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CLINICAL AND PATHOLOGICAL OBSERVATIONS IN INDIA

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CLINICAL AND PATHOLOGICAL OBSERVATIONS IN INDIA

BY

J. FAYRER, C.S.I., M.D., F.R.S.E.

FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS OF LONDON; FELLOW OF THE ROYAL COLLEGE OF SURGEONS EDINBURGH; HONORARY PHYSICIAN TO THE QUEEN; SURGEON-MAJOR BENGAL ARMY; PROFESSOR OF SURGERY IN THE MEDICAL COLLEGE OF BENGAL; FIRST SURGEON OF THE MEDICAL COLLEGE HOSPITAL, CALCUTTA; MEMBER OF THE SENATE AND LATE PRESIDENT OF THE FACULTY OF MEDICINE OF THE UNIVERSITY OF CALCUTTA.

LONDON

J. & A. CHURCHILL, NEW BURLINGTON STREET

1873

20564

"Non hypotheses condo, non opiniones vendito
Quod vidi scripsi."

TO

HENRY HANCOCK, Esq.,

PRESIDENT OF THE ROYAL COLLEGE OF SURGEONS OF ENGLAND,

THIS VOLUME IS DEDICATED,

WITH

THE AFFECTIONATE REGARDS

OF

AN OLD PUPIL.

PREFACE.

The contents of the present volume are, like those of its predecessor, of a practical character, being the fruit of several additional years of experience in an extensive field of observation.

The results of the publication of the former volume in 1866 have been such as to encourage me to offer this continuation of clinical and pathological observations made since that date, and I trust that it may meet with as favourable a reception.

In explanation of any repetition that may be observed during the discussion of some of the subjects brought under notice, I may remark that this has to some extent been unavoidable in reproducing, in their present form, articles that have already appeared in different journals at various dates. With respect to any modification of views and opinions formerly entertained, this has been the natural consequence of more extended experience and further study and observation.

The points of most interest in these notes appear to me to be those having reference to septicæmia, blood dyscrasia, and disturbance of the nervous system, as illustrated in the remarks on pyæmia, osteo-myelitis, embolism, the formation of cardiac

coagula, and urethral fever. These pathological conditions have been considered as they have been met with in persons who have suffered from disease or accident, or who have undergone operations, whether in hospital or under other circumstances in Bengal—where heat and moisture, defective hygiene, and that condition which, from want of a more precise designation we call "malaria," had induced a state of cachexia or constitutional disturbance favourable to the development of these untoward complications, which are as distressing to the surgeon as they are dangerous to the sufferer.

I would record my grateful acknowledgments to my Colleagues and my Assistants in India, to Mr. J. Chatto, Librarian of the Royal College of Surgeons of England, and to Mr. E. Fayrer, for much valuable aid in producing this volume.

LONDON, *May*, 1873.

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CLINICAL SURGERY IN INDIA.

ADDRESS IN SURGERY,

DELIVERED AT

THE ANNUAL MEETING OF THE BENGAL BRANCH OF THE BRITISH MEDICAL ASSOCIATION,

MARCH, 1868.

MR. PRESIDENT AND GENTLEMEN,—A period of three years has elapsed since I had the honour of addressing an Annual Meeting of this Association. On that occasion I took the opportunity, in alluding to the state of surgery in Bengal, of especially soliciting your attention to certain pathological conditions arising in the medullary structure of the bones, and productive of great mortality from blood poisoning among those who had suffered accident, or undergone surgical operation in the hospitals of this city. In connection with, and closely allied to, this subject, I described what seemed to me, in some measure, to account for the prevalence of this form of disease, and I stated that vitiated health before admission into defectively constructed hospitals was one great cause. This vitiated state of health I attributed to imperfect nutrition, to residence in a crowded and badly drained and ventilated city, and to that consequent general deterioration of constitutional vigour implied in a want of nervous energy, and the existence of a defective condition of the blood-making apparatus, which, in persons

under such circumstances—living in a damp, tropical climate, and on the alluvial delta of a large river—is aggravated by the ever-present existence of that peculiar poison, or state, which, for want of a better name, we call malaria. I endeavoured to suggest how far, and to what extent, each of these causes may be held to be responsible for the occurrence of disease; and in speaking of the share in it that may be due to nosocomial influences, I was careful to avoid what might appear to be animadversion on any one; for, whatever the defects of the Calcutta hospitals, and especially of that of the Medical College may be, it is to be borne in mind, that at the period when constructed, they were all that the sanitary science of the time considered necessary, and that any condemnation now pronounced must, on similar grounds, apply to most of the great European hospitals of that period.

The experience and improved knowledge of the last fifteen years have so changed the pre-existing views on these subjects, and have so entirely revolutionized the ideas of hospital construction, that it is no reflection on any one, but simply a matter of duty, to point out defects where we find them, and to profit in all respects by the errors and experience of the past. During the last three years, the Medical College Hospital and its defects have been much discussed, and a committee appointed by Government has thoroughly investigated the question, and made suggestions for alteration and improvement. The committee consisted of medical men, civilians, engineers, merchants, and independent gentlemen, including a member of the native community; so that all interests were represented; and after careful investigation and comparison, and taking evidence from the medical officers of the hospital, they have confirmed the unfavourable reports that brought about the nomination of the committee. It is a matter of regret that the eminent physician to whom the hospital owes so much for its very existence was not in India at the time these matters were under consideration, to have added the weight of that great and scientific experience, which has so much benefited other departments of

the public service, to the deliberations and suggestions of the committee; for I feel certain that no one would more willingly than Dr. Mouat have contributed to the subject all the advantages of the increased practical and scientific knowledge of late years.

The recommendations of the committee have not as yet been all carried into effect, though I trust they shortly will be; but one, and perhaps the most important change in the internal arrangements of the hospital, had already, at the instance of the medical officers, been carried out—the reduction of the number of beds from twenty-five to sixteen in each ward, and this has been followed by undoubtedly good results, as I propose to show.

The reduction of the number of beds in the wards of a large hospital from twenty-five to sixteen in each, *i.e.*, about eighty-eight in all, is, in a great city, ill-provided like Calcutta with accommodation for the sick, a matter of serious importance, and not to be undertaken without due consideration and assurance of its necessity. That such was the case I am quite satisfied, and feel sure that the results have already been such as not only to justify, but to prove the necessity for the change.

It is to be noted, that although the cubic space, even before the change, was considerable, and perhaps so far equal to what is now considered to be sufficient, the superficial area was much below the ordinary requirements, owing to the disproportion between the height and the length and breadth of the wards. It is an axiom in hospital hygiene that a certain minimum proportion of cubic space is required for a sick European soldier, but it is no less one of its canons that he must have a certain proportion of superficial space, and that you may not increase the one at the expense of the other. Height is a great advantage in a hot climate, but it must not be gained at a sacrifice of superficial area.

Taking the average of the ordinary sized wards, I find from a table furnished to me by Mr. Bouser, the purveyor of the

hospital, that when we admitted 25 into one ward, each patient had an average of 61 superficial, and 1,530 cubic feet of space; and since we reduced the number from 25 to 16, that each patient has 95 superficial, and 2,391 cubic feet of space. Now it has been laid down that each European in this country is to have in hospital 120 superficial feet, 10 feet of wall space, and 2,400 cubic feet; whilst each Native shall have 99 superficial feet, 9 of wall space, and 1,584 cubic space—so that, taking the actual average of the wards, the patients therein accommodated have still, notwithstanding the reduction, rather less than the regulation allowance.

When, therefore, the question of the propriety of the reduction of our numbers, in view of the limited extent of hospital accommodation in Calcutta, is raised, as it has been, by the municipal authorities, the answer is clear, that it is better to secure the welfare of sixteen than endanger twenty-five. Nor is this a mere theoretical or imaginary notion: it is a simple, practical truth, and will stand the test of inquiry. Now, I would not have you suppose that I mean that contracted space alone is inevitably to be followed by evil results. Far from it. I am willing to admit that the ideal is seldom attained, that we must frequently depart from, rarely expect to realize it, and yet we may have fair results; but I am not prepared to say so much in the case of a hospital, whose other faults of construction are prominent, and where it consequently behoves us to do as much as we can to make up for, and not add to, existing defects.

The recognised principles of hospital construction are now so well known that I need hardly refer to them; but, as what I am stating is of general interest, and may be heard by others than medical men, I would briefly remark that, though few and simple, they are essentially requisite to the well-being of the sick. I may also add in anticipation, that neither this hospital nor any other building in Calcutta that I know of, in any way fulfils these simple conditions. We know that it has been the fashion in years past to construct our great European hospitals in one mass or block of building, capable of holding

a large number of sick, often compressed into small space; and that in the fulfilment of this idea, no regard was had, because, indeed, none was considered necessary, to due segregation, isolation, or classification of disease. Some of these large edifices were plain, others ornate, many of them costly in the extreme, liberally endowed, and munificently found in all that was supposed to be necessary to comfort as well as to health. Ventilation and cubic space, decoration of the walls and a cheerful aspect, with many other amenities that sympathy and kindness could dictate, were not wanting; and as far as the hygienic knowledge of the time went, they were perfect. If we criticise and find fault now, it must be done with all deference to the limited knowledge of our predecessors, and in the full consciousness that our ideas of to-day may twenty years hence be regarded as equally obsolete as theirs are now. But it is our plain and positive duty in such an important matter as the welfare of the sick, and in dealing with that very plastic element, the life, or rather, I should say, the death figure, to note the errors taught us by the experience of the past; and not only to point them out, irrespective of all considerations, but to apply our improved knowledge to the benefit of the present and the future. It seems to me that no duty is more imperative on municipal, provincial, or imperial government than that of making provision on a liberal scale for the inevitable sick. In any given population, a certain number must at all times be laid aside by sickness, and of this number a certain proportion is as surely unable to provide for itself, and therefore becomes a responsible and inevitable charge on the rest of the community. The sanitary knowledge of the time indicates the best, the most economical, and, at the same time, the most rational method of providing for their wants—a charge as important and serious as any that has to be sustained. Calcutta is, I fear, as badly prepared to meet its liabilities in this respect as any other great city, and it is certain that such provision as it has is, according to present views, of an imperfect nature. But it is gratifying to know that the subject is now attracting

attention, and that the influence of hospital construction and hygiene on the welfare of the sick, and especially on those in whom the surgeon is most interested, is daily being more recognised. New hospitals are constructed in compliance with the principles laid down as essential for the welfare of the sick, and in many cases such alterations as they were capable of have been, or are being made, with the view of improving existing buildings. For much interesting matter connected with this subject I would refer you to a most able Report by Dr. Sutherland on the Hospitals and Barracks of the United Kingdom, published in 1861. On a large scale, too, it has been well tested by the Americans in the great campaigns which have recently terminated; and no one who has read the valuable Report styled Circular No. 6, Surgeon-General's Office, War Department, Washington, 1865, can fail to have been struck with the great success attending their adoption of the new system of hospital construction and administration in their regimental and field hospitals.

The same principles, modified, are applicable in civil life; and as they have to do with fixed and permanent institutions, there is all the more reason why they should be adopted. The great difficulty, no doubt, is expense; but this ought not for a moment be allowed to stand in the way of the accomplishment of what is a most obvious duty, and the tendency to admit this argument is, I am happy to think, becoming more evident daily. With reference to the suggestions of the committee that reported on the Medical College Hospital in February, 1867, I may say that, like those of Dr. Sutherland in the case of the European hospitals, they had in view the improvement of the sanitary condition of the present hospital, provided it should be deemed impossible to construct a new one; and I am glad to say that, after a year's delay, some part of the work has at last been commenced, though from the original defects of construction, it is improbable that any very satisfactory or radical improvement can result from what may be done.

In a few words, the requisites of a good hospital, according

to present views, are the following. It is beyond a doubt that all hospitals, however large or small, should be constructed on this principle, that they should be multiples of what is laid down as the *ward unit*, viz., a simple chamber, capable of accommodating any number up to 25 patients, in two rows, with from 1,500 to 2,500 cubic feet, and 90 to 120 superficial feet for each individual. It is essential, moreover, that these apartments should have cross ventilation, and that the walls be pierced with a sufficient number of windows and doors to admit of free egress and ingress of air. Such wards must be built on well-drained and wholesome ground, and be protected by verandahs in hot, and warming apparatus in cold, climates. Lavatories and latrines should be constructed outside, and the administration should be so arranged, that each ward may receive its due share of care and attention. Every hospital, however large, should be a multiple of this unit, arranged in a variety of ways, V shaped, or *échelon* shaped, half moon, or star shaped, or in parallel pavilions, according to individual circumstances. All blocking or crowding together of sick into one apartment, however spacious, must be avoided; and in surgical cases, especially after operation, the more perfect the isolation, the better. For the mode in which the principle has been applied in America, I might refer here to the Report already mentioned; and it may be seen in England, as I believe, in the Herbert Hospital at Woolwich, in the Lariboisière* in Paris, in the Colonies, and I am happy to say almost everywhere (except in Calcutta) in India.

To quote from the writings of a scientific living surgeon, Mr. Spencer Wells:—"Not only must communication of wards with each other be avoided, but there must be separate wards containing one, or at most two beds, for patients recently operated on, and in lying-in hospitals for women recently confined, before we can hope to reduce mortality from the excessive to the unavoidable rate."

* I believe that the Lariboisière has not proved so good a hospital as it was expected to be.

Statement showing the Diseases which have caused Death after Surgical Operations and Injuries in the Medical College Hospital during the years 1864, 1865, 1866, *and* 1867.

Year.	Total number of operations and injuries.	BLOOD-POISONING DISEASES.										OTHER DISEASES.																					Grand total.	Percentage to total operations.
		Pyæmia and Osteo-myelitis.	Gangrene.	Exhaustion.	Diarrhœa.	Dysentery.	Erysipelas.	Embolism of Heart.	Pneumonia.	Peritonitis and Liver Abscess.	Total.	Percentage of deaths to total operations.	Peritonitis.	Peritonitis, with internal Hernia.	Tetanus.	Shock.	Coma.	Uræmia.	Pelvic Cellulitis.	Sloughing of Bowels	Phthisis Pulmonalis.	Compressio Cerebri.	Cholera.	Embolism of Basilar Artery.	Laceration of Brain.	Fatty Heart.	Total.	Percentage of deaths to total operations.						
1864	195	22	4	4	2	1	0	0	0	1	34	17·43	0	0	0	4	0	0	0	0	0	0	0	0	0	0	4	2·05	38	19·48				
1865	165	15	4	10	3	2	1	0	1	0	36	21·68	0	0	3	1	1	1	0	0	0	0	0	0	0	0	6	3·61	42	25·30				
1866	153	12	3	12	2	0	0	1	2	0	32	20·91	0	1	2	1	0	0	1	1	1	1	0	0	0	0	8	5·22	40	26·14				
1867	161	10	0	6	0	0	2	0	0	0	18	11·18	2	0	5	4	0	0	0	0	0	0	2	2	2	1	18	11·18	36	22·36				

I have said that the diminution of the number of beds appears to have been followed by an improvement in the results of the surgical cases; and partly to another cause, to which I shall request your attention presently, the improvement may, I believe, be attributed. I have to thank Dr. Ewart, who has so ably administered the affairs of the hospital during the absence of Dr. Chevers, for a return of the surgical operations performed during the two years that preceded and the two years that succeeded the diminution in the number of beds, and from it I make out the fact that blood-poisoning diseases have decreased.

