that which seems to have been the most successful is the application of the mercurial plaster at a period not later than the third day from the outbreak of the eruption.

Attention must be paid to the state of the eyes, which often suffer much during attacks of the small-pox, though Dr. Gregory states that the conjunctiva never becomes the seat of the pustules. From the time when the swelling of the face begins, during the maturation of the eruption, the eyelids are often so much swollen as completely to close the eyes, while their edges are glued together by a tenacious secretion from the Meibomian glands. The patient will be much relieved by bathing the eyes frequently with warm water, and any pustules that occupy the margins of the palpebræ should be carefully cauterized with the nitrate of silver.

The condition of the mouth and throat must not be neglected. If old enough, the child may be made to gargle with a little infusion of roses, while, should it be too young to do this, the endeavour must be made to keep the mouth and throat free from the secretions which collect there, by washing or syringing them frequently with warm water, and by applying a weak solution of chloride of lime to the fauces. If difficult respiration should come on, in consequence of the affection seriously involving the larynx and trachea, the patient's condition, according to the testimony of almost all writers, is rendered nearly hopeless.

The intense itching of the eruption during the latter part of the period of maturation, and the stage of desiccation, not only distresses the patient exceedingly, but is often the occasion of subsequent disfigurement, in consequence of the desire to scratch being irresistible, and the pustules being converted by abrasion of their heads into troublesome ulcerations. The application of sweet oil, cold cream, or spermaceti ointment, will do something towards allaying the irritation; but you will often find it necessary to muffle the hands of children, in order to prevent their producing troublesome sores by scratching themselves.

The convalescence from small-pox is often very tedious; the patient's recovery is frequently interrupted by various intercurrent affections, and the latent seeds of scrofulous disorder are in many instances called into activity by its attack. These, however, are occurrences which present nothing of a special character, and it is therefore unnecessary to make any observations with reference to their treatment.

Although previous vaccination usually confers upon the system a complete immunity from subsequent attacks of small-pox, yet to this rule there are occasional exceptions. In many instances, indeed, the occurrence of *small-pox after* alleged successful *vaccination* may be accounted for by the

careless performance of that operation, by the use of lymph taken from the arm at too late a period, or by the production in some way of a spurious instead of a genuine vaccine vesicle. It must be confessed, however, that when every allowance has been made for these casualties, the number of cases of small-pox occurring after successful vaccination is proportionably much greater than the number in which a second attack of small-pox is experienced by those who have either had that disease casually, or in whom it has been produced by variolous inoculation. It would occupy far more time than we have at our command, if we were to attempt to enter upon the inquiry as to the causes of the failure in the protective power of vaccination. Different views have been taken by very high authorities upon this subject; but there is one important fact concerning which nearly all are agreed—namely, that the liability to a subsequent attack of small-pox is almost incalculably diminished by revaccination. Considering, then, how simple the operation is, and how nearly painless its performance, while the benefit to be obtained by it is so inestimable, I would strongly urge you to revaccinate all persons turned twelve years old, even though they had been vaccinated with the most complete success in their infancy.*

But although we should take a comparatively low estimate of the value of vaccination, and confess to the fullest extent the failure in its *complete* preservative virtue, we shall yet find, in the modifying and mitigating influence which it exerts over small-pox, more than enough to make us value it as a priceless boon. Twenty years ago, small-pox raged epidemically at Marseilles, where it attacked almost exclusively persons under 30 years of age. M. Favart,† who sent an account of this epidemic to the Academy of Medicine at Marseilles, estimated the number of the inhabitants of that city under 30 years of age at 40,000. Of these, about 30,000 had been vaccinated, 2,000 had had small-pox casually or by inoculation, and 8,000 had had neither variola nor cow-pox. Of this last class, 4,000, or 1 in 2, were attacked by small-pox, and 100 of them, or 1 in 4, died. Of those who had had small-pox previously, only 20, or 1 in 1000, were again affected; but 4 of these, or 1 in 5, died; while of the vaccinated, although 2000, or 1 in 15, had it, yet it proved fatal only to 20, or 1 per cent.

The influence of vaccination in rendering attacks of small-pox which may succeed to it, so much less severe, and so much less dangerous, than the unmodified disease, does not in many instances manifest itself in any diminution of the intensity of the primary fever. The symptoms with which modified small-pox sets in are often as severe as those of the unmodified disease, and are also in general of the same duration. So soon as the eruption begins to make its appearance, however, the difference

* For facts shewing the preservative influence of re-vaccination, see Steinbrenner, Traité sur la Vaccine, 8vo. pp 683—734. Paris, 1846.

† As reported by Steinbrenner, op. cit. p. 166.

between the two diseases usually becomes apparent. In many instances, notwithstanding the sharp onset of the patient's illness, the eruption is exceedingly scanty, not more than from twenty to a hundred pustules appearing over the whole body. In other instances the eruption is much more abundant, and in a few exceptional cases the pustules are actually confluent. But even when they are most numerous, the pustules seldom fail to follow a different course from that which they pursue in ordinary variola, and run through their different stages within little more than half the period required by the eruption of unmodified small-pox. The small size of the pocks,—the frequent absence of the central depression,—their imperfect suppuration,—and their speedy desiccation, are the chief local characters of this affection; while the almost complete absence of the secondary fever is both its grand constitutional peculiarity and the main source of the patient's safety.

Besides the modified small-pox to which reference has just been made, there is another and still milder affection often observed in children, to which, from the extreme lightness of the symptoms that usually attend it, the diminutive appellation of *varicella* or *chicken-pox* has been given. Much difference of opinion has existed with reference to the relations borne by this disease to small-pox; and even at the present day writers are not quite agreed whether to regard it as an extremely mild form of variola, or as an affection altogether distinct from it. The weight of evidence, however, is decidedly in favour of the opinion that varicella is an affection distinct from, and wholly independent of, small-pox, not being produced by any modification of the poison of that disorder, nor affording any kind of protection from its attacks.

Varicella is almost exclusively a disease of childhood, and in the great majority of cases it occurs prior to the completion of the first dentition. Its initiatory fever, which is scarcely ever severe, is sometimes altogether wanting, so that the appearance of the eruption on the surface is the first occurrence that calls attention to the child's condition. Now and then, however, exceptions occur to this mildness in the onset of the disease; and I have occasionally seen children (chiefly those in whom the process of dentition was going on with activity at the time of the attack) suffer for twenty-four or thirty-six hours from febrile symptoms quite as severe as those which precede the attack of measles, or as accompany a sharp attack of influenza. The duration of this premonitory stage of chicken-pox is somewhat uncertain; the vesicles which characterize it making their appearance after twenty-fours in some cases,—not for thirty-six or forty-eight hours in others; while, as already mentioned, the eruption is occasionally the first symptom of the existence of the disease.

The eruption usually consists of more or less numerous, minute, circular vesicles, containing a transparent serum, irregularly distributed over the face, head, shoulders, and trunk, but rarely appearing on the lower

extremities; and, even when present in considerable abundance, being very seldom confluent at any part. For two or three days they increase somewhat in size, but their contents then become turbid and milky; about the fourth or fifth day they shrivel, and then dry up into a light, pulverulent scab, which falls off on the eighth or ninth day of the disease. It very seldom happens that any cicatrix is left after the detachment of the scab of varicella, unless the skin has been irritated by the patient scratching it in order to relieve the itching, which is sometimes very troublesome. Besides these differences between the eruption of chicken-pox and that of variola, another, and still more striking peculiarity of the former disease consists in the appearance of two or three successive crops of vesicles, so that after the third day of the affection vesicles may be observed close to each other in all stages of their progress.

The disease is one so void of danger, that it requires hardly any treatment beyond the adoption of a mild antiphlogistic regimen; and, no complications occur during its course, nor sequelæ remain after its disappearance, concerning which any thing more need be added.

LECTURE XXXIX.

Measles and scarlatina—once confounded together, though essentially different diseases.—Symptoms of measles—their chief danger due to the supervention of bronchitis or pneumonia.—Treatment.

Scarlatina—great differences in its severity in different cases—symptoms of each of its three varieties—sequelæ of the disease—diagnosis from measles.—Treatment.

When the short-lived prejudices which at first were entertained against vaccination had been removed, men passed, as they not seldom do, to the opposite extreme, and over-estimated the worth of that discovery which they had before undervalued. Physicians rejoiced in it, as a means of getting rid for ever of a disease which might well be counted among the opprobria of their art,—philanthropists exulted in the probable extermination of one of the most fearful scourges of the human race, and statisticians counted the increase brought to the population, and drew up elaborate tables to illustrate their bright anticipations of the future.* In these over-sanguine calculations, however, they almost entirely lost sight of the fact, that not all who were preserved from small-pox, would be added to the useful population of the country, but that the life of many would be prolonged only for a short season, to be cut off soon by some other disease, against which neither science nor fortunate accident has hitherto discovered a talisman. Experience has proved the truth of what calm reflection might have suggested, and with the diminution in the frequency of small-pox there has been an increase, though not to an equal extent, in the prevalence of *measles* and *scarlatina*.

It is not easy to state with exactness the amount of mortality which these two diseases occasion, for though they are never altogether absent from a large city like London, yet their frequency and their fatality vary much in different years. At one time they occur sporadically, and are then in most instances mild in their character, and readily amenable to treatment; while at another time they prevail as epidemics, and are attended with alarming symptoms, which it is often not in the power of medicine to control. Dr. Gregory, who, in his work on the Eruptive

* As an instance of which may be mentioned the work of Duvillard, De l'Influence de la petite Vérole sur la Mortalité, 4to. Paris, 1806.