The results of the year of the change can hardly be taken as a fair criterion; for during that period, so many of the sick and famine-stricken creatures who came into the city during the great calamity of that year were admitted, that the ordinary nature of the hospital returns was, of necessity, different from what is usual. It appears from these returns of the surgical operations (and they are perhaps the best test that can be applied to the sanitary condition of a hospital), that, in the year 1864, there were one hundred and ninety-five important operations performed by Professor Partridge and myself. Out of these twenty-two died of pyæmia and osteo-myelitis, four of gangrene, four of exhaustion, two of diarrhœa, one of dysentery, one of peritonitis and liver abscess, making a total of thirty-four deaths (or 17·34 per cent.) out of one hundred and ninety-five cases, from what may be truly called blood-poisoning diseases. Of other diseases, there were, out of the number, four from shock (or 2·05 per cent. out of the whole number), or in all thirty-eight deaths out of one hundred and ninety-five cases (or 19·48 per cent.)

In 1865 the record shows one hundred and sixty-five cases of operation, out of which fifteen died of pyæmia and osteo-myelitis, four of gangrene, ten of exhaustion, five of diarrhœa and dysentery, one of erysipelas, and one of pneumonia, being a total of thirty-six cases of blood-poisoning diseases in one hundred and sixty-five cases, or 21·68 per cent. There were also out of this number of one hundred and sixty-five cases, three deaths

from tetanus, one from shock, one from coma, one from anæmia, making six deaths, or a total of forty-two, or 25·30 per cent. of the whole number. These occurred before the diminution of beds took place.

In 1866 it appears that there were one hundred and fifty-three important operations, of which twelve died of pyæmia and osteo-myelitis, three of gangrene, twelve of exhaustion, two of diarrhœa, one where the most evident cause of death was plugging of the right side of the heart, and two from pneumonia, making in all thirty-two deaths from blood-poisoning, or 20·91 per cent. out of one hundred and fifty-three cases. There were also out of this number, one death from internal hernia, two from tetanus, one from shock, four from other causes, making a total of forty out of one hundred and fifty-three, or 26·14 per cent. of the whole. Not much improvement you will say, excepting in the item of pyæmia, where you have twelve out of one hundred and fifty-two, against fifteen out of one hundred and sixty-five in the previous year, and twenty-two out of one hundred and ninety-five in the year before that.

In 1867 the record tells of one hundred and sixty-one important operations, with ten deaths from pyæmia and osteo-myelitis, six from exhaustion, two from erysipelas, eighteen in all from blood-poisoning diseases, or 11·18 per cent. There were also five deaths from tetanus, four from shock, two from cholera, and seven from other causes, making a total of eighteen, or thirty-six in all, or a percentage of 22·38.

Now these facts may not show anything very definite, but still they are sufficient to prove that there is a diminution in the particular class of cases, viz., pyæmia and osteo-myelitis, to which I more particularly referred in my last address in 1865; and so far I think that, even by the imperfect evidence of statistics on a small scale (and they are only really reliable on a large one), it is proved that the condition of the hospital has improved during the past two years.*

* This improvement has continued to the present time.

I avail myself of this opportunity of requesting your attention to certain other interesting surgical matters, and first of all to one to which, I believe, we are in no small degree indebted for the diminution in blood-poisoning diseases after surgical operations, wounds, and accidents, and that is, *the application of the antiseptic principle in the treatment of surgical disease.* It is within the last eight or ten years that the discovery of the existence in the atmosphere of myriads of germs of vegetable infusorial organisms, capable of the most rapid multiplication, and of resisting a temperature above 240° Fahrenheit, has thrown much light on the occurrence of blood-poisoning after injuries and operations. These germs develop rapidly in the presence of organic fluids and give rise to putrefactive changes, some requiring the presence of oxygen for their action, such as the bacteria. The vibriones, on the other hand, develop where oxygen is wanting. They require an organic fluid (a menstruum) for their reproduction, and putrefactive or fermentative changes accompany their growth. These germs increase according to the amount of organic impurity in the air, and therefore abound richly wherever men, and especially sick men, are crowded together. This constitutes what is called the septic condition of the atmosphere, and it is one that has a great influence on wounds and surgical operations. The germs of bacteria-termo are most abundant. There are also mycoderms, mucedines, and torulæ, and they not only have the properties of rapid development and of inducing various changes, such as the alcoholic, acetic, butyric, and lactic fermentations, but they rapidly induce putrefaction in organic matters, and give rise to septic conditions by which the blood is contaminated. They have great power of resisting destruction, a temperature of 260° Fahrenheit, it is said, being necessary to ensure their death. Now, it has been ascertained that, when an organic infusion has been deprived of these germs by a high temperature, and is protected from their further access from the air, it remains as unalterable as any ordinary chemical solution; no tendency is shown to decomposition, no symptom of life is

manifested. The germs that are developed in organic infusions, are certainly according to this theory introduced from the air.

Professor Lister, in studying the effects of these septic changes on wounds and injuries, conceived the idea of excluding these noxious elements entirely from wounds and suppurating surfaces, and thus of protecting the natural restorative power of the tissues. To quote his own words: "The material which I have employed is carbolic or phenic acid, a volatile organic compound, which appears to exercise a peculiarly destructive influence on low forms of life, and hence is the most powerful antiseptic with which we are at present acquainted. The first class of cases to which I applied it was that of compound fractures, in which the effects of decomposition in the injured part were especially striking and pernicious. The results have been such as to establish conclusively the great principle that all the local inflammatory mischief and general febrile disturbance which follow severe injuries are due to the irritating and poisoning influence of decomposing blood or sloughs. For these evils are entirely avoided by the antiseptic treatment, so that limbs which otherwise would be unhesitatingly condemned to amputation, may be retained with confidence of the best results. . . . Since the antiseptic treatment has been brought into full operation, and wounds and abscesses no longer poison the atmosphere with putrid exhalations, my wards, though in other respects under precisely the same circumstances as before, have completely changed their character; so that during the last nine months not a single instance of pyæmia, hospital gangrene, or erysipelas has occurred in them." *

The main object of this antiseptic mode of treatment is the purification of the air which is to gain access to the wound, and not the local application of a specific agent to the wound itself. To fulfil this intention, it is necessary that the injured

* *Lancet*, Sept. 21, 1867.

part should be enveloped in the antiseptic agent, which, according to Professor Lister, is carbolic acid, according to others, sulphurous acid, or any other agent that has the power of destroying these germs. The process of repair is thus allowed to proceed undisturbed by contaminated atmosphere, and there is reason to believe that when this can be really effected, the powers of Nature are equal to much more than is generally supposed.

The carbolic acid is thus used as a protective, and not as a corrective, and it is this point in particular that Professor Lister has demonstrated. No doubt as a local application, and as a deodorizer and local antiseptic, destroying organic effluvia which already exist, it is also very useful, and is or should be much used on a large scale. But this, though important, is, as you will perceive, very different from its application as a purifier of the air and a preventive of septic poisoning. For some months this substance has been freely applied by my colleague and myself in the wards of this hospital, and if we cannot speak with the unqualified enthusiasm of some of its advocates, we can at all events say that we have found in it an important addition to our means of combating pyæmic disease.

I have with the aid of my house-surgeon, Baboo Mohendro Nath Guptoo, made out a list of cases treated by carbolic acid during the last three or four months. It is too long to read, but I have abstracted from it the results of the most interesting cases; and though I am hardly in a position to prove by figures that our success has been greater than usual, I am able to state my conviction (and it is that of my colleague also), that many of these cases would, without the carbolic acid, certainly have done badly. To one or two cases I shall request your attention as singularly illustrative of the facts.

CARBOLIC ACID CASES.

	No.	Bone.	Date of Admission.	Date of Discharge.	Number of days under treatment.	Result.
Compound Fractures.	1	Right Tibia.	2nd Aug., 1867.	11th Nov.	3 months 9 days.	Recovered.
	2	Right Tibia and Fibula.	1st Sept., 1867.	15th Nov.	2 months 15 days.	Ditto.
	3	Right Tibia.	29th Sept., 1867.	20th Jan., 1868.	3 months 20 days.	Ditto.
	4	Right Tibia and Fibula.	21st Oct., 1867.	25th Jan., 1868.	3 months 4 days.	Ditto.
	5	Ring Finger.	8th Dec., 1867.	27th Jan., 1868.	1 month 19 days.	Ditto.
	6	Index Finger.	13th Jan., 1868.	Still under treatment, very nearly well.		
Amputations.	1	Syme's Amputation of Foot.	23rd Sept., 1867.	27th Sept.	4 days.	Died from Pyæmia.
	2	Leg by modified circular method.	21st Oct., 1867.	25th Jan., 1868.	3 months 4 days.	Recovered.
	3	Finger, with a portion of metacarpal bone.	8th Dec., 1867.	27th Jan., 1868.	1 month 19 days.	Ditto.
	4	Ditto.	14th Jan., 1868.	Still in Hospital.		
	5	Ditto.	16th Jan., 1868.	Ditto.		

CARBOLIC ACID CASES—(*continued.*)

No.	Part.	Date of Admission.	Date of Discharge.	Number of days under treatment.	Result.
1	Head.	4th Oct., 1867.	29th Oct.	25 days.	Recovery.
2	Scrotal tumour	11th Oct., 1867.	12th Jan., 1868.	2 months 15 days. From the date of operation.	Ditto.
3	Leg.	14th Oct., 1867.	26th Oct.	12 days.	Died from Tetanus.
4	Head.	18th Oct., 1867.	7th Nov.	20 days.	Recovery.
5	Leg.	25th Oct., 1867.	25th Jan., 1868.	3 months.	Ditto.
6	Scrotal tumour	28th Oct., 1867.	17th Dec.	12 days from the date of operation.	Died from Tetanus.
7	Hand.	30th Oct., 1867.	26th Dec.	1 month 26 days.	Recovery.
8	Scrotal tumour	6th Nov., 1867.	22nd Dec.	18 days from the date of operation.	Died from Diarrhœa and Exhaustion.
9	Leg.	12th Nov., 1867.	20th Nov.	8 days.	Died from Diarrhœa.
10	Behind Ear.	13th Nov., 1867.	15th Jan., 1868.	2 months 2 days.	Recovery.
11	Right Elbow.	27th Nov., 1867.	20th Dec.	23 days.	Ditto.
12	Mammary Region.	4th Dec., 1867.	21st Dec.	17 days.	Ditto.
13	Head.	25th Dec., 1867.	12th Jan., 1868.	17 days.	Ditto.

CARBOLIC ACID CASES—(*continued.*)

	No.	Part.	Date of Admission.	Date of Discharge.	Number of days under treatment.	Result.
Wounds.	14	Foot.	28th Dec., 1867.	22nd Jan., 1868.	25 days.	Recovery.
	15	Perineum.	18th Dec., 1867.	12th Feb., 1868.	1 month 24 days.	Ditto.
	16	Below the Chin.	5th Jan., 1868.	15th Feb.	1 month 10 days.	Ditto.
	17	Perineum.	10th Jan., 1868.	27th Jan.	17 days.	Ditto.
	18	Head.	16th Jan., 1868.	22nd Jan.	6 days.	Relieved.
	19	Hand.	17th Jan., 1868.	18th Jan.	1 day.	Ditto.
	20	Forehead.	3rd Feb., 1868.	19th Feb.	16 days.	Recovery.
	21	Ditto.	26th Jan., 1868.	28th Feb.	1 month 2 days.	Ditto.
		Ditto.	27th Jan., 1868.	28th Feb.	1 month.	Ditto.
	22	Lower Jaw.	27th Jan., 1868.	Still in Hospital.		
	23	Head.	26th Jan., 1868.	Ditto.		
	24	Thigh.	19th Feb., 1868.	Ditto.		
	25	Fore-arm.	24th Feb., 1868.	Ditto.		
	26	Leg.	20th Jan., 1868.	Ditto.		
	27	Knee.	28th Jan., 1868.	Ditto.		

CARBOLIC ACID CASES *(continued.)*

Wounds.

No.	Part.	Date of Admission.	Date of Discharge.	Number of days under treatment.	Result.
28	Nose.	19th Feb., 1868.	Still in Hospital.		
29	Labium.	1st Nov., 1867.	Ditto.		
30	Breast.	11th Oct., 1867.	Ditto.		
31	Finger.	13th Jan., 1868.	Ditto.		
32	Inguinal Region.	10th Feb., 1868.	Ditto.		
33	Chest.	14th Feb., 1868.	Ditto.		
34	Inguinal Region.	22nd Jan., 1868.	Ditto.		
35	Head.	28th Feb., 1868.	Ditto.		
36	Foot.	9th Dec., 1867.	Ditto.		
37	Scrotal tumour	20th Dec., 1867.	Ditto.		
38	Arm and Chest.	30th Dec., 1867.	Ditto.		
39	Inguinal Region.	8th Jan., 1868.	Ditto.		
40	Legs.	8th Jan., 1868.	Ditto.		
41	Scrotal tumour	20th Dec., 1867.	Ditto.		
42	Ditto.	24th Feb., 1868.	Ditto.		

CARBOLIC ACID CASES—(*continued.*)

Ulcers.

No.	Where.	Date of Admission.	Date of Discharge.	Number of days under treatment.	Result.
1	Penis.	11th Sept., 1867.	30th Sept., 1867.	19 days.	Recovery.
2	Leg.	27th Sept., 1867.	26th Jan., 1868.	4 months.	Ditto.
3	Penis.	7th Nov., 1867.	6th Dec., 1867.	1 month.	Ditto.
4	Foot.	22nd Nov., 1867.	13th Dec., 1867.	20 days.	Ditto.
5	Soft Palate.	2nd Dec., 1867.	5th Dec., 1867.	3 days.	Death.
6	Scrotum.	18th Dec., 1867.	10th Feb., 1868.	23 days.	Recovery.
7	Leg.	30th Oct., 1867.	24th Feb., 1868.	3 months 24 days.	Ditto.
8	Ditto.	19th Feb., 1868.	Still in the Hospital.		
9	Elbow.	11th Oct., 1867.	Ditto.		
10	Ankle.	5th Jan., 1868.	Ditto.		
11	Leg.	10th Jan., 1868.	Ditto.		

Recovered	..	32
Relieved	..	2
Died ..	..	6
Remaining	..	25
Total	..	65 cases.

Abstract of Cases treated in the First Surgeon's Ward, with a mixture of one part of Carbolic Acid and five of Linseed Oil.

Date of Admission.	Number.	Names.	Sex.	Nature of Case.	Result.	Date of Result.	Remarks.
2nd Aug., 1867.	1	Ramlal Ghose,	M	Compound commtd. fracture of the tibia.	Recovery	11th Nov.	Compound commtd. fracture of the right tibia at its middle, caused by a fall from his horse.
1st Sept., 1867.	2	Prankissen Mullik,	,,	Compound fracture of the right tibia and fibula just above the ankle.	Ditto.	15th Nov.	Compound fracture of the right tibia and fibula above the ankle, by a fall from a height of about ten feet.
4th Sept., 1867.	3	Golucknauth Roy,	,,	Necrosis of the last metatarsal bone of the right foot and of the phalangeal bones.	Death.	27th Sept.	Syme's amputation at the foot performed on the 23rd September, and the patient died on the 27th, of pyæmia.
11th Sept., 1867.	4	Jadooputty Haldar,	,,	Sloughing of the penis.	Recovery	30th Sept.	Patient had an attack of cholera, and was taken away by his friends.

Date of Admission.	Number.	Names.	Sex.	Nature of Case.	Result.	Date of Result.	Remarks.
27th Sept., 1867.	5	Jhagoo,	M	Sloughing ulcers of the leg.	Recovery	26th Jan., 1868.	Suffering from two sloughing ulcers of the legs since the last six weeks. One placed above the inner malleolus of the left leg, and the other at the middle of the right.
29th Sept., 1867.	6	J. L.,	,,	Compound fracture of the right tibia.	Ditto.	20th Jan., 1868.	Fracture was simple on admission, but subsequently became compound by the formation of two or three openings.
4th Oct., 1867.	7	Gopaulchunder Aitch,	,,	Contused wound on the head.	Ditto.	29th Oct.	Had a contused wound on the head by the fall of a piece of wood from a height of twelve feet. Bone not denuded.
11th Oct., 1867.	8	Tarruknauth Doss,	,,	Scrotal tumour.	Ditto.	12th Jan., 1868.	Scrotal tumour about the size of a cocoanut for the last seven years. Operated on the 28th October, and dressed with carbolic acid and oil.

14th Oct., 1867.	9	Sabaram,	F	Incised wounds.	Death.	26th Oct.	Sustained several incised wounds of the legs, by falling upon a heap of broken bottles. Patient was doing very well as regards wounds, but died of traumatic tetanus.
18th Oct., 1867.	10	Sopna,	M	Vascular tumour.	Recovery	7th Nov.	Has had a tumour about the size of a marble on the right side of his head for the last six weeks. Tumour removed on the 18th October under chloroform.
21st Oct., 1867.	11	Nowbuth Khalasee,	,,	Compound commtd. fracture of both bones of the left leg at their middle.	Ditto.	25th Jan., 1868.	Caused by the limb being run over by the wheel of a railway engine half an hour before admission. Primary amputation performed at the upper part of the leg. Patient came in very low. Discharged with a wooden leg.
25th Oct., 1867.	12	Gourchunder Ghose,	,,	Necrosis of the left tibia.	Ditto.	25th Jan., 1868.	The disease first commenced with an abscess about six months ago. Necrosed portions removed. There was ulceration of the leg.

Date of Admission.	Number.	Names.	Sex.	Nature of Case.	Result.	Date of Result.	Remarks.
28th Oct., 1867.	13	Mudhoosudun,	M	Scrotal tumour of twenty years' standing.	Death.	15th Dec.	In consequence of bad health, the operation was postponed till the 5th December, when it was performed. Patient was doing very well, until traumatic tetanus came on on the 15th, of which he died.
30th Oct., 1867.	14	Lukhun,	,,	Large lacerated wound on the palm of the left hand.	Recovery	26th Dec.	Caused by the fall of a block of wood.
6th Nov., 1867.	15	Hossney,	,,	Scrotal tumour of ten years' standing, of the size of a large cocoanut.	Death.	22nd Dec.	Operated on the 4th December. He died on the 22nd of diarrhœa and exhaustion. Had elephantiasis of both legs.
7th Nov., 1867.	16	C. W.,	,,	Sloughing chancre.	Recovery	6th Dec.	
12th Nov., 1867.	17	Ramdeen,	,,	Necrosis of right tibia.	Death.	20th Nov.	Died of chronic diarrhœa.

13th Nov., 1867.	18	Radhachurn,	,,	Medullary tumour behind the ear.	Recovery	15th Jan., 1868.	Has had a tumour of the size of a goose's egg behind the right ear for the last year. Tumour removed on the 26th November.
22nd Nov., 1867.	19	Gyah,	F	Sloughing ulcer of the toes.	Ditto.	15th Dec.	
27th Nov., 1867.	20	Doloo,	M	Cystic tumour on the inner side of the right elbow of one year's standing.	Ditto.	20th Dec.	Tumour removed on the 27th of November.
4th Dec., 1867.	21	A. M.,	F	Mammary tumour.	Ditto.	21st Dec.	
25th Dec., 1867.	22	B. V.,	M	Contused wound of the head.	Ditto.	12th Jan., 1868.	
2nd Dec., 1867.	23	Soorathnauth Mookerjee,	,,	Sloughing ulcer of the soft palate.	Death.	5th Dec.	Patient came in moribund, suffering from enlarged spleen and low intermittent fever.
8th Dec., 1867.	24	Ojeer,	,,	Compound commtd. fracture of the left ring finger.	Recovery	27th Jan., 1868.	Amputation of the finger, with the head of the metacarpal bone.
28th Dec., 1867.	25	Kallydoss Mookerjee,	,,	Epithelioma of the great toe.	Ditto	22nd Jan., 1868.	Toe removed under chloroform.

Date of Admission.	Number.	Names.	Sex.	Nature of Case.	Result.	Date of Result.	Remarks.
18th Dec., 1867.	26	E. P.	M	Sloughing of the scrotum.	Recovery	10th Feb., 1868.	
18th Dec., 1867.	27	Obhoychurun Mittra,	,,	Fistula in ano.	Ditto.	12th Feb., 1868.	Fistula laid open on the 18th December.
5th Jan., 1868.	28	Shaik Omad,	,,	Epithelioma removed on the 8th Jan.	Ditto.	15th Feb.	An epithelioma, about the size of an eight anna piece, below the lower lip of seven months' standing, commencing first as a small pimple.
10th Jan., 1868.	29	Sittanauth,	,,	Fistula in ano.	Ditto.	27th Jan.	Fistula laid open on the 10th January.
16th Jan., 1868.	30	E. P.	,,	Contused wound on the head.	Relieved.	22nd Jan.	Patient was discharged at his own request.
17th Jan., 1868.	31	H. J.	,,	Lacerated wound of the hand.	Ditto.	18th Jan.	Ditto.
3rd Feb., 1868.	32	Bheem Doss,	,,	Contused wound on the forehead.	Recovery	19th Feb.	

26th Jan., 1868.	33	Bamah Dossee,	F	Ditto.	Ditto.	28th Feb.	Wound healed long before her discharge, but she was detained by the injury to her hip.
27th Jan., 1868.	34	Shaik Alloo,	M	Ditto.	Ditto.	28th Feb.	
13th Feb., 1868.	35	S. R.	F	Contused wound of the head.	Ditto.	26th Feb.	
30th Oct., 1867.	36	Naseebun,	,,	Sloughing ulcer of the leg.	Ditto.	24th Feb., 1868.	Patient took grs. iij. of opium every three hours.

The following Cases are still in the Hospital.

Date of Admission.	Number.	Names.	Sex.	Nature of Case.	Result.	Date of Result.	Remarks.
27th Jan., 1868.	1	Ramrutun,	M	Necrosis of the lower jaw.	Recovery	....	Necrosis of the right lower jaw of two and a half years' standing. Four sequestra removed on the 29th January, and the patient is now nearly well.
26th Feb., 1868.	2	Abdool Kader,	,,	Contused wound on the forehead.	Ditto.	....	The wound is very nearly well.
13th Jan., 1868.	3	Jonardhone,	,,	Compound commtd. fracture of the left index finger.	Ditto.	....	Amputation at the line of the wound performed on 14th January, and the patient is nearly well.
19th Feb., 1868.	4	Judoonauth Ghose,	,,	Sinus in the thigh.	Doing well.	....	Patient came in with a large sinus on the upper and outer part of the left thigh extending upwards, but not leading to necrosed bone.
19th Feb., 1868.	5	Juggessur,	,,	Sloughing ulcer of the leg.	Ditto.	....	The ulcer is now granulating, all the sloughs having separated.

24th Feb., 1868.	6	Nutto,	,,	Incised wound of the forearm.	Ditto.	....	There is slight suppuration of the wound.
20th Jan., 1868.	7	TroylukonauthBanerjee,	,,	Necrosis of the fibula.	Ditto.	....	Sequestrum removed on the 8th February, and since then patient doing well.
11th Oct., 1867.	8	Kadernauth Doss,	,,	Chronic ulcer about the elbow.	Ditto.	....	Excision of the elbow performed on the 25th October, and the patient doing well at present.
5th Jan., 1868.	9	Mathoor,	,,	Hypertrophy and ulceration about the ankle.	Ditto.	....	A fish wounded his left ankle a year ago while bathing.
28th Jan., 1868.	10	Toolsee,	F	Incised wound behind the left knee.	Ditto.	....	The wound and the surrounding tissues became gangrenous; but since the application of carbolic acid, the wound is doing well. Gangrenous portions separated.
19th Feb., 1868.	11	Johorum,	,,	Polypus of the nose.	Ditto.	....	Polypus removed on the 24th February, and the incised part dressed with carbolic acid and oil. Slight suppuration in the wound.
1st Nov., 1867.	12	Kally,	,,	Hypertrophy of both labia majora.	Ditto.	....	Hypertrophied parts removed on the 17th December. The patient is very nearly well.

Date of Admission.	Number.	Names.	Sex.	Nature of Case.	Result.	Date of Result.	Remarks.
11th Oct., 1867.	13	Mrs. M. C. A.	F	Cancer of the breast.	Doing well.	....	The breast removed on the 9th December; the wound is very nearly cicatrized.
13th Jan., 1868.	14	J. N.	M	Paronychia of the right middle finger.	Ditto.	....	The finger removed on the 26th January. Patient is nearly well.
10th Feb., 1868.	15	J. W.	,,	Inguinal hernia on the left side.	Ditto.	....	Operated on the 25th February. The wounds dressed with carbolic acid and oil, after the plug was removed.
10th Jan., 1868.	16	T. T.	,,	Chronic ulcer of the left leg.	Ditto.	....	Ulcer cicatrizing; before applying the carbolic acid, liquor lyttæ had been employed.
14th Feb., 1868.	17	A. P.	,,	Stabbed wound.	Ditto.	....	Stabbed wound in the left hypochondrium.
22nd Jan., 1868.	18	T. P.	,,	Direct inguinal hernia on the left side.	Ditto.	....	Operated on the 18th February. Wounds dressed with carbolic acid and oil after the removal of the plug.

28th Feb., 1868.	19	Gopaul Kahar,	,,	Contused wound on the head.	Ditto.	....	
9th Dec., 1867.	20	Shaik Kadu,	,,	Lacerated wound behind the right heel.	Ditto.	....	Came in with a large lacerated wound behind the heel, caused by the fall of a bar of iron. The tendo Achilles was divided and the os calcis fractured.
20th Dec., 1867.	21	Shaik Omur,	,,	Scrotal tumour.	Ditto.	....	Tumour removed on 9th January, 1868, and the patient very nearly well.
30th Dec., 1867.	22	Mohendronauth,	,,	Adhesion of the arm to the side of the chest.	Ditto.	....	Result of a burn; cicatrix dissected out the 20th January.
24th Jan., 1868.	23	W. W.	,,	Inguinal hernia on the right side.	Ditto.	....	Operated on the 27th January, 1868. Patient doing well.
8th Jan., 1868.	24	Azim,	,,	Syphilitic periostitis.	Ditto.	....	Abscess opened, notwithstanding the use of potas. iodid. and the application of liquor lyttæ.
20th Dec., 1867.	25	Jadoo Doss,	,,	Scrotal tumour.	Ditto.	....	Tumour removed on the 26th of December; the wound cicatrized rapidly.
24th Feb., 1868.	26	Ramessur,	,,	Ditto.	Ditto.	....	Tumour removed on the 2nd March, weighing 15lbs. 15oz.

Carbolic acid is used in various ways. The pure acid is sometimes applied at once to the surface of a wound, which it not only protects against contamination, but guards against any possible septic absorption, by congelating the albuminous fluids and blood, and thus plugging the open vessels. As an oleate or glycerate, *i.e.*, one part of the strong acid to four or five of oil or glycerine, it is most frequently used for ordinary dressing. Professor Lister also applies it in the form of a paste. As a lotion, in the proportion of one to four drams to a pint, it is an excellent stimulant, detergent, and antiseptic wash. The paste we have not used here.

The result in these cases has been so favourable, so different from what we have been accustomed to, so exactly what we might expect, if the theory of M. Pasteur and Mr. Lister's application of it be true, that I think the conclusion is inevitable, that we have at our disposal a new and powerful auxiliary in the treatment of disease. It seems to have inspired equal confidence in Europe, and appears to be freely used in most large metropolitan and provincial hospitals in Great Britain. I trust it will fulfil the great expectations it has raised, and that it may be freely used, not only in hospitals as a preventive of disease, but wherever large numbers of men are crowded together, as a preservative from those septic conditions which there is too much reason to believe cause mischief to wounds and injuries, and are largely concerned in the production and spread of zymotic disease.

The following is an abstract of some of the most important cases that have been treated with carbolic acid in my wards, since its introduction into the practice of this hospital :—

Five amputations, of which four recovered and one died, the death in this case occurring from pyæmic symptoms in an enfeebled constitution; the operation was an amputation of the foot. Six cases of compound fracture, all recovered; four of these were of the lower extremity and were very severe. In these, perhaps more than in any other cases, the benefit of the carbolic acid was shown. Of wounds and surgical operations,

including the removal of scrotal and other tumours, there have been forty-three cases; twenty-one of these resulted as follows:—seventeen were cured or relieved, and four died. There are twenty-two cases still under treatment, and they are for the most part doing well. Of abscesses, ulcers, sloughing sores, &c., there have been eleven well-marked cases; six were discharged cured, one died, and the remainder are doing well under treatment.

There is not much in this abstract, perhaps, to convey definitive proof of the beneficial results of carbolic acid; but to the surgeons who treated and watched the cases, its good effects were very apparent, and the circumstances of each have impressed them with the most satisfactory evidence of its value. It was frequently obvious that, just at a point in its progress where the supervention of unfavourable symptoms was dreaded, the aspect of a case became favourable, when former experience would have led them to anticipate the reverse; and the impression left on their minds, certainly on mine, is that they have found a valuable auxiliary in the treatment of surgical disease. I shall read you one or two cases more in detail, illustrative of the action of carbolic acid, and those who have had experience of such cases will be able to form an opinion on the subject for themselves.

Case 1.

Gunshot Fracture of the Femur.

Woozir Ally, aged 25 years, admitted into the Second Surgeon's Ward, 11th February, 1868, with compound comminuted fracture of the right femur, at the junction of the middle with the lower third, caused by a bullet wound. A splinter of the femur, about 2½ inches long, and 1 broad, was removed. Wound dressed with carbolic acid and oil, and the leg and thigh put on a long splint. For the first few days after the accident, the patient suffered from attacks of fever, with the pulse at 128, and temperature 103°, but there were no rigors.

April 20th.—At present the patient is doing well; pulse on

an average 100. Temperature 103°. Tongue clean. Wound contracting with slight discharge of healthy pus. On the 12th May another small piece of bone separated. I am indebted to Dr. Partridge for this important case.

Case 2.

Compound Fracture of the Leg.

Joomun Khan, aged 36 years, Mahomedan, Police Sowar, was admitted into Dr. Partridge's Ward, on the 16th of July, 1867, having sustained a compound fracture of the right leg, by a fall from his horse. A lacerated wound communicated with the fracture. The tibia was denuded of its periosteum to the extent of about an inch above and below the fracture. There was a good deal of bleeding; and the ends of the bones were considerably displaced.