Fevers, has collected together with much labour the statistics of those diseases, presents us with a table, from which it appears that, on an average of five years, very nearly six per cent of the mortality of London is due to measles and scarlatina. This number, indeed, is not so great as at once to impress us with the formidable nature of these two affections; but it should not be forgotten, that (according to the Fifth Report of the Registrar-General), 81 per cent. of this mortality occurs in children under five; and 97 per cent. in children under ten years old; while no figures can accurately represent the instances in which death is occasioned by their complications or sequelæ.

These two diseases present many points of resemblance,—so many, indeed, that they were long supposed to be but varieties of the same malady; and the essential differences between them were not recognized till within the last seventy years. It is, however, on many accounts important to distinguish between them,—for not only are they not attended by the same degree of danger, but this danger arising from dissimilar causes, the treatment which they require is in many respects different. We shall presently examine into some of those peculiarities in their symptoms on which we chiefly rely in forming our diagnosis between the two affections; but I may even now state some of the broad distinctions between them.

Measles is still more eminently than scarlet fever a disease of early childhood,—for of 1293 deaths which it occasioned in London in 1842, 93·8 per cent. occurred in children under five years old, and 99 per cent. in those under the age of ten; while of 1224 deaths from scarlatina 31 per cent. occurred after five, and 10 per cent. after ten years of age. Though there are great fluctuations both in its prevalence and in the mortality which it occasions, yet its variations in these respects are less considerable than those of scarlet fever; while the number of persons who pass through life without having experienced its attack, is smaller than of those who die without ever having been affected with scarlatina. Though a more universally prevalent disease, however, it is fortunately less dangerous, its mortality not exceeding 3 per cent. of the patients attacked by it; while the medium rate of mortality from scarlet fever is estimated at at least double that amount. When measles proves fatal, too, it is very seldom the fever itself which occasions the patient's death, but generally its complication with inflammatory disease of the respiratory organs. Scarlet fever, on the contrary, destroys its victims in all stages of the disease; and in many of the worst cases, in which death takes place early, no organic change is left behind which the scrutiny of the anatomist can discover.

The *symptoms* that attend the onset *of measles* present little besides their greater severity to distinguish them from those of ordinary catarrh. A child, previously in perfect health, becomes suddenly restless, thirsty,

and feverish, and, if able to talk, generally complains of head-ache. The eyes grow red, weak and watery, and are unable to bear the light; the child sneezes very frequently, sometimes almost every five minutes, and is troubled by a constant, short, dry cough. On the fourth day from the commencement of these symptoms, a rash makes its appearance on the face, whence it extends, in the course of about forty-eight hours, to the rest of the body and the extremities, travelling in a direction from above downwards. The rash is made up of a number of minute, deep red, circular stigmata, not unlike flea-bites, slightly elevated, especially on the face, and though close together, yet usually distinct from each other; the skin in the interspaces between them retaining its natural colour. On the cheeks, the spots sometimes become confluent, and then form irregular blotches, about a third of an inch long by half that breadth; while the spots elsewhere often present an indistinctly crescentic arrangement. The eruption fades in the same order as that in which it appeared, and after the lapse of forty-eight hours from its appearance, at which time it is at its height on the trunk, it is beginning to disappear from the face. On the seventh day of the disease the rash grows faint on the body generally, and on the eighth or at latest the ninth day, it has entirely vanished, leaving behind either a little general redness of the surface, or a few yellowish red spots, corresponding to some of the situations which the eruption itself had occupied. In some cases a partial desquamation of the cuticle takes place after the rash has disappeared; but this is by no means constant, while, when it occurs, the epidermis separates in minute branny scales, never in large portions, as it often does after scarlatina.

Unlike small-pox, in which the appearance of the eruption is immediately followed by the subsidence of all the previous symptoms, the constitutional disturbance of measles is in many instances not at all alleviated on the outbreak of the rash. The reverse, indeed, is frequently the case; and in many instances, for twenty-four or forty-eight hours afterwards, the fever is aggravated, and the cough more troublesome than before, while the voice often becomes hoarser, and the throat is somewhat sore in consequence of the inflammation of the palate and fauces, which may be seen to be the seat of a punctated redness, resembling that produced by the eruption on the skin.

The aggravation of the symptoms, however, when it does occur, is only temporary; and on the sixth day of the disease, if not sooner, an amelioration in the patient's condition becomes apparent; the fever diminishing, the cough growing looser and less frequent, and moist sounds becoming audible in the lungs, where previously nothing was heard but rhonchus or sibilus. In cases, however, in which the disease takes a less favourable turn, this is the period when the supervention of serious thoracic complication is most to be feared. It happens, indeed, occasionally, that the disorder of the respiratory organs is severe from the very commencement

of the child's illness, and that it merely becomes aggravated with the progress of the disease. But, in the majority of cases, it is not until the eruption has already reached its acme, or is just beginning to fade, that serious inflammation of the larynx or bronchi, or of the substance of the lungs, is set up, while the symptoms of any such occurrence need to be watched all the more carefully at this period, from the rapidity with which they tend to a fatal issue. Still, although the danger from mischief in the chest is most imminent at this stage of the disease, yet the same symptoms may come on at a later period, when the eruption has already faded for one or two days; or even later, and at a time when a sort of incomplete convalescence is already established. I need not now do more than remind you of the croupal symptoms which sometimes come on at the decline of measles, and which, as I mentioned some days ago,* are so dangerous and intractable. At this period, too, inflammation of the substance of the lungs is to be dreaded, and all the more from its coming on almost imperceptibly, unattended with much cough or dyspnœa, and associated with such considerable sympathetic disturbance of the stomach and bowels, as very readily to lead into error with reference to the seat of the disease. The course of the affection of the lungs in this case is usually chronic: the child loses flesh,—becomes the subject of an irregular hectic fever; and when the thoracic symptoms at length become more apparent than at first they had been, and the cough grows more frequent and attended with more expectoration, the case so closely resembles one of tubercular phthisis that it is exceedingly difficult to avoid an erroneous diagnosis.

The *treatment* of measles is usually very simple: in mild cases, indeed, little is needed beyond confinement to a warm chamber, a spare diet, and gentle antiphlogistic remedies. The cough, which is the most troublesome symptom,—frequently, indeed, the only one that calls for much attention,—is often very much relieved by the application for three or four hours, of a small blister, no bigger than a shilling, to the trachea, at the point just above the sternum; and this slight counter-irritation, which seldom produces any vesication of the surface, may be repeated during the course of the affection. If more than this be needed, small doses of antimonial and ipecacuanha wine, with laudanum or the compound tincture of camphor, may be given every few hours. The imperfect desquamation that sometimes takes place as the eruption declines, is often attended with very distressing itching of the whole surface; while the cough is sometimes frequent and troublesome at night, and the child is thus prevented from sleeping. To relieve these troublesome symptoms, as well as to check that tendency to diarrhœa which often comes on at the decline of measles, it is desirable to follow the plan pursued by Sydenham,

* See Lecture XX. p. 236.

and to give an opiate every night,—a small dose of Dover's powder being the best form in which it can be administered.

But though these simple measures are amply sufficient in the great majority of cases, we yet must not allow ourselves to be betrayed into inertness when any indications of mischief in the chest make their appearance. Such symptoms sometimes come on early in the disease, and before the eruption has well appeared, the child seeming much oppressed, and experiencing considerable dyspnœa, although the auscultatory evidences of disease in the chest may be but small. This nervous dyspnœa is often relieved by the application of a mustard poultice to the chest, and by placing the child in a hot bath—a proceeding which will very frequently be followed by the appearance of the rash abundantly over the whole surface. Should these measures, however, fail to produce relief, or should the symptoms from the first be alarming, the distress and dyspnœa very considerable, and the rash not merely scanty, but of a dark or livid hue wherever it has appeared, the abstraction of blood is urgently required; and general depletion should, under such circumstances, be employed in preference to merely local bleeding. If bronchitis or pneumonia should come on at a later period of the disease, when the rash has already fully appeared, or is beginning to decline, the question of bleeding, as well as of the mode in which the depletion shall be practised, must be determined entirely by the severity of the chest symptoms, and is little if at all modified by any considerations drawn from the circumstance of their supervening during the course of another disease. The unfavourable conditions under which infants are placed in the Hôpital des Enfans at Paris, has induced, on the part of French physicians, a dread of depletion in the course of measles which is certainly not justified by the characters that the disease presents in this country. A repetition of depletion is, however, not generally either necessary or useful, especially if the first abstraction of blood be followed up, as it ought to be, by the free employment of tartar emetic. The dyspnœa, which is frequently exacerbated towards evening in the course of the pneumonia and bronchitis that accompany measles, is generally much relieved by mustard poultices; but the application of blisters under these circumstances is hazardous, since the sores which they produce are often very intractable; and the irritation and suffering they occasion proves, in many instances, seriously prejudicial to the children. It is important, too, to bear in mind that little reliance can be placed on mercurial remedies in the treatment of active rubeolous pneumonia, though small doses of the Hydr. c. Cretâ, with Dover's powder, are often exceedingly useful in cases where a hepatized state of the lung is left behind after the subsidence of the fever, and of the more acute inflammatory symptoms. I spoke so fully some days since concerning the treatment of croup supervening on measles, that it cannot be necessary to repeat the remarks which were

then made; neither need I add anything to what I said on a former occasion about cancrum oris—which distressing affection occasionally supervenes on the decline of measles.