On admission the fracture was reduced, and side-splints were applied to the leg. The wound was dressed with carbolic acid, after the bleeding had ceased. On the fourth day after admission, a MacIntyre splint was applied. There was considerable suppuration about the seat of fracture, and superficial sloughing attended with fever for about a fortnight after admission: carbolic acid dressing was continued. On the 29th July a piece of bone, about two inches long, was removed from the wound. Sloughs gradually separated, and the wound assumed a healthy aspect. There was ulceration in different parts of the leg from the pressure of the splint. A piece of bone, about an inch long, was removed on the 21st of August from the upper fractured end; and on the 22nd September, a piece, about two inches long, from the lower fractured end; several small pieces of bone exfoliated subsequently. By the 21st October the wound over the fracture was about the size of an eight anna bit; the bed-sore and ulcers on other parts of the same leg were healing, and the fracture was firmer.

On the 10th January, 1868, the ulcer over the fracture had quite healed, and the union of the fracture was firm.

On the 6th March the fracture was quite firm; there were superficial ulcers in three or four places, brought on originally by pressure of the splint. The patient in very weak health. He died afterwards of diarrhœa, having recovered from the fracture; but being much reduced by long confinement, he sank under the exhaustion of an attack of diarrhœa. The wounds were dressed throughout with carbolic acid mixed with linseed oil, in the proportion of acid ʒj. to oil ʒiv.

Case 3.

Compound Fracture of the Leg.

Prankissen Mullik, aged 14 years, admitted 1st September, 1867, with compound fracture of the right tibia and fibula, about two inches above the ankle, caused by a fall from a height of about ten feet, two hours before admission. About two inches of the upper fragment of the tibia protruded through a large lacerated wound, with the periosteum stripped off here and there. The wounds were dressed with carbolic acid and oil, and the leg put on MacIntyre's splint. The patient did very well throughout the whole period of the treatment; there was no constitutional disturbance of any kind, except slight fever, for the first three or four days after admission; after which the wound, from which there was hardly any suppuration, began to heal.

By the 5th November the union was quite firm. Wound entirely healed; he could walk pretty well. No shortening. On the 15th discharged: carbolic acid and oil dressing had been applied throughout the whole period.

Case 4.

Compound Fracture of the Leg; Amputation.

Nowbuth Khalasee, aged 25 years, admitted 21st October, 1867, with compound comminuted fracture of both the bones of the left leg, about the middle, caused by the limb being run over by the wheel of a railway engine, an hour before admission. The bones were smashed into pieces, splinters projecting in

all directions, with extensive laceration of the muscles, vessels, &c. &c.

Immediate amputation (one hour after the accident) of the leg, three inches below the tuberosity, was performed by Dr. Fayrer's modified circular method. The patient became very low on the operating table. The cut ends of the bones were dressed with carbolic acid. The surface of the wound was sponged with the same, and the whole wound dressed in like manner. Dressing changed next day. He began to gain strength rapidly, and the wound to heal, without much suppuration.

On the 3rd January, the stump was quite healed, and the general health was good. He remained in hospital till the wound had cicatrized, when he was discharged with a wooden leg.

Case 5.

Incised Wound of the Knee-joint.

A native lady, aged about 30 years, of healthy constitution, and in the eighth month of pregnancy, had had the cavity of the left knee-joint opened by an incision made with the view of evacuating a collection of fluid, the result of inflammatory action. I saw her some days after the injury had been inflicted. There was considerable constitutional disturbance due to the formation of an enormous popliteal abscess, as well as to the irritation from the wound of the joint. A probe passed freely into the joint, and touched the surfaces of the bones. The abscess in the popliteal space was opened, and about twenty ounces of pus evacuated. The wounds were then dressed with the glycerate, *i.e.*, carbolic acid one part, glycerine three parts, and the limb was placed on a splint. She never had after this, whilst under my observation, a single untoward symptom, and rapidly recovered. The wounds healed; and within a month she returned to her home, with the knee joint slightly flexed, but with no anchylosis, and evidently there was no mischief in the cartilages.

This is a most unusual result of a wound of the knee-joint,

and the favourable termination may, I think, to a great extent be attributed to the antiseptic.

I have said that, to a certain extent, I believe the general health of the majority of our patients is compromised by malaria, that certain tendencies to disease are thereby impressed, and that the phenomena of other disordered conditions are modified and characterised by its presence. I probably express no novel view of this matter, when I say that an ague fit is perhaps one of the least frequent forms in which malaria expresses itself, and that a thousand other symptoms, affecting chiefly the nervous and the vascular systems, indicate its operation as distinctly as the best marked quotidian or tertian could do. It is certainly within my experience that persons may be, so to speak, saturated with malaria, and yet never have had fever, until the change of climate, or the sea voyage, that was to renovate the broken-down general health, developed it, much to the astonishment of the sufferer; or the accident that to another would have proved slight, gave rise to an attack of fever, which prostrated the patient completely. I think that I have remarked the influence of malaria in another instance, which must be within the experience of almost every surgeon who has practised in Bengal, and that is, the great tendency to fever of a paroxysmal character after catheterism—a condition which, when developed, may be called *urethral fever*.

It is well known to surgeons everywhere that the passage of a bougie or catheter is sometimes followed by constitutional disturbance very similar to an attack of ague, viz., rigors, succeeded by pyrexia and profuse sweating; or, if the actual ague fit be absent, there is often a state of lassitude, with muscular pains and debility, loss of appetite, nervous exhaustion, turbid urine (showing elimination by the kidneys of phosphates, or nitrogenous detritus), and a low febrile condition, with a dry tongue and herpetic eruptions about the lips. This condition may last for some days, and finally pass away, leaving the patient weak, and broken down in physical as well as mental

strength. These symptoms may occur even when there is no urethral disease, after the passage of an instrument for the purpose of relieving or exploring the bladder, and they may assume any intensity, from that of a simple transient feeling of *malaise* to the most deadly paroxysm of fever. I say may, because it is not always that any constitutional disturbance follows catheterism, and fortunately in a large number of cases no such untoward result occurs. In certain individuals—nor is it possible, that I am aware of, to say in whom it will happen—but in those who suffer from stricture of the urethra, it appears that the proclivity is most marked, and in such cases the passage of an instrument may give rise to constitutional disturbance of the most serious character, especially, as I am inclined to believe, in the malarious climate of Bengal.

It was supposed by Sédillot that the morbid changes occurring in cases of ordinary urethral fever were due to septic absorption, and that they only occurred when the mucous membrane of the urethra had been lacerated in the operation. But it can hardly be so, for they are not confined to cases where the urethra has been injured; nor are they frequently found to occur after the most severe operation on the urethra through the perineum. It is, I believe, chiefly in cases of old stricture that the most formidable symptoms arise; and happily it is rare that the passage of a bougie or catheter is followed in ordinary cases by anything worse than an ague-like paroxysm. But in certain old strictures, where there is a combination of organic obstruction with spasm, and probably a thickened bladder, with kidneys and prostate in an incipient state of disease, we must bear in mind this morbid tendency, and not only endeavour to prepare the patient by rest, sedatives, and other appropriate treatment, but effect the dilatation as gently and carefully as possible, when we commence the treatment. The pathological condition under consideration has been explained to be due either to reflex action from the urethra through the nerve centres or to septic absorption from the lacerated mucous membrane of the urethra. I cannot, as I have said, altogether accept the latter

explanation, although I think it possible that in some cases it may be true, for the results are generally quite disproportionate to the injury; and in the most striking examples the symptoms of constitutional disturbance follow too rapidly after the operation to admit of such an explanation. I should rather attribute it to reflex action through the nervous system, and it is perhaps one of the best examples of what our predecessors called "constitutional irritation," expressed in one case by the mildest, in another by the severest disturbance, and even death. Though the precise method or channel by which this is brought about may not be apparent, it is not more difficult to comprehend than that tetanic spasm of the muscles of the jaws should follow the insertion of a thorn into the finger, convulsions attend the cutting of an infant's tooth, or hæmorrhoids give rise to pain in the sole of the foot.

The true cause of this urethral fever is to be sought for in common with those that explain the phenomena of fever generally, such as the cold, the shivering, and the hot fits; and however the first impression may be produced, whether by retention in the blood, or the absorption into it of some morbid material, or by the irritation of certain peripheral nerve filaments and reflex action through the nerve centres, thus affecting the whole economy, the phenomena and results are similar. I have selected two cases as strikingly illustrative of the worst consequences of this accident. Although such are fortunately not frequent, they serve to show what may occur in the treatment of stricture, and are the severest expressions of a condition which, as in other fevers, may be, in one instance, a mere chill, in another a rigor that precedes death.

Case 1.

A healthy-looking Englishman, J. E. N., aged 38 years, cook of a ship, was admitted 14th June, 1867, with irritable organic stricture of the urethra. He was in the First Surgeon's Ward of Medical College Hospital about two years ago, for the same complaint, and was discharged relieved, after three months'

treatment. The stricture was of a very irritable nature, and had great tendency to contract after dilatation. No special treatment was resorted to, except slow dilatation by the bougie; division of the stricture was proposed as the only chance of giving permanent relief, but not submitted to. Since his discharge the urethra has contracted again. He has been in another hospital for some time, where, he says, the stricture was split by a dilator, but without permanent benefit. The operation was not attended, however, with much constitutional disturbance. He was in a Liverpool hospital also a few months ago for stricture of the urethra, where instruments were passed. He has been in the habit of passing No. 6 catheter himself when he has felt difficulty in micturating.

15*th*.—The stricture was dilated with Holt's dilator. No. 12 catheter was passed afterwards, and urine withdrawn. There was slight difficulty in introducing the catheter, on account of the spasm. Quinæ, gr. v.; tr. opii, min. xxv. immediately. Fomentations every four hours.

6 P.M.—Has passed only a few drops of water since the operation, with much straining. Bladder not distended, slight oozing of blood from the urethra. Has considerable pain and fever, which was preceded by a rigor. Catheterism was tried gently, but not successfully, on account of spasm. Diaphoretic mixture, with tr. hyoscyami, every three hours; opium suppository.

16*th*.—Has, with much straining, succeeded in passing a few drops of urine. Complaining of pain all over the abdomen, which is tense, hard, and tympanitic. Tongue dryish and furred at the centre. No more bleeding from the urethra. Extremities rather cold. Pulse very weak. Can retain neither food nor medicine. A catheter was passed, but no urine found in the bladder. Ordered.—Turpentine stupes to the abdomen, and fomentations every two hours. Opium, gr. j. every three hours; castor oil and turpentine enema; mustard plaster to the abdomen; twenty leeches to the abdomen; brandy and soda-water frequently.

2 P.M.—Leeches have fallen off after drawing blood freely.

No more vomiting. Two stools. Pain in the abdomen easier. Pulse very weak. Has not made water—not drowsy. Very restless and thirsty; quite conscious up to the last. Died at 5 p.m.

Post-mortem Examination.—Urethra dissected out. There was some ecchymosis in the bulbous portion, and a small clot of extravasated blood outside it. The stricture was in front of the membranous, extending into the bulbous portion. Two old false passages led downwards to the bulb, but did not perforate it. Urethra otherwise entire. At the seat of the stricture the urethra was slightly split, but only through the mucous membrane. Small intestines somewhat congested; no peritonitis or effusion of lymph in the abdomen. Both lungs much congested, the right having two or three tubercular deposits in its apex. The bases of both œdematous and not crepitant. Heart adherent to the pericardium by old ligamentous bands. Right ventricle contained some dark fluid blood. Liver enlarged and fatty, weighing 4 lbs. 1 oz.; kidneys much congested, their capsules tearing off easily. Bladder thickened, contracted, and empty. No sign of inflammation or mischief of any kind about the bladder or in the pelvis.

Remarks.—This may be regarded, at first sight, as death caused by uræmia. But the symptoms were not such as to justify the supposition. The fever and great prostration after it, with the tympanitic state of the abdomen, made me think at first that some injury had been done to the peritoneum, and that peritonitis was the result. But the post-mortem showed that such was not the case, and that there was nothing whatever in the urethra to account for this condition, excepting through the medium of the nervous system. The perfect consciousness and clearness of intellect until the moment of death, are also opposed to the supposition that death was caused by uræmia.

Remarks by Dr. Colles on the Post-mortem Examination.—No peritonitis found. The heart united to the pericardium by old adhesions; its muscular tissue healthy; no fatty degeneration; valves healthy. Lungs somewhat congested. Kidneys highly engorged with blood; the tubules in the cortical portion full

of imperfectly formed epithelial scales. Bladder healthy but somewhat thickened. Urethra contains two false passages, just in front of the prostate, going a little way beneath the mucous membrane. Nearer the bladder is seen the superficial rupture of the mucous membrane caused by the dilatation.

Case 2.

P. H. R., a healthy-looking East Indian trader, aged 41 years, was admitted on the 21st June, 1867, with stricture of the urethra of 13 years' duration. He passed water formerly in a very fine stream, but for the last four years only in drops; it dribbles day and night, soiling his dress. Never had complete retention of urine; catheterism was once tried about two years ago unsuccessfully. Had no perineal abscess or fistula. On the day of his admission, catheterism was tried, but the instrument could not be introduced into the bladder. The stricture was hard, and occupied the bulbous and the front of the membranous portions of the urethra.

6 P.M.—Has had fever since 2 p.m. preceded by a rigor. Passed water more freely; slight bleeding from the urethra. Effervescing draught, with tincture of hyoscyamus, every three hours.

22*nd*.—Fever still continuing. Pulse 96. Tongue moist. Bleeding from the urethra has stopped. Diaphoretic mixture ℥j.; potas. bicarb. gr. x. every three hours; milk, sago and soup; iced water.

23*rd*.—Two stools. No fever. Slept well. No thirst. Feels weak, otherwise better in every respect. No. 5 catheter passed into the bladder, commencing with No. 2. Quinæ, gr. x.; tr. opii. min. xxv. statim.

24*th*.—Has had fever since last night, but no rigors. Passing urine as before in drops.

6 P.M.—No fever now. Had a rigor. Bowels open. Quinæ, gr. v. every four hours.

25*th*.—Had shivering again in the night. Pulse 100 full. Two stools. Some pain in the perineum, no swelling. Tongue

clean. Continue diaphoretic mixture; fomentations to the perineum.

26*th*.—Pulse 100. Temperature 102°. Fever still continuing. No more shivering. One stool. Continue medicine.

5 P.M.—Passed four thin stools. Complains of a griping pain. Tr. opii min. xxx. statim.

7 P.M.—Pulse 108, very weak. Temperature 102°. Vomited three times. Tongue clean and moist. Has taken very little food. Passed water. Omit all medicines. Mustard plaster over the stomach; beef tea and brandy, half an ounce of each every hour; soda-water and ice.

27*th*.—Two stools in the night, passed in the bed clothes. Tongue warm and moist. No vomiting. Made urine. Extremities cold. Pulse imperceptible at the wrist. Carotid 140. Respirations 52. Temperature in axilla 102°; hand 92°; mouth 102°. Mustard plaster over the heart; brandy ʒ iv.; ether chloric, min. xx.; spirit ammon. aromatic. min. x. every half-hour.