I will now, in conclusion, briefly sketch the more striking features of *scarlet fever*. To describe it minutely would indeed require much time, for there are few diseases whose characters vary so widely in different instances. In one case it presents itself as an ailment so trifling as scarcely to interrupt a child's cheerfulness even for a day; in another case it is so deadly that medicine is unable to stay its course even for a moment; and that it destroys life in a few days—sometimes even in a few hours. Such a disease might seem to merit a very minute investigation at our hands; and on this it would be my duty to enter, did I not feel that, after all that has been written on the subject of the eruptive fevers, it will be enough for me on the present occasion to recal to your recollection some of those points concerning each of them, which are of the greatest practical moment.

It is hardly necessary to remind you that the remarkable differences in the severity of the affection, and in the symptoms which attend it, have given rise to its subdivision into the three varieties of scarlatina simplex, scarlatina anginosa, and scarlatina maligna. In the first of these the patient experiences an attack of fever, often very mild, always of very short duration, and accompanied by the appearance of a bright scarlet rash over the whole surface, and generally by a slight degree of sore throat. In the second the fever is more intense, and subsides less speedily, while, as its name implies, the attendant sore-throat is very severe: and in the third the fever generally assumes a typhoid character, sloughing of the inflamed tonsils not unfrequently occurs, and a variety of complications in many instances supervene, by which the patient's danger is still further aggravated.

In cases of *scarlatina simplex* the attack is usually ushered in by vomiting, which is in many instances often repeated, and which is accompanied by very intense heat of skin, by great rapidity of the pulse, by headache or heaviness of the head; and by so considerable a degree of sensorial disturbance as to give rise to delirium in many children who are old enough to manifest this symptom. On the following day, often within twenty-four hours from the commencement of the patient's illness, the rash of scarlatina makes its appearance. It usually shews itself first on the neck, breast, and face, whence it extends, in the course of twenty-four hours, to the trunk and extremities. Its colour is a very bright red, due in part to a general flush of the skin, in part to the presence of innumerable red dots or spots, which look like minute red papillæ, though often they communicate no sense of roughness to the hand. To this, however, there are occasional exceptions: the rash on the chest and body presenting sometimes, when at its height, a slightly papular character; and now and then minute sudamina are intermingled with the eruption. In some instances the

redness of the surface is universal, but in other cases the rash appears in patches of uncertain size and irregular form, which never affect any definite shape, and never present a clearly circumscribed margin. For three days the rash usually continues to become of a deeper colour, and more generally diffused over the whole surface; it then slowly declines, but does not wholly disappear until the seventh, or sometimes the eighth day of the disease. The appearance of the eruption is not in general succeeded by any immediate diminution in the other symptoms; but on the contrary, they often increase in severity until the eruption has reached its acme, when they slowly decline with the disappearance of the rash. Sometimes, indeed, when the case is very mild, the fever abates so soon as the rash is fully out; and the child regaining its cheerfulness on the third day, shews no further sign of illness, though the rash remains visible for two or three days longer. Now and then, too, especially in young infants, the affection throughout consists of little more than of an eruption on the skin, the presence of which is almost the only evidence of their having been attacked by a disease sometimes so deadly. Such, however, are exceptional cases; and in most instances, even when the disease is mild, a slight degree of soreness of the throat comes on on the second or third day; the palate and tonsils appear red, and the latter are generally somewhat swollen, and deglutition is slightly impeded. The tongue also is preternaturally red, and its papillæ, which are very prominent, project through the white or yellowish fur which coats it, and thus form an appearance as characteristic of scarlatina as the rash itself. The redness fades from the fauces, and the fur disappears from the tongue, as the eruption declines; but the prominence of the papillæ often continues for some days longer. As the rash subsides, that process of desquamation of the epidermis generally commences, the uninterrupted performance of which I mentioned to you a few days ago as so essential to the complete recovery of a person convalescent from scarlet fever. The cuticle peels off from the hands and feet in large flakes, but on the face and trunk the desquamation usually takes place in furfuraceous scales. Both its degree and duration vary much in different cases: sometimes it is over in five or six days; while in other cases the cuticle is reproduced, and then desquamates several times in succession, and the process is thus protracted for three or four weeks, or even longer. It is not possible to assign a cause for these differences. Some epidemics of scarlatina are characterised by the abundance of the desquamation, and its almost universal occurrence, while at other times it is scanty, and often wanting.