4 P.M.—Pulse in the carotid 132. At the wrist *nil*. Temperature 103°. Respirations 48. Two stools, consisting of a slight brownish fluid. No more vomiting. Extremities cold. No reaction yet. Eyes somewhat congested. Occasionally delirious, but for the most part conscious until just before death. Died at midnight.

Post-mortem Examination.—Coats of the bladder hypertrophied. Its inner surface much congested. Ureters dilated and thickened. Kidneys partially congested and fatty. The stricture was in front of the membranous portion of urethra. Lungs healthy, but hypostatically congested. There were no clots in the right cavities of the heart. Some atheromatous deposit on the tricuspid and mitral valves. Slight suppuration in the bulbous portion of the urethra.

Notes on the Post-mortem Examination by Dr. Colles.—The stricture is seen just at the bulb; there is slight laceration of the mucous membrane, with a shallow old false passage which existed on admission. The bladder is thickened and sacculated; its mucous membrane, full of ridges and pits, being

of a dark purple colour from intense congestion, with patches of extravasation of blood. Both ureters slightly dilated. Kidneys: cortical structure pale. On pressing the papillæ of the tubular portion, some purulent-looking fluid escapes, consisting wholly of large flattened irregular epithelial cells, with large nuclei and nucleoli, and, mixed with these, bodies which may be either free nuclei or pus cells. The structure of the cortical portion shows numerous epithelial cells, mixed with granules, singly or in masses. The liver is pale, rather friable, and with the lobules ill-marked. The cells under the microscope are seen to be full of fat globules (which are also scattered through the parenchyma), with their nuclei indistinct. The muscular fibres of the heart are not fatty.

Remarks.—This was a case of urethral fever induced in a strong, healthy-looking man by the simple passage of an instrument. There was no injury. There was evidence neither of pyæmia nor of embolism. Death occurred as in the collapse of any exhaustive disease. It is true that he had diarrhœa the last two days of his life, but this was, I believe, due to the same cause as the collapse generally, and came on when death was approaching.

In neither of these cases was there any injury done to the urethra that could be considered sufficient in itself to cause death, nor were there any indications of pyæmia or embolism. In the one case there was a slight tear in the urethra where the stricture had been split, and in the other slight suppuration about the seat of dilatation, but nowhere were there any inflammatory changes to suggest blood-poisoning or embolism. It is true that both were men more advanced in life than their ages of thirty-eight and forty-one implied, and that in the one case the liver, and in the other the kidneys, were somewhat fatty; but there was nothing in either that indicated, before the operation was performed, any structural or organic disease, and they both were quite as healthy and strong in appearance as the majority of persons who undergo surgical treatment. In neither case was any violence used in dilating the stricture, nor

was there at the time anything to indicate suffering or unusual injury; far less so, indeed, than we frequently see inflicted in the dilatation of obstinate strictures that slowly yield to treatment, and are unattended by constitutional disturbance.

It is evident that catheterism has a tendency to induce this condition of fever through reflex action, and that it may do so, in certain constitutions, especially where old strictures exist in malarious persons, if the viscera be in the least diseased.

I have not recorded any other cases, as it seems to me that these sufficiently illustrate the most serious consequences that may result from catheterism. It is almost our daily experience that the operation is followed by a rigor. In some cases it is so by a severe attack of fever, and I can recall to my memory several instances in which it was succeeded by serious internal changes; in one an abscess in the wrist-joint, in another in the eyeball, and in a third in the liver. Can we in any case predicate that such constitutional mischief will follow? I fear not. But it behoves the surgeon in all cases to be most careful to use the instrument with as little violence and with as much patience as possible, and to avoid, if he can, inflicting injury on the lining membrane of the urethra. In cases of stricture, and especially those that are old and irritable, rest for some time before and after the passage of the instrument, with the use of antiperiodics and sedatives, may be productive of much benefit. Above all, if the first attempt at catheterism have developed the tendency to febrile disturbance, it is right to wait until that has entirely passed away, before any attempt be resumed to pass the instrument. Patience is most essential, and no urgency on the patient's part should induce the surgeon to force the dilatation, which is more likely to be followed by delay than speed. The increase in size of the instruments passed should be gradual, a new number every second or third day. "Festina lente" should be the motto to guide us in such cases, and we may rest assured it will prove to be the best economy of time as well as of labour.

I have yet another subject to which I wish to request your

attention, and I will do it as briefly as possible, considering its importance. In the year 1862 I introduced into my wards a new and, as it seemed to me, a more simple method of operating for the *radical cure of hernia*. I had previously practised that which is known as Wütz er's, or some of its modifications, such as that by Mr. Redfern Davis, with some success; but owing to the complicated apparatus, and the tedium of the treatment, I was led to search for something that might prove as efficacious and be at the same time more simple. I was indebted for the idea to Mr. Syme's plan of treating hernia, and that which I have adopted and now practise is a modification of his method. I had, up to the end of 1867, operated on 67 cases in the hospital, and have had several since. Some of these cases are still under treatment, and those patients who are capable of being brought before the meeting I submit for your inspection, that you may have an opportunity of seeing the treatment in this stage. I also hope to show you certain cases that have been operated on some time ago, and have thus satisfactorily solved the doubtful question whether the operation which at first is successful proves permanent in its good results.

The object of the operation is to close or so far contract the opening in the abdominal wall on its inner peritoneal aspect that the protrusion of the hernia shall be limited, or altogether prevented; and the mode in which this is accomplished is by procuring adhesion or contraction of the margin of the opening, whether at the internal ring in oblique inguinal hernia, or of the direct opening in the other form. I believe that unless the operation effect this purpose, it is not likely to be successful; and as it is not possible to make certain of always accomplishing this end, a proportion of cases will fail. I find that, out of the 67 cases operated on in the hospital, 11 failed altogether, and 9 were only relieved; that is, though not successful altogether, they yet were so much improved that the hernia was controllable by a truss. One case only died, and in this instance death was not due to peritonitis, but to erysipelas affecting the thorax; so that, although no doubt death was indirectly due to the opera-

tion, it was not the immediate result of it. Indeed, I know of no operation of importance attended with so little danger. Wound of the peritoneum does not necessarily involve dangerous consequences. More than once I have injured it by puncture, as proved by the free discharge of peritoneal fluid, but no ill result followed. In one case related in the "Indian Annals," this happened; the patient recovered, and wrote to me from Ceylon some months after to say that he was perfectly well. The recoveries in nearly all the cases have been rapid; the proportion of success is most gratifying; and when we consider the importance of a favourable result, it is impossible not to feel satisfied that so simple a surgical proceeding should suffice so often to ensure it.

I have placed the instruments with which I operate on the table for your inspection, and you will see that they are very simple;—a plug of wood, with two ligatures, and a curved needle to pass the ligatures through the abdominal wall with a second small piece of wood to knot the ligatures over, constitute the apparatus. The method of performing the operation is simple, but it requires some care and confidence for its effective completion. The fore-finger of the left hand oiled, is inserted into the inguinal canal, and the scrotum invaginated is pushed before it up to the internal ring with firm and decided pressure. One ligature, strong and well waxed, is then threaded in the needle, the point of which is insinuated along the palmar aspect of the finger on its radial side, until it has reached the extreme apex of the invagination. It is then forced through the abdominal parietes, and appears on a line with the anterior superior spine of the ilium, about $1\frac{1}{2}$ or 2 inches internal to it. The needle is then unthreaded and withdrawn, to be threaded with the second ligature, and again introduced, this time on the other side of the finger, to be pushed through the abdominal wall as before—this time transfixing at a short distance from the point where it first pierced, but emerging through the same opening in the integument. The needle is again unthreaded and withdrawn. The plug is now pulled into the canal, its

apex being tied firmly against the apex of the invagination, and the threads firmly knotted over the small piece of wood. The operation is thus completed.

The plug is left *in situ* for three or four days or more, until pus appears to flow freely from beside the ligatures. These are then cut, and the plug withdrawn. The discharge is gently pressed out, a pad and spika bandage are applied, and the patient is kept in bed, and cautioned not to strain at stool for some days. As soon as the wounds have cicatrized a truss may be applied, which should be worn for some months, especially when any exertion is made; it may gradually be left off when the tissues have become firmly consolidated. The time occupied in treatment varies from a month to six weeks in ordinary cases. If there be much suppuration, and that has burrowed among the abdominal muscles, there may be delay, and counter openings rendered necessary, but such cases are the exception. The only one was that of a native, who was attacked with erysipelas, and died of pyæmia, the result of cellulitis.

During the period of the insertion of the plug the bowels generally remain confined, and indeed for several days after its removal; should they act, the patient must be warned against efforts at straining.

I find, by referring to the records of my wards, that I have, up to the end of 1867, operated sixty-seven times. In 1862 I had fifteen cases, of which ten succeeded, one was relieved, and four failed. In 1863 eight cases, of which five were successful, two were only relieved, and one failed. In 1864 eight cases, of which six were successful, two relieved. In 1865 fourteen cases, of which ten were successful, three relieved, one failed. In 1866 seven cases, five successful, two failed. In 1867 fifteen cases, of which ten were successful, one was relieved, three failed, and one died.

The fatal case was that of Ram Coomar Doss, who was admitted on the 27th February, 1867, with inguinal hernia of the left side, operated on the 5th March, and died on the 26th, of erysipelas. Extensive suppuration was set up between

the muscles. Erysipelas affected the chest, the cellular membrane sloughed, and free incisions were made to expose the sloughy tissues. After death consolidation was found of the two lower lobes of the right lung, and there was a large pyæmic patch in the upper lobe. There were no cardiac coagula.

There was thus a total of sixty-seven cases, of which forty-six were apparently successful; nine were relieved; eleven failed altogether, and one died.

Before discharging any of those returned as cured, they were submitted to the severest tests—lifting weights, climbing up a pole, jumping, running up and down-stairs without a truss; and unless they were able to bear these tests they were not considered as cured. In many of them I fear the hernia may have returned afterwards. But I have seen some after a long interval, and am happy to say there can be no doubt that, in their cases, the improvement was permanent.

I have placed on the table a specimen illustrative of the mode in which the occlusion is effected. It was derived from the case of a French sailor, who had been operated on some months before he met with an accident, which caused his death. You will see that the internal ring is perfectly closed. I have also brought into the room several patients who are recovering from the operation, and so far they promise to do well. I have also some persons who were operated on at different periods of time past, and you will be able to judge by them how far we may, in favourable cases, hope to succeed.

I would here repeat what I have often before stated, that I regard the operation as one of a somewhat uncertain character as to its results, but offering a sufficient prospect of success to warrant the surgeon, and justify the patient in its being attempted.

I must not detain you further, and thank you for giving me your attention so long.

ON THE PYÆMIA OF OSTEO-MYELITIS.

Dr. Braidwood has recently published a treatise on Pyæmia,* which is meant to be an exhaustive one, and its merits have been recognised by the Sir Astley Cooper Prize for 1868 having been conferred on its talented author. As the work of a young man, whose experience is as yet necessarily limited, it is most creditable, and full of promise. I have no intention of reviewing the book, but have merely to notice certain passages in which, referring to my views on the subject of osteo-myelitis, I think he has imperfectly represented what I have said.

In his historical review of the subject of pyæmia, he refers to the opinions of all those who have recorded any since the days of Hippocrates, but he has not always, I think, succeeded in giving their real point. For example, he disposes of Dr. Chevers by saying that "Chevers lays great stress on previous abdominal complications in predisposing to pyæmia." Is this brief sentence to be taken as representing a summary of the views and opinions of one who, upwards of twenty-five years ago, threw more light on the causes of death after surgical operations than has been shed on the subject by any individual writer since, and who laid the foundation of a branch of surgical pathology that has not been surpassed in interest or importance? Of Sir James Simpson (who by the way takes freely from Chevers all that he has to say

* "On Pyæmia, or Suppurative Fever." London, 1868.

as expressive of his contribution to our knowledge of pyæmia), we read—"Sir J. Y. Simpson objects to the term pyæmia, and prefers the name 'surgical fever.' This state of the surgical patient he considers to be generically, if not specifically, the same as puerperal fever in the child-bed mother. He further proves the analogy between those two diseases, as regards their anatomical conditions, pathological lesions, symptoms, and progress. Neither of them, he says, can be excited artificially by the common causes of inflammation; 'but they are developed by specific causes,' and allied to them both is erysipelas. Both he ascribes to a vitiated or diseased condition of the general circulating fluid. 'This doctrine,' he remarks, 'enables us to perceive how in one set of cases, or one epidemic of puerperal fever, the febrile effect or element may be more marked than the inflammatory; and how in others, and those generally the most amenable to treatment, the inflammatory effect or element may be more marked or prominent than the febrile.'"

Of myself he says, "Dr. Fayrer, from his observations, concludes that 'osteo-myelitis, an acute and diffuse inflammation, a sort of erysipelatous form, is a very frequent sort of pyæmia;'" and again, "Of late, the origin of suppurative fever from osteo-myelitis has been promulgated by Professor Fayrer, of Calcutta; but in support of this theory a very small amount of evidence is producible." Again, quoting my remarks on amputation in osteo-myelitis, he says: "Looking at Professor Fayrer's data, which are our guides to amputation, they are most unreliable;" and so on. Now, I think that Dr. Braidwood must have made himself very imperfectly acquainted with what I have written on this subject, and with the data, which he considers so unreliable, or he could hardly have expressed himself so decidedly. He evidently admits the existence of such a pathological condition as osteo-myelitis, and has described some cases which were clearly of this nature. He recognises its dangers, but he appears to regard it not as the cause, but the consequence of pyæmia, placing it in the same category with other pathological changes significant of that morbid state. It is here I join issue

with him, by stating that the pyæmia, blood-poisoning, septicæmia, surgical fever, call it which you will, is frequently due to and caused by suppuration occurring in the cancellated texture of bone, after injuries, wounds, or surgical operations, when, in all other respects, the patient is doing well. Osteo-myelitis, I assert, is the precursor and cause, and not the result or sequence of the dangerous pyæmic symptoms, which, if not early recognised and promptly dealt with, will cause death. It is not to be regarded as merely one of a series of indications of blood-poisoning, but as an original condition of disease attended with the greatest danger to life, and one which, if observed early, and removed by ablation of the affected bone, may be followed by recovery. I could give no better illustration of this than that of the case of the Mahommedan, Sheikh Ashgur, who, when suffering from the most aggravated pyæmic symptoms from osteo-myelitis of the femur, rapidly recovered when the affected bone was removed by amputation at the hip.*

Of course, if this interference be not exercised in time, the pyæmic condition will rapidly advance beyond hope of recovery, and amputation will then be too late to save life. It is the importance of knowing and early recognising this that I have endeavoured to demonstrate in what I have written. I have more than once had the gratification of seeing a successful issue when amputation was early resorted to, in cases where, if the osteo-myelitis had been merely expressive of a general pyæmic condition, the operation was not likely to have been of any service.

I am perfectly aware that diffused suppuration of a bone does not take place generally, or as a natural consequence of wound or injury; and when it occurs it is, no doubt, expressive of some defect of either the patient or of the conditions in which he is placed, or both. But I regard this local expression of an imperfect condition of the health as very different from that which is generally understood by the vague term pyæmia, one

* "Clinical Surgery in India," p. 609.

expressive of general blood poisoning, and which presents itself in its most dangerous form if the local mischief of the bone be not removed. This untoward result is fortunately not of very general occurrence, but it is so liable to occur occasionally that due stress should be laid on its importance. It is, no doubt, to be classed among the large group of evil results which are, to a great extent, caused by what has been recently called "Hospitalism," and it sometimes appears almost in an epidemic form; but it may and does occur sporadically, under the most favourable conditions; and I have more than once met with it in private houses and in healthy subjects, when timely interference by amputation has preserved life that was rapidly succumbing under the most marked pyæmic symptoms. At the time I wrote my attention was directed, and I gave much thought and study to the disease, as it was present in almost an epidemic form in the Medical College Hospital; and both I and my colleagues found that it frequently occurred after the simplest operations in which bone was interfered with. Such also has been, to a certain extent, the experience of M. Jules Roux, who advocated, as I have done, amputation through a joint, to avoid, in the first place, leaving any of the bone affected, and in the second, to obviate the danger of what has been called "traumatism" of the next bone.

Of late the opportunities of continuing my observations on osteo-myelitis have, I am happy to say, considerably diminished, for it has been comparatively absent from the wards, and we have not at present the same dread of mischief in the bones that we used to have; but pyæmia from other sources still continues, and the pathological changes expressive of that form of blood poisoning are not less frequently presented for study here than they are in other hospitals. As to the cause of these changes, I do not now offer any opinion further than that they have followed hygienic improvements in the hospital and its surroundings.

I must, therefore, repeat my opinion that, whilst fully recognising many other sources of blood poisoning, and admitting

the probability of the cancellated tissue of bones sharing with other tissues in morbid changes the consequence of pyæmia, I regard osteo-myelitis as a distinct, original, and dangerous form of disease liable to occur under peculiar circumstances, after wounds, injuries, and operations, nay even idiopathically, and productive of the most deadly form of surgical fever—resulting in disintegration or local death, with a low form of so-called inflammation in the viscera, cavities, and tissues generally of the body; but that, if recognised early, and the diseased bone removed, recovery may, in favourable cases, occur. The symptomatology and treatment of osteo-myelitis, I have already fully discussed in my "Clinical Surgery in India." I see no reason to alter the views there expressed, nor have I anything to add on this subject.

As Dr. Braidwood has criticised my opinions on this cause of blood poisoning, and has gone deeply into the pathology of pyæmic changes, I am somewhat surprised that he has not commented on what I have said respecting the so-called abscesses in the lungs, liver, and other viscera. Of these, I have expressed my conviction that they are not abscesses at all, but that they are local deaths, or gangrene of portions of tissue caused by toxæmia or embolism. That collections of pus, but more frequently of puriform matter, are found in these situations, I freely admit, but these are the consequences of the presence of the quasi-foreign body—the dead tissue, around which, when life is prolonged, suppuration is set up, as when a thorn is imbedded in the flesh, or as in the case of the core of a boil, for the purpose of extrusion of the foreign body or dead tissue from connection with the surrounding living tissue. I would adduce in proof of this the frequent presence of one of these so-called abscesses at the margin of the lung or liver, where a portion, frequently of an irregular triangular form, is dead, broken down and fetid, surrounded with a layer of condensed and congested tissue, from which, by a process of ulcerative and liquefactive degeneration, the dead is separated from the living part. In some cases of pyæmia, the local has so long preceded somatic

death, that collections of purulent or puriform fluid have had time to take place; but death often overtakes the subject of the disease before any such change can occur. It can hardly, I think, be correct to speak of these, as Dr. Braidwood describes them, as abscesses, or, if they be so called, the true nature and origin of the purulent collections should be indicated. I do not include in this category the abscesses which are frequently found in the areolar tissue in other situations, whether internal or external, and which are no doubt due to a condition which is frequently idiopathic, and not in any way due to either wound or injury. The form of pyæmia called idiopathic is by no means uncommon in Calcutta.

There is also another result of blood poisoning, on which I have frequently remarked in communications to the "Indian Annals" and other periodicals, viz., the rapid formation of firm fibrinous coagula in the right side of the heart, and the consequent apnœa, which in many cases proves rapidly fatal. I do not now offer any opinion on the cause or nature of the condition of the blood, which occasionally in surgical patients as well as in those suffering from exhaustive diseases determines the formation of these coagula, which either destroy life, or, having endangered it, produce subsequent evidence of thrombosis and embolism. I am quite aware that it has been stated that these coagula form either during dissolution or in the advanced stage of diseases (as croup, diphtheria, cholera, &c.), which is the precursor of death, or as one of the latest vital changes in pyæmia itself; but such is not, I am satisfied, always the case. Over and over again I have seen patients who were not in this condition, and for whom there was every reason to prognosticate recovery, with a healthy, or at all events not unhealthy looking granulating surface, after a surgical operation or wound, overwhelmed suddenly as it were, and carried off in a comparatively short space of time. A remarkable example of it occurred recently, in which a young man, who had sustained an injury, causing gangrene of a portion of integu-

ment, was suddenly attacked with all the symptoms of cardiac and pulmonary obstruction, and sank in a complete state of cardiac apnœa within a few hours. The post-mortem revealed what had been diagnosed during life, plugging of the right cavities of the heart and of the pulmonary artery with firm adherent fibrinous coagula.

I have selected from the Medical College Pathological Museum some illustrations of the pathological conditions resulting from pyæmia due to various causes, though chiefly to osteo-myelitis; and I think that a reference to these would convince Dr. Braidwood that the data on which to form an opinion are not wanting here.

Cases of Pyæmia and Osteo-myelitis.

No. 42.—Lithotomy performed 3rd September, 1864. Died from pyæmia, 19th.

Liver: right side of the right lobe at its anterior and right angle a mass of so-called abscesses and in a state of gangrene. All the abscesses communicating with one another, and about the size of walnuts. Spleen: ordinary size, congested, contains two or three so-called abscesses, the size of small shot. Left lung: lower lobe somewhat congested, but still crepitant; upper lobe healthy. Right lung: upper lobe crepitant in front, congested behind; the portion at the upper and posterior end of the fissure in a state of incipient grey hepatization. Lower lobe altogether in a state of grey hepatization; when cut into, the fluid which escapes is full of cells about half the size of blood corpuscles. Bladder: cavity small, walls greatly thickened, mucous membrane congested above, dark green below, apparently almost gangrenous, as is also the lower end of rectum.

No. 57.—Large osteo-sarcoma of the right ulna (upper end involving the olecranon) removed by Dr. Fayrer, 10th November, 1864. The bony shell of the tumour is deficient anteriorly, and so thin behind that it has been cut through in

two or three places. Within is a cavity ; the walls of the bony shell are lined with a pultaceous mass.

No. 63.—Ulna radius and wrist-joint. Amputation for osteo-myelitis 20th November, 1864, through the middle of the humerus. The space occupied by the tumour, and excised portion of the ulna, was full of pus, and surrounded by infiltrated areolar tissue. A suppurating cavity led to the wrist-joint, into which it opened, laying bare the end of the radius for about an inch. On the anterior aspect of the forearm was a large cavity corresponding to that formed by the removal of the tumour. It contained three or four ounces of fetid coffee-coloured pus full of flakes.

No. 63A.—Humerus of the same patient, who died on the 4th December of pyæmia, showing osteo-myelitis. A small portion of the lung sent with it was infiltrated with pus, besides containing numerous so-called abscesses, varying from the size of a pea to that of a pin's head.

No. 331A.—Heart of a Hindoo, æt. 30 years, who died of pyæmia eighteen days after the right femoral had been tied in Scarpa's triangle for elephantiasis of the lower third of the leg. The femoral artery and vein and the iliac veins were healthy. A minute abscess was found in each kidney. Both lungs were full of patches of dead tissue, surrounded by zones of red hepatization. The preparation shows a large ante-mortem coagulum occupying the right ventricle, and extending into the pulmonary artery and into its main branches. The clot has taken the cast of three pouches behind the sigmoid valves. The left ventricle and aorta are occupied by a smaller coagulum.

No. 105.—Osteo-myelitis of the tibia after Syme's operation performed for laceration of the foot 27th February. Secondary amputation through the thigh, 15th March. Section of the tibia showing osteo-myelitis.

No. 108.—Lungs and heart of H. D., who died 17th March, 1865, the secondary amputation being too late to prevent the occurrence of pyæmia. Both sides of the heart filled with fibrinous clots extending from the auricle to the artery. The

clot in the left auricle is very large. The clot in the left ventricle is small and rope-like, and terminates in the aorta about an inch above the sigmoid valves by a free extremity. The venæ cavæ are occupied by two clots about the size of a hazel-nut. Right lung full of patches of dead tissue, intensely congested posteriorly, and having its posterior surface smeared with greenish lymph. Sac of the right pleura contained about an ounce of purulent serum. Liver: right lobe full of large patches of the so-called pyæmic suppuration.

The right femoral vein of the same patient contained an ordinary red post-mortem clot, extending from the stump to near the junction of the profunda vein, where it became fibrinous. This portion, microscopically examined, showed a quantity of granules, some oil drops, and some cells looking like altered blood corpuscles. At the point of junction of the profunda vein there was a small quantity of pus discharged from the femoral vein, the lining membrane of which was roughened.

A branch of the portal vein, about half the size of a No. 1 catheter, close to the most disorganised part of the liver, was found occluded by a coagulum.

No. 113.—Right knee-joint of K., of the Bengal Artillery, who was shot on the inner condyle of the femur, in the attack of Dewangiri in Bhootan, and died of pyæmia in Calcutta. The ball entered the cavity of the joint on the inside, and lodged in the inner condyle, whence it was removed after the patient reached Calcutta. The aperture in the skin preserved. The bone around the ball was carious and infiltrated with pus. The interior of the joint was quite disorganised by inflammation, and contained pus, the cartilage covering the outer condyle and the back of the patella being partly absorbed, exposing the bone. The femur was almost completely detached from the soft parts by the formation of extensive abscesses. The veins of the thigh were healthy. A large pyæmic abscess had formed under the deltoid, and opened into the right shoulder-joint, the cartilages of which were eroded. There was a large patch of dead tissue in one lung, and a similar one in each kidney. Pelves of

the kidneys full of pus. Ureters enormously dilated. The heart and other viscera were healthy.

No. 146.—Fractures of the right femur, tibia and fibula, in a native, sustained in the great cyclone of 5th October, 1864. The ends of the fibula over-ride slightly, and are united by their sides, which come into contact. The fragments of the tibia are everywhere a quarter of an inch apart, but are united by a large mass of callus formed on the outer side of the bone, nearly filling the interosseous space. The gradual "modelling" of fractured bones is well illustrated. The separated ends of the tibia have been greatly rounded off; the medullary canal is open (after eight months) in both bones.

The femur has been broken across nearly transversely about the middle, and a second fracture, running downwards from the first through the lower fragments, separated a piece of bone on its outer side. This has re-united to the lower fragment, but no union between the two main fragments ever took place; on the contrary, their ends are well rounded. Dr. Partridge inserted two ivory pegs (which still remain) in the upper fragment; this led to the formation of some callus at the back of the upper and in front of the lower fragment, but the patient died of pyæmia, 6th January, 1865.

No. 221.—G., aged 12 years, a native lad, admitted in August, with a lacerated wound about an inch above the patella. The wound, about a quarter of an inch long, ran transversely across the thigh. From the time of admission, pus mixed with synovia-like fluid was discharged from the wound. Excision of the knee-joint performed by Dr. Fayrer. The patient died 13th September of pyæmia. Both lungs contained so-called pyæmic abscesses, varying from a quarter to two-thirds of an inch in diameter. Heart healthy; right ventricle contained a fibrinous clot, which extended through the auricle to the venæ cavæ. Nothing remarkable in the microscopic character of the liver or kidneys. Femoral, saphena, and iliac veins of the injured side healthy; no pus or

coagula in them. Small patches of osteo-myelitis in the tibia; cancellated tissue soaked with pus.

No. 239.—I. H., admitted 2nd October, 1865, with an injury of the left knee, followed by suppuration; amputation performed on the 25th. There were collections of pus in and above and below the joint. The synovial membrane round the patella was thickened, pulpy, and of a deep crimson colour. Incipient ulceration of the cartilages of the femur; the cartilage on the inner side of the tibia was quite detached, and could be peeled off from the bone; semilunar fibro-cartilages had almost disappeared; the crucial ligaments were softened. The femur was removed on the 9th November at the hip, osteo-myelitis having set in. The bone-section shows extensive osteo-myelitis, and purulent deposits extending to the cancellated tissue of the head of the bone. The patient died on the 13th, ninety hours after the last amputation.

No. 276.—Portion of a growth removed from the left upper jaw of a native, aged 30 years, 19th January, 1866. The tumour was of a year-and-a-half's duration. There was a growth of two months' duration on the other side, involving the whole of the upper jaw, which "consists of oval cells, nucleated nuclei, and fibro and fibro-plastic matter." The patient died on the 22nd of pyæmia, with the left lung entirely consolidated and passing into the suppurative stage.

No. 292.—A portion of the upper lobe of the left lung of a native, who died from pyæmia after secondary amputatian of the forearm, in consequence of sloughing, &c., after amputation of the thumb. Section showing a cluster or two of miliary tubercles, and a patch of sloughing lung from pyæmia.

No. 294.—Remains of the radius and ulna of the right side in a patient who died from pyæmia, after secondary amputation of the forearm, following amputation of the thumb. Necrosis of both bones. No osteo-myelitis. Lung studded with pyæmic patches. Veins of the arm and forearm, connected with the radial and ulnar artery, were filled with pus up to their junction with the axillary, where there was a

slight recent adherent coagulum. Kidneys very fatty. Under the microscope spheroidal cells very scanty, nuclei indistinct and filled with dark granular fatty matter; denuded intervals also studded with fat granules.

No. 325.—The stump of the right forearm amputated above the elbow-joint on account of osteo-myelitis. Sections of the ulna and radius show destruction of the medulla, necrosis of the shaft and suppuration with softening, and degeneration of the cancellated structure of the heads of these bones. Humerus also divided, and on section healthy.

No. 342.—Arm of S., amputated at the shoulder-joint for osteo-myelitis of the humerus. This man recovered.

No. 360.—The parts of the upper arm of F. R., aged 20 years, admitted 29th April, 1866, with a gunshot wound of the middle third of the upper arm. The soft parts much shattered; bones comminuted. Gangrenous ulceration and osteo-myelitis supervened after the extraction of the bullet. Amputation at the shoulder-joint, 2nd May. Specimen exposes the injured parts and a section of the humerus. The main bulk of the humerus above the injury much congested, but free from inflammatory exudation or pus. An inch above the fracture of the bone diseased. Lungs contained numbers of pyæmic patches in the inferior lobes. "These in the centre consisted of soft yellow puriform-looking material, which, on examination under the microscope, brought to view a good many fat globules and granular matter, and very few pus globules."

No. 380.—The humerus of a patient, J. E. M., aged 12 years, who was admitted 3rd July, 1864, and died 10th June, 1866. Excision of the elbow-joint performed 9th April. Abundant suppuration beneath the pectoralis major. Shaft detached from the head. On section, the cancellated and medullary structures of the shaft and head of the humerus were found destroyed by osteo-myelitis. It is owing to the destruction of the parts that the head has become separated from the shaft at the epiphysis. Right lung covered with lymph, the result of pleurisy and empyema.