The danger of this disease is by no means in proportion to the abundance of the rash, but rather to the degree of the affection of the throat, the severity of which is the distinguishing feature of *scarlatina anginosa*. In this form of the affection the premonitory symptoms are usually much

more severe than in the scarlatina simplex: they are also often of longer duration, the rash not shewing itself until the end of the second, and sometimes even not until the third day. It is, moreover, less generally diffused over the surface than in the milder variety of the disease, but appears in the form of large scarlet patches irregularly distributed over different parts of the body, especially on the back. Almost from the commencement of the patient's illness, soreness of the throat is experienced, attended with difficulty of deglutition, and often with considerable stiffness of the neck, and pain and difficulty in moving the lower jaw, due in part to the swelling of the submaxillary glands. On examining the throat, it is seen to be intensely red, and the tonsils both red and swollen. The swelling of the tonsils increases rapidly, until they almost block up the entrance to the pharynx, and thereby render the attempt to swallow so difficult that fluids are often returned by the nose. An adhesive mucus collects about the back of the throat, and often seems to cause great annoyance to the patient, and specks or patches of lymph form upon the tonsils, and look like sloughs covering ulcers, though, on detaching them, it is seldom that any breach of surface appears beneath. In some of the severest cases, a very troublesome coryza comes on, and an adhesive, yellowish, matter is secreted in abundance by the mucous membrane of the nares, whence it runs down upon the upper lip, excoriating the skin over which it passes, and causing still more serious suffering by the obstacle which it presents to free respiration. In some epidemics the inflammation extends to the parotid glands, and to the cellular tissue about the neck, the parts thus affected becoming rapidly swollen, and acquiring a great size and a stony hardness. In some cases this affection is confined to one side; in others, both sides are attacked in succession, while sometimes the two are involved simultaneously; and the integuments under the chin and in front of the neck becoming likewise inflamed, and tense and swollen, the lower jaw is so firmly fixed, that the attempt to swallow is rendered almost impracticable, and the patient is exposed to a new source of danger, from the difficulty of taking nutriment in quantity sufficient to support the feeble powers of life. Coupled with this severe local affection, there is, as might be expected, a corresponding intensity in the constitutional disturbance. The heat of skin is very great, the pulse extremely frequent, and, though not small, is yet from an early period very easily compressed; the sensorial disturbance is considerable, and the restlessness extreme. The tongue does not present that appearance which I mentioned as being characteristic of scarlatina in its milder form, but is coated with a dirty brown fur, though red at its tip and edges, and often becomes dry at a very early period of the disease,—partly, no doubt, in consequence of the swelling of the tonsils and of the glands compelling the patient to breathe with his mouth open.

Between the severer forms of scarlatina anginosa and that still more dangerous variety of the disease to which the name of *malignant* has been applied, the differences are of degree rather than of kind. Symptoms such as have been just enumerated are present in many cases of malignant scarlet fever; but the fever very early assumes a typhoid character, and death takes place sooner than the amount of the local lesions suffices to explain; whilst in the scarlatina anginosa a direct proportion always exists between the severity of the local mischief and the degree of constitutional disturbance.

A little girl, five years old, went to bed quite well on the night of the 20th May, but awoke vomiting at 4 A.M. on the 21st. Through the whole of the 21st, the child seemed very ill, and her bowels were much purged. Towards evening, a red rash appeared on her body, and she complained of sore throat. On the following day the soreness of her throat increased, and the submaxillary glands began to swell. On the 23d I saw her: she was lying in her mother's lap, with her face of a deep scarlet, verging on a crimson hue; and the rash, which was generally diffused over the whole body, presented the same colour; her eyes were half open, and the conjunctivæ injected; the submaxillary glands somewhat swollen; the tonsils very red, covered with shreds of mucus; deglutition difficult; respiration hurried; pulse too frequent and too feeble to be counted. She had been delirious during the whole of the preceding night. Ammonia was given in doses of gr. iij. every four hours; but at 4 P.M. on the 24th, I found her lying on her back in a semi-comatose condition, though capable of being roused; her surface quite cool, of a generally livid red colour; her pulse exceedingly feeble; her respiration noisy and difficult, rendered so in part by an abundant secretion of yellow adhesive matter in the nares. The swelling on the right side of the throat was much the same as on the previous day, but the left parotid was greatly swollen, and of a stony hardness; the tonsils were more swollen; deglutition was difficult, and a large quantity of tenacious mucus was collected about the fauces. The diarrhœa still continued, and at 10 o'clock the same night the poor child died, within ninety hours from the commencement of her illness.

Although the affection of the throat was in this case rapidly on the increase, yet it was not to that alone that the child's death could be attributed, but rather to the depression of all the vital powers, which was so considerable that, on my first visit to the child, little more than forty-eight hours after her seizure, the pulse could no longer be counted. Even in the malignant form of scarlatina, however, it is seldom that death takes place so early, but the patient more commonly survives to the end of the sixth or seventh day, and, under these circumstances, the affection of the throat generally goes on increasing in severity. The inflammation of the tonsils terminates in the formation of several small, but excavated, un-

healthy ulcerations, or sometimes a more extensive sloughing involves the parts at the back of the throat. The coryza to which reference was made just now is generally very severe, and both that and the swelling of the parotids add greatly to the patient's sufferings. These glandular swellings are remarkable for the stony hardness which they present, and for the very slight tendency which they shew to suppurate, and if matter form it is usually in the cellular tissue about the glands, not in the glands themselves. Although the affection of the nares and fauces, and the swelling of the parotid glands, often present a very serious obstacle to respiration, yet true croupal symptoms are not of common occurrence; and in the epidemics which I have witnessed in London, I have not met with either diphtheritis or œdema of the glottis. You must remember, however, that in almost every epidemic of scarlatina there is some peculiarity in the course that the disease takes, and that those complications which one year are frequent and perilous, are in another year but seldom met with, or are attended with comparatively little danger.

Even though the patient should survive the immediate peril of the fever, a long catalogue of sequelæ remains, some of which may endanger or even destroy life. Sometimes, indeed, the patient passes through the first week of the disease with few or no symptoms to excite anxiety; and then, when the rash is on the decline, swelling of the parotid glands comes on; sloughing ulcers form on the tonsils, which had not seemed to be very much inflamed previously; an acrid discharge takes place from the nostrils, and death follows in the course of four or five days. In the majority of instances, however, the glandular swellings which come on after the lapse of a week from the commencement of the disease, though tedious and painful, yet do not endanger life. Occasionally, indeed, death occurs in consequence of the matter formed by the inflammation of the glands, or of the cellular tissue around them, burrowing backwards behind the pharynx, instead of pointing externally. In these cases of retro-pharyngeal abscess, after more or less evident indications of inflammation in the neighbourhood of the parotid or submaxillary glands, accompanied, in all probability, with a swelling on one or other side of the neck or jaw, the patient begins to experience difficulty in deglutition, which goes on increasing until the attempt to swallow becomes quite impracticable. As the dysphagia increases, respiration becomes also very difficult, but the dyspnœa continues to increase progressively, and is not aggravated in paroxysms, as in cases of cynanche trachealis, though the effort to swallow will sometimes bring on threatening suffocation. Moreover, there is seldom any modification in the tone of the voice, such as occurs in croup, though the voice becomes by degrees whispering and then extinct; while if the throat be examined, the tonsils are observed to be free from swelling; and sometimes neither they nor the soft palate show the slightest increase in redness or other

token of inflammation. The general symptoms, coupled with the negative results afforded by examination of the fauces, point tolerably plainly to the real nature of this affection; but positive certainty concerning it can be obtained only by a means which Mr. O'Ferrall, of Dublin, was, to the best of my knowledge, the first to point out, and which consists in passing the finger for some distance down the throat, when the presence of a tumor pressing forward the posterior wall of the pharynx or œsophagus, will at once reveal the cause of the patient's sufferings.

Coupled with the swelling of the parotid glands, or even independently of it, inflammation of the internal ear is often met with as a consequence of scarlatina. This otitis terminates in abundant purulent discharge, which sometimes continues for many weeks; and occasionally it completely destroys the organ of hearing, and renders the patient hopelessly deaf for the remainder of his life. Another, but fortunately a very rare, sequela of the disease is the inflammation of some of the larger joints. One instance only of this has come under my notice; in the case of a little boy whose right humerus became permanently anchylosed to the scapula, in consequence of inflammation which attacked his shoulder-joint after scarlet fever.

I have already spoken, in a previous lecture,* of that very frequent and very serious occurrence, the dropsy which succeeds to scarlet fever, and need not, therefore, refer to that subject now. But there are other cases, in which, without any definite local complication, the convalescence from scarlet fever is fluctuating and protracted. In such cases the bowels are irregular in their action, alternately relaxed and constipated; the evacuations unhealthy; the tongue red and raw; and aphthous ulcerations sometimes appear on the inside of the mouth; while an irregularly remittent fever harasses and weakens the child. These symptoms, however, which closely resemble those that sometimes come on during convalescence from measles, are of much less frequent occurrence as consequences of scarlatina.

The *diagnosis* of scarlatina is not in general attended with much difficulty; and the points of difference between it and measles are so well marked, that it is not easy to understand how the two diseases should so long have been confounded together. Their period of incubation is different; that of scarlatina not exceeding a week, that of measles often extending to two. Their premonitory symptoms are very dissimilar—those of measles closely resembling the signs of a severe catarrh; while the attack of scarlatina is announced by sickness, succeeded by intense heat of skin, by sore throat, great sensorial disturbance, and extreme rapidity of the pulse. There is no other disease of childhood, indeed, in which the two last-named symp-

* See Lecture XXXV. p. 429.

toms supervene so speedily after the commencement of illness ; and their appearance will often enable you, even before the appearance of the rash, or any complaint of sore-throat, to form a correct conclusion with reference to the nature of the affection. The premonitory stage of measles usually continues for three or four days—that of scarlet fever, in its regular form, only for twenty-four hours ; while the other symptoms which appear in cases of scarlet fever, in which the rash is delayed, are such as quite to forbid the supposition of the patient being affected with measles. The character of the two eruptions is so dissimilar, that I need not here dwell on their peculiarities, nor do more than remind you that, while in measles the great danger to life arises from the supervention of bronchitis or pneumonia, the two great sources of hazard in scarlet fever, are the affection of the throat during its progress, and the occurrence of dropsy after its decline.*