No. 394.—Osteo-myelitis of the humerus after amputation for a compound fracture of the forearm, with a wound opening the elbow-joint. The medulla is almost altogether destroyed, and a portion of the cancellated tissue in the head of the bone, larger than a split pea, is dead and beginning to break down. The cancellated tissue is infiltrated with pus, of which the cavity of the shoulder-joint was also full. The articular cartilage along the lower edge of the head of the bone is partially absorbed. Secondary amputation through the shoulder-joint was performed twelve days after the receipt of the injury and primary amputation, but the patient died within three days. The lungs were full of pyæmic patches.

No. 448.—The femur of a patient on whom amputation of the leg at the knee-joint was performed 26th August, 1866, death supervening 3rd September. Patient was suffering from suppurative disease, which had formed communication with the knee-joint.

A section was made of the whole length of the femur. The lower two-thirds were tolerably healthy. The cancellated structure of the upper third, inclusive of that of the neck and head of the bone and medullary cavity, was blackened and discoloured, and gave off a highly offensive odour from advancing osteo-myelitis. There was also puriform matter.

No. 482.—Femur of a patient, showing osteo-myelitis in the whole length of the bone after amputation at the knee-joint. Flaps sloughed and hæmorrhage took place from the popliteal. The popliteal was tied successfully. Bleeding occurred from some minute branches, and the patient died at last.

No. 484.—The lower half of the femur of the patient mentioned in No. 482. (The patient had compound comminuted fracture of the tibia and fibula and knee joint). Section of the femur, showing osteo-myelitis at the upper part of the bone. Amputation was performed in this case at the knee-joint, which was found full of blood, though the condyles and cartilages were healthy.

Nos. 507 & 508.—Upper third of the humerus of B. N., aged 30 years, a farmer. States that, about a year ago, while employed in cutting grass, he suddenly jerked his right arm and immediately felt a deep-seated pain in the elbow-joint, which continued for several days, and terminated in a small painful tumour upon the inner side of the joint. The tumour gradually increased, and was soon followed by fever; and as it was imagined that suppuration had occurred, incisions were made and purulent matter discharged in small quantity. The tumour, however, gradually increased in size, the incisions ulcerated, and other ulcers formed upon the surface. At present the tumour has the shape of two cones, united at their bases; the surface is irregular, and it involves the lower half of the upper arm and upper half of the forearm. It is soft but perfectly immovable. The ulcers all superficial, but grey-looking, and of various sizes. The forearm is partially flexed, the elbow-joint anchylosed. Flexion of the forearm partially impeded, but extension entirely so. Had lancinating pains in the tumour. No fever for past fifteen days; pulse 102, weak. Bowels regular, appetite indifferent. The tumour was examined by the microscope. It is cerebriform cancer with oval cells with nuclei. The bone is diseased. The medullary canal is full of soft grey-coloured substance. The disease has extended a little higher than the surgical neck. Under the microscope it presents pus cells, blood corpuscles, with fatty matter.

No. 546.—Left knee-joint, liver and left lung of a patient admitted with compound fracture of the left leg and lower jaw, and who died of pyæmia. A.—Synovial membrane of the knee-joint at each side of the patella and above the condyles of the femur is thickened and covered in places with a deposit of lymph. B.—Liver (small with a long thin left lobe) contains in the upper surface of the right lobe a cavity nearly the size of a walnut, filled with broken-down tissue. There is a much smaller one of the same kind on the under surface of the left lobe. C.—Lung; intense congestion of lower lobe; upper lobe hepatized and containing several solid nodules, which would

probably have ultimately broken down into the so-called pyæmic abscesses.

No. 611.—The femora and lungs of E. D., who died on the 16th March, 1867, of osteo-myelitis after amputation. The bone of the right thigh amputated 7th March, shows the rounding of the divided edges of the bone and the general atrophy of the whole bone. The opening of the medullary canal is covered by a firm fibrous membrane derived from the periosteum.

The upper portion of the left femur bisected shows (amputation performed 18th February) the periosteum peeled off the upper part of the shaft. Near the divided end of the bone it is nearly one-third of an inch thick. This thickened portion of the periosteum does not extend to the cut surface of the bone, but terminates by a sharp free margin, which is a quarter of an inch from the cut surface at its nearest, and nearly one-eighth of an inch from it at its furthest points. The irregularly-shaped portion of bone thus left between the free edge of the periosteum and the line of division of the bone is evidently dead. In the recent state its dead white colour could be easily distinguished from the somewhat greyish hue of the living bone, as seen on the face of the bisected surface. At one point, close to the edge of the thickened periosteum, a furrow is beginning to form between the living and the dead bone. The medulla protrudes slightly beyond the cut end of the bone. It is infiltrated throughout with pus, as is also the cancellated tissue. Near the lesser trochanter the whole thickness of the medulla has come away, with one-half of the bone, showing that the periosteum is here detached from the bone. The whole medulla is full of cavities. There is incipient erosion of the cartilage on the head of the femur at its upper edge.

The heart contained a remarkably firm clot, attached below around the "moderator band," and extending up into the pulmonary artery and thence into its branches as far as they were traced. Both lungs contained pyæmic patches, and the lower lobe of the left lung was solidified.

No. 622.—Stump of A., admitted with moist gangrene of the leg and foot, after a wound on the heel. Amputation performed; died of pyæmia 2nd April, 1867. A good specimen of osteo-myelitis, the stump showing the sloughing state of the soft parts and characteristic protrusion of the medulla (especially that of the tibia) beyond the cut ends of the bones.

No. 659.—The humerus of a patient named S., aged 40 years, admitted 6th May, 1867, with a lacerated wound on the inner aspect of the left elbow-joint. Joint opened from extensive suppuration. Amputation performed 25th May; died 5th June, from pyæmia.

No. 679.—Thigh of P., aged 21 years, admitted 24th June, 1867, with an incised wound in the right knee-joint, inflicted by himself in cutting grass. Suppuration set up in the joint and among the muscles of both calf and thigh. Amputation between the middle and lower thirds of the thigh. Periosteum peeled off the bone. Large abscesses in soft parts laid open. The patella has been thrown down to show the inside of the joint. The thickened pulpy state of the synovial membrane is well seen. The inner condyle of the femur and the corresponding portion of the tibia have lost a large portion of their cartilage of incrustation, and the external condyle has begun to be denuded also. Amputation 4th July, at the hip-joint—osteo-myelitis having set up in the femur. The limb has been laid open from the inner angle of the first amputation up to the line of the second, so as to show the periosteum completely detached from the bone. There is a layer of blood effused between it and the bone. The medulla is seen protruding from the cut end of the femur. Patient died 5th July. Lungs were emphysematous and exsanguine, and there was an extensive ante-mortem coagulum found in the right side of the heart and pulmonary artery.

No. 917.—Liver showing a large pyæmic abscess at the under surface of the left lobe, from D. C., aged 30 years, admitted 4th July, 1868, for inguinal hernia of the right side, and who died 9th September. Pelvis of the same showing changes in the

wall of the inguinal canal of the right side, where the operation for radical cure was performed by Dr. Fayrer; the opening through the canal will admit the insertion of a finger.

No. 956.—Liver of B., aged 46 years, who died of pyæmia on the 28th November, 1868, after perineal section performed on the 4th.

No. 987.—Specimens showing several pyæmic patches in the lungs; heart full of ante-mortem clots; right lobe of the liver occupied by large so-called abscesses and several small ones; congestion of the spleen. Taken from S. T., aged 22, admitted 31st December, 1868, with compound fracture of the right tibia and fibula. Amputated 20th January, and died of pyæmia 2nd February.

No. 994.—Portion of the liver with small pyæmic patches. Rectum and bladder showing recto-vesical fistula from an Englishman named W. H., aged 44 years, admitted 16th December, 1868, with vesical calculus and fistula. Lateral lithotomy performed. Section shows repair after the operation. Mucous membrane of the bladder ecchymosed.

No. 1190.—Case of osteo-myelitis. Section of the head of the left scapula from a European, who died of pyæmia after secondary amputation at the shoulder-joint. The section across the coracoid process and joint shows the state of the cancellated structure after low inflammation and suppuration of bone causing pyæmia.

CASES OF OSTEO-MYELITIS AND PYÆMIA.

Case I.

Amputation of the Forearm.—Acute Osteo-myelitis.—Secondary Amputation of the Humerus.—Fresh Osteo-myelitis.—Third Amputation at the Shoulder-joint.—Recovery.

F. S., aged 34 years, German; occupation, contractor. Admitted with gunshot wound of both hands, at half-past four a.m. of February 25, 1866. He states that, as he was drawing the ramrod out of a gun loaded with two bullets in each barrel, it exploded, and the four bullets went through his right hand and injured also the left. The right hand is completely shattered, and the fingers of the left hand are also injured. He says there was a great deal of hæmorrhage, from want of medical aid at Mutlah.

February 25.—Amputation of the right forearm was performed at 7 a.m., at its lower third, by antero-posterior flaps; and two phalanges of the ring and little fingers, and the last phalanges of the middle and index fingers of the left hand, were removed. He was ordered tinct. opii. ℥xl. In the evening he did not complain of much pain; his tongue was moist; was thirsty; had slept a little during the day; passed urine; pulse 84; temperature in axilla 100°. Morphia gr. ½ h. s. During the night he became delirious; he was very restless and thirsty; vomited occasionally.

The next morning his pulse was 116; head hot; tongue moist; very restless; answered rationally when questioned; no stool. Liq. ammon. acet. ʒ ij., with effervescing draught every two hours; castor oil ʒ vj. stat. In the evening his pulse was 104; temperature 103°; no stool; tongue moist; not delirious; slept a little; vomited occasionally. Seidlitz powder ʒ ij. stat.; continue effervescing draught without liq. ammon. acet.

27*th.*—Pulse 112; tongue moist; slept well; no stool since admission; not so thirsty as before; forearm slightly swollen. Cathartic enema stat. 6 p.m.: Pulse 108; temperature 101°; no stool after the enema; was very thirsty during the day; took a little food; swelling of the forearm extending. Calomel gr. v.; ext. colocynth. gr. vij.; m. ft. pil. h. s. Castor oil ℥j. after four hours, if bowels are not moved.

March 3*rd.*—Pulse 104; the swelling on the elbow fluctuating; a large incision made, and some pus let out; another incision made on the lower part to relieve tension. Castor oil ℥vj.; tinct. rhei co. ℥ij.; aq. menthæ ℥j., stat. 6 p.m.: Pulse 100; temperature 102°; four stools; tongue moist; not much pain in the stump; morphia gr. ½ h. s.

6*th.*—Pulse 96; temperature 103°; all the ligatures have come away; a slough of cellular tissue taken out of the opening in the forearm; stump looking healthy; discharge diminishing; flaps have united.

11*th.*—Did not sleep well last night; the arm was very painful. The forearm at the lower part looked puffy; a little deep-seated pus let out by an incision. The bone beneath was felt somewhat denuded. 6 p.m.: Pulse 104; temperature 104°; tongue moist; had one stool; had a slight rigor during the day, followed by heat of skin; does not complain of much pain in the arm; feels weak; is somewhat delirious; head hot. Cold lotion to the head; fever mixt. ℥j. q. 3tiâ h.; Seidlitz powder ℥ ij. stat.

12*th.*—Pulse 104; temperature 103°; no more rigors; no stool; is quite sensible; good deal of discharge from the wound; not much pain in the arm. 5 p.m.: Pulse 128; temperature 108°; tongue moist; had two rigors, one at 11 a.m., the other at 4 p.m. They lasted for half an hour, and were followed by profuse perspiration. Feels a tightness about the chest on breathing; no cough; not delirious. Fever mixt. ℥j. q. 3tiâ h.

13*th.*—Pulse 112; no more rigors; sweated a good deal in the night; tongue clean and moist. 2 p.m.: Amputation

of the arm performed by antero-posterior flaps; lost about five or six ounces of blood; fifteen ligatures applied. The bones were examined by Dr. Ewart; both much diseased; medullary canal of the radius and ulna had lost all appearance of medulla, which was replaced by carious and purulent *débris;* surface of the bones carious, and the cancellated structure of their heads infiltrated with pus; end of the humerus healthy; soft parts of the stump healthy. 7 p.m.: Pulse 96; skin cool; no bleeding; no more rigors.

14*th.*—Pulse 96; slept pretty well; no more rigors; tongue moist; no bleeding. 5 p.m.: Pulse 102; temperature 104°; tongue moist; no more rigors; feels hot since 2 p.m.; somewhat thirsty; not much pain in the stump; not much swelling; slight brownish discharge; wounds of fingers granulating; no discharge from them. Fever mixt. and acet. of potash, q. 3tiâ h.

15*th.*—Pulse 104; not much discharge from the stump; not much pain; discharge slightly fetid. 4 p.m.: Had three stools since morning, rather loose, passed with griping and straining; did not feel hot during the day; pulse 100; temperature 102°; no rigors; appetite fair. Acid. muriat. dil. ℥v.; quiniæ mist. ℥ij.; tinct. ferri muriat. ℥v.; tinct. opii. ℥x., t. d. Pulv. cretæ co. c. opio ℈j., three powders during the night.

During the rest of March he was doing well.

April 1*st.*—Pulse 84; temperature 100°; complains of pain in the stump, which is œdematous; the absorbents a little red and inflamed; very little discharge. 6 p.m.: Pulse 102; temperature 103°; complains of much pain in the stump; no rigors.

2*nd.*—Pulse 100; temperature 102°; pain in the arm a little easier; slept well at night; no rigors.

3*rd.*—Pulse 120; temperature 103°; had a slight rigor during the night, followed by heat of skin; skin still hot; no sweating in the night. An incision was made on the anterior aspect of the stump, and a few small bits of bone removed. 7 p.m.: Had a distinct rigor at 11 a.m., which lasted for

about a quarter of an hour; had another slight one at 1 p.m., which lasted only for a few minutes; does not complain of much pain; was delirious throughout the day; pulse 120; temperature 104°; perspiring now.

4*th*.—Seven a.m.: Pulse 114; temperature 104°; no more rigors; sweating now; was very thirsty at night. 11 a.m.: Amputation at the shoulder-joint performed; thirty-two ligatures applied; not much blood lost; flaps very vascular. There was some suppuration along the side of the humerus. The lower end was denuded of periosteum for about half an inch; the medulla protruding. The bone, when sawn across lengthwise, showed diffuse suppuration in the cancelli, with three or four foci of pus within the medullary canal. 3 p.m.: Pulse 100; temperature 102°; no more rigors; thirst less; some pain in the stump; no bleeding.

5*th*.—Pulse 128; temperature 105°; no more rigors; tongue moist; is very thirsty; some pain in the head; no bleeding. 5 p.m.: Pulse 128; temperature 105°; thirst less; still complains of pain in the head; feels occasional pain in the chest; no cough.

6*th*.—Pulse 124; temperature 103°. 6 p.m.: Pulse 124; temperature 102°; no rigors; no pain in the head; tongue clean and moist; no thirst; a good deal of very fetid sanious discharge from the stump; one suture cut off to allow a free drain to the discharge.

7*th*.—Pulse 120; temperature 103°; no shivering; feels easier; slept well; tongue clean and moist. 6 p.m.: Pulse 112; temperature 103°; discharge from the stump free; no rigors; four ligatures came away.

8*th*.—Pulse 112; temperature 102°; slept badly; was very restless, and occasionally delirious. 6 p.m.: Pulse 112; temperature 104°; felt hot during the day; no rigor; was delirious during the day; discharge thicker and less fetid; seven ligatures came away.

9*th*.—Temperature 102°; slept pretty well during the night; seventeen ligatures came away. 6 p.m.: Pulse 124; tem-

perature 104°; no shivering; has not been delirious again; two ligatures came away.

10*th*.—Pulse 120; temperature 102°; not much pain in the stump. 6 p.m.: Pulse 116; temperature 102°; discharge from the stump healthy, less in quantity, and drains away freely; stump looks very healthy.

11*th*.—Pulse 104; temperature 102°; two ligatures came away; stump united in some parts, in others granulating; no shivering.

12*th*.—Pulse 106; temperature 100°; very little discharge from the stump; all the ligatures have come away; soft parts united.

Continued to do well, and left the hospital on the 15th. He has now recovered, and is rapidly gaining strength.

25*th*.—He has recovered.

Remarks.—This is a case of great interest in a pathological, as well as a surgical point of view. It illustrates what I have so frequently pointed out as the great tendency here, on the part of bones, when divided, to take on an unhealthy action, to pass speedily into a state of suppuration, involving the whole of the cancellated structure, and rapidly inducing constitutional mischief, which, if not checked by the removal of the affected bones, is likely to terminate fatally by toxæmic changes. This form of diffused osteo-myelitis may occur, as the case proves, whilst all around it is doing well. On each of the occasions in which it occurred in this case, the soft parts of the stump were doing so well as to have almost healed. It will be observed that the symptoms indicating the disease in the bone were not the immediate or direct sequel of the operation, but supervened at a period of seven days later, when the general condition of the patient was favourable. They were ushered in by violent rigors and consecutive sweats, with rapid pulse and hurried respiration. Amputation on each occasion was performed as soon as the symptoms had fully declared themselves, and fortunately in time to anticipate any of those structural changes in the lungs which experience has taught us are but too certain to

follow when the source of the mischief cannot be removed. It is very satisfactory to see how perfectly successful the last operation proved, notwithstanding its magnitude and the weak condition of the patient from incipient blood-poisoning, loss of blood, and the shock of former operations; and it seems to me to prove that disarticulation, where it can be practised, is often safer than amputation through the bones. For here, after two amputations in the same limb, performed through the continuity of the bones, osteo-myelitis followed each. The third operation, disarticulation at the shoulder-joint, proved successful. It is probable that had I amputated at the elbow-joint, instead of just above it, on the first occasion, when osteo-myelitis appeared, the patient might have been spared the necessity of an operation subsequently at the shoulder-joint; but I thought that cutting through a part altogether sound and above the next joint would probably result more favourably, and hoped that osteo-myelitis would not attack the sound bone. I now feel so satisfied of the advantages, in a pathological point of view, of amputation at the joint over that through the shaft of the bone, that I shall hesitate on any future occasion to cut through a bone when there is a joint near the injury at which the limb may be removed. Such a rule cannot of course be made absolute, but I suspect if it were of more general application, the mortality after amputation would diminish. There can be no doubt that the tendency to suppuration in bone is more marked in some localities than others, and it certainly is so here in Calcutta. Imperfect hospital construction and local hygienic defects have, no doubt, much to do with it, but these cannot be the sole causes. The question still requires further investigation, and I am convinced that if a section were made of the bone of every amputated limb, and the lungs and other viscera examined in fatal cases, it would be found to be a more frequent cause of mortality than is perhaps supposed. I now feel better able to account for the loss of many cases after amputation in field service, where death was attributed, sometimes, perhaps, rather vaguely, to other and

uncertain causes. Were all such cases to be carefully examined, and the same minute inspection made as that practised more than twenty years ago by the pathologist who threw the first real ray of light on the cause of death after surgical operations (I need hardly say I refer to Dr. Norman Chevers), I feel certain that suppuration in bone would be found to take a higher place as a cause of the blood-poisoning, surgical fever, or pyæmia—call it which we will—that raises the death figure of surgical operation statistics so high. No one can read the report of M. Roux's experience and practice in the St. Maundrier at Toulon, without feeling that this may be the case; and I am sure that no one can witness what occurs here, without feeling that his experience must lead him to opinions similar to those of the eminent French surgeon, and suggest a similar practice. I can most conscientiously say that I had arrived at and recorded similar views before I had either heard of or seen his report. My experience in this great surgical hospital has not only led me to, but has confirmed me in them. The case I have related is not less interesting in a surgical point of view, and it shows how much not only nature can sustain, but how far the surgeon's aid may be instrumental in saving life. This man (not in a very high state of health—for he was residing in a most unhealthy part of Bengal, the Mutlah station, where he had had more than one attack of fever, and occasional attacks of malarious enlargement of the liver and spleen) sustained the shock of a very severe gunshot wound, by which one hand was shattered to pieces, and the other much mutilated. He lost much blood from want of assistance at the time, and travelled fifteen miles on a railway engine, in a state of exhaustion from hæmorrhage, before he reached the hospital, where, ten hours after the injury, he underwent amputation of the right forearm and all the fingers of the left hand. He was subsequently attacked by osteo-myelitis in the ulna and radius, which rendered a second amputation of the arm imperative at a time when he was much prostrated. Recovering from this, he was again attacked by the same disease in the humerus, which,

as the only hope of saving life, necessitated amputation at the shoulder-joint. From this he recovered, notwithstanding all he had undergone from shock, loss of blood, suppuration, surgical fever, and the effects of living and enduring all this in a hot and malarious climate.

Case II.

Amputation of both Thighs.—Recovery from the first Operation.—Death after the second from Osteo-myelitis.

H. D., an English girl, aged 17, brought up in India, of delicate constitution and strumous diathesis, was admitted on March 1, 1866. She had been suffering for the last six or seven years from strumous disease of the right knee-joint. The ulceration began on the integument near the knee, and had gradually extended over the lower part of the thigh, the knee, and leg, until the joint had become completely disorganized, and the limb atrophied. The tibia dislocated; the right knee contracted and rigid; the muscles of the limb wasted; and the joint very tender on pressure over the condyles of the femur, showing that the bone was also involved in the strumous disease. There were several deep sinuses in the lower part of the right thigh, communicating with the joint, and the bone in places had begun to exfoliate. The cancellar structure appeared to be infiltrated with tuberculous matter. There were several of the peculiar white cicatrices of former strumous ulcers on the limb, and other parts of the body. For the past few weeks her health had been failing. She had had diarrhœa, and had been wasting rapidly, notwithstanding the administration of iron, cod-liver oil, port wine, and good food. As it appeared that the only chance of saving life was by removing the limb, on March 7, amputation was performed by double flaps at the junction of the upper and middle thirds of the limb. Twenty-three ligatures were applied. The bone was small, and the

medulla looked unhealthy. She bore the operation fairly under chloroform; indeed, her pulse rose under its influence, and continued to be better throughout the day.

For some days her pulse continued rapid, and the temperature high. Recovery went on somewhat slowly, until after she had been removed home on the 25th, when it became more rapid, and by April 24, the stump had quite cicatrised.

She was readmitted on February 18, 1867, with the left knee in much the same condition as the right had been when she was in the hospital, nearly a year before—extensive ulceration, with exfoliation of bone, disorganization of the joint, and backward dislocation of the tibia. The stump of the right leg was also extensively ulcerated. Amputation was performed about the middle of the thigh by the modified circular operation. She bore the operation well under chloroform; and, as on the former occasion, a large number of ligatures was required. The flaps were brought together with catgut sutures.

19*th*.—She is doing well; slight venous oozing from the stump; no fever. As on the last occasion, vomiting continued for some time after, as a consequence of taking chloroform.

20*th*.—Better, but very weak; still slight venous oozing from the stump.

21*st*.—Doing pretty well; several ligatures have come away; takes her food well; a thin purulent discharge commencing.

23*rd*.—All the ligatures but two have come away; no fever; discharge thin. The catgut sutures answer admirably; they are not softened, and do not cause the least irritation.

25*th*.—All the ligatures except that of the femoral have separated; discharge less; she is doing well.

March 3*rd*.—She has not been doing so well for the last three or four days. On the 1st she had a rigor, and was feverish; the pulse also was weak, and rose to 140 in the evening. The soft parts of the stump look healthy, but they are retracting, and at the bottom of a sinus, in the line of union of the flaps, there is a portion of denuded bone. The

symptoms are very suspicious. Removed her bed to a more airy part of the ward.

4th.—She is not doing well. The pulse is quick and feeble, and she is feverish. Examined the bone carefully, and found the medulla protruding, and the periosteum stripped for a short distance from around its end. The medulla, though protruding, is also detached from the bone. A drop of pus exuded during the examination. I fear there can be no doubt that osteo-myelitis is setting in. She is too feeble to bear amputation at the hip-joint. There is a hope that the mischief in the bone may be local.

She continued getting weaker and weaker in spite of stimulants, quinine, iron, and good diet, until the 17th, when she sank from exhaustion and obstruction to the pulmonic circulation by the formation of fibrinous coagula in the right side of the heart.

The body was examined on the 17th at 8 a.m. The lungs were free from tubercle, and the greater part of both was healthy and crepitant, although a large portion of each was consolidated. There were several well-marked pyæmic (gangrenous) patches in each, and one large one in the right lung the size of a florin. No pleurisy; no effusion in the thorax. The heart was healthy, but contained firm white ante-mortem fibrinous coagula in the right auricle and ventricle extending far into the ramifications of the pulmonary artery. There were also smaller clots of a similar character in the left ventricle and aorta. Liver and spleen healthy. Kidneys large, but not so healthy. No suppuration in the pelvis. Suppuration had occurred round the bone, and the periosteum was denuded in places. The femur, on a longitudinal section being made, was found to contain deposits of pus throughout the whole extent of the medulla; indeed, the bone was in a complete state of diffused osteo-myelitis.

Remarks.—Death in this case was the result of osteo-myelitis—that is to say, of the blood-poisoning consequent on diffuse suppuration in the medulla of the divided femur. The imme-

diate cause of death was probably the formation of fibrinous clots in the right side of the heart and pulmonary artery, the supply of blood to the pulmonic circulation being thus interfered with. This plugging of the right side of the heart is a frequent cause of death, not only in cholera and other exhaustive diseases, such as croup, diphtheria, &c., but also as the result of changes wrought in the blood in pyæmia, whether caused by osteo-myelitis or other source of septicæmia. It is a condition we frequently observe in our patients in this hospital, and is one that we readily diagnose in its incipient stages, even two or three days before death; for to the ordinary symptoms of pyæmia are added great rapidity and urgency of breathing (whilst at the same time the air is freely entering the air-cells), feeble and irregular pulse, with great restlessness and delirium, which ends in death. The post-mortem condition of the lungs and heart confirms the diagnosis, and explains the phenomena. In cases of pyæmia we find that portions of the lung have become solidified, ecchymosed, and interspersed here and there with the true pyæmic patches of dead tissue, varying in size from a pea to a five-shilling piece. These are generally surrounded by an areola of congestion, sometimes, if the patient have lived long enough, with suppuration, and in the centre we find dead tissue bathed in a sanious or puriform discharge. Such are what are so frequently, and, as I think, erroneously, called abscesses. They are not, in fact, abscesses at all, and when true pus is formed either in them or about them, it is a secondary consequence, the result of a process set up around the dead tissue, just as we so frequently see it in the ordinary furuncle—where the first event is the death of a portion of tissue, the second the suppuration by which it is separated and thrown off from the living part. These local deaths are due to capillary embolism and to blood-poisoning. In addition to these changes in the lung, or similar ones in the liver, spleen, or kidneys, we frequently find the pleuræ to be the seat of puriform or purulent effusions, either on the surfaces or in the cavities—the former most frequently in the vicinity of the dead

patches, which are found chiefly at the base and near the surface of the lungs. It is in conditions such as these that the formation of fibrinous coagula in the heart readily occurs, and when it does so death generally, if not always, results. But I may here repeat what I have elsewhere noted, that this supervention of cardiac pulmonary plugging by fibrinous coagula may occur altogether independently of pyæmia or the other diseases to which I have referred; and as a result apparently of any wound or surgical operation—indeed, as one of the consecutive dangers of surgical proceedings, it has not received the attention to which it is entitled. Whatever the condition of the blood, the blood-vessels, and the innervation may be that favours the occurrence of this fatal pathological change, there is, I think, no doubt that it may be so induced. A case recently came under my observation in which, after removal of a large tumour, when all was progressing favourably, and the wound had nearly healed, symptoms of plugging suddenly made their appearance, and the patient was rapidly carried off. The earliest symptoms observed were facial paralysis of both sides and squinting of one eye, with signs of plugging of the right side of the heart or pulmonary arteries. The post-mortem examination revealed a heart firmly plugged on the right side with fibrinous coagula, and also similar, though smaller, coagula in the left ventricle and aorta. A patch of softening of the medulla oblongata close to the pons and emergence of the seventh and sixth nerves, due to plugging of the inferior cerebellar artery by an embolus, explained the facial paralysis and squint. In this case there was no other way of accounting for it than as a result of the operation. I have observed similar results in other cases, and where no other cause than the operation or wound could be assigned. But there are other points of interest about the case of this poor girl. The fact of amputation of both thighs is itself one. The recovery from the first operation, and the fatal result of the other from osteo-myelitis, are also of import with regard not only to the condition of the patient after

the loss of so large a portion of the body, but also in reference to the hygienic conditions under which she was placed. As I have elsewhere said, recovery from amputation of the thigh is a somewhat rare event in Calcutta under any circumstances. The first amputation was performed just after the hospital had been emptied of all the patients, fumigated, and whitewashed, and before any other patient had been re-admitted. The second was performed when the hospital was full, but when every attention was paid to cleanliness, and all overcrowding avoided. In the first instance recovery occurred; in the second, when all seemed to be going on favourably, osteomyelitis insidiously set in, and had its usual unfavourable result. Amputation was considered, and she was actually placed on the operating table and under chloroform; but the extreme debility and depression not leaving any apparent hope of her surviving the operation, it was deemed advisable not to incur the risk of death on the operating table. The appearances after death exactly corroborated the diagnosis made during life.

Case III.

Osteo-myelitis of the Skull.—Death from Pyæmia and the formation of Fibrinous Coagula in the right side of the Heart.

Tarramoney, aged 25, a resident at Hautkholla, in Calcutta, was admitted on May 13th, 1867, having received a severe injury to the scalp, by falling into a well. The accident occurred three days before admission.

There was an extensive lacerated wound of the scalp on the right frontal region. The bone was laid bare to the extent of four by two inches. The pericranium was altogether removed, but the bone itself not injured. She complained of a good deal of pain in the head, was feverish, and the bowels were confined. There was restlessness and general *malaise*. No vomiting. The wound was dressed, and the flap adjusted as nearly as possible

in its proper place. During the first week the patient went on well.

20*th*.—Pain over the left orbit; discharge free; wound looks healthy; the bone about the centre of the exposed portion is dull and dry. In the day she had fever; increased pain in the head; much perspiration, the thermometer standing about 90° in the ward. Salines ordered every third hour.

21*st*.—Had a rigor this morning; her pulse has been quickening during the last two or three days. The pain in the head and feverishness make us apprehensive that intra-cranial mischief is occurring. The rigor lasted, the nurse says, for full half an hour; it was followed by sharp fever and sweatings. There is a certain amount of stupor; is inclined to vomit