With a few words on the *treatment* of scarlatina, I will bring this subject, and the present course of lectures, to a close. The milder forms of the disease require, as you know, but little interference ; and you fulfil every indication by keeping the child in a cool and well-ventilated chamber, placing him on a spare diet, giving some mild antiphlogistic medicine during the progress of the fever, and sponging the surface occasionally with tepid water if the heat of the skin be considerable. When the eruption is on the decline, the hot bath every night is often very useful in favouring the process of desquamation ; while the child must be kept strictly within doors, his diet must still be mild and unstimulating, and due attention must be paid to the state of the bowels, until the period has passed when there is much ground for fearing the supervention of dropsy. For some time after, much caution must be exercised in not allowing the child to go out when the air is cool, and in avoiding all errors of diet ; while it is also expedient that flannel should be worn next the skin for a considerable period after apparent convalescence from scarlet fever.

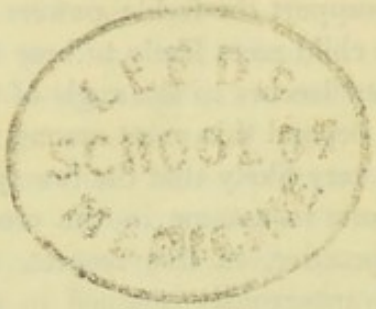
Even in severer cases of the disease, you must not be in too great a hurry to resort to active measures, for you will remember that a somewhat stormy onset is characteristic of all but the very mildest forms of scarlatina. That disturbance of the sensorium, for instance, which, when the child is sufficiently old, shows itself by the early occurrence of delirium, must not lead you to have recourse hastily to depletion, either general or local, in order to quiet the disorder of the brain. The results afforded by

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* I have purposely omitted to say any thing concerning the diagnosis between scarlatina and the kindred exanthema, called Rötheln by German writers (the rubeola of some continental nosologists ; for, though I believe there to be a foundation for this distinction, my own opportunities have not enabled me to come to any positive conclusion on the subject.

depletion in scarlet fever, even when the disease occurs in the adult, are by no means encouraging, and in the child the loss of blood under these circumstances is even less well borne; so that, unless the patient be robust and plethoric, the cerebral disturbance very serious, and the evidences of congestion of the brain very marked, you should content yourselves with the application of cold to the head, perhaps employing cold affusion, and with cold sponging of the surface. In the malignant forms of the disease there is often very considerable disturbance of the sensorium, great restlessness alternating with a state of stupor; but the frequent and feeble pulse at once forbids depletion in such cases, and points out the necessity for adopting every means to support the feeble powers of life. If there be much sore-throat, and the child seem likely to bear the loss of a little blood, I sometimes apply a few leeches to the angle of the jaw; but have hardly ever carried depletion beyond this point among my patients at the Children's Infirmary. It is very likely that the low type which a disease such as scarlatina is almost sure to assume in the crowded dwellings of the poor, has rendered my practice, in this respect, somewhat different from that which might be advantageously pursued in the case of children more favourably situated. To the same circumstances it is also probably due that in a large proportion of cases I have found it desirable to give ammonia almost from the outset of the disease; a practice which has been recommended as universally applicable, and which (though the remedy does not deserve the indiscriminate encomiums that have been lavished on it) you will do well to follow, whenever the pulse presents the characters of great frequency and softness combined. The state of the throat must be carefully watched in every case of scarlet fever: and whenever there is much swelling of the tonsils, if the child be too young to gargle, a slightly acidulated lotion should be injected into the throat, by means of a syringe, every few hours, in order to free it from the mucus which is so apt to collect there, and to be the source of much discomfort. If there be much deposit of lymph upon the tonsils, it is generally desirable to apply the strong hydrochloric acid, mixed with honey, in the proportion of about one part of the former to six of the latter, by means of a dossil of lint, or a camel's-hair pencil, two or three times in the twenty-four hours; but the strength of the application must be increased if the tonsils be ulcerated, or if any disposition to sloughing should appear. The coryza which is so distressing and so ill-omened a symptom in cases of severe scarlatina, is best treated by throwing a small quantity of a solution of gr. j. or gr. ij. of nitrate of silver in ℥j. of distilled water, up the nostrils every four or every six hours. The glandular swellings are very difficult to relieve. When considerable they do not seem to be benefited by leeches; the employment of which is also, in many cases, contraindicated by the feeble state of the patient's powers; while they show very little disposition to

suppurate, and consequently are not relieved by lancing: so that the constant application of a warm poultice is often all that can be done to afford ease to the patient. Children in whom the local affection is severe, or in whom the disease assumes a malignant character, require all those stimulants, and that nutritious diet, which we are accustomed to give to patients in certain stages of typhus fever; though, unfortunately, the best devised means will, in many such cases, prove ineffectual.



THE END.

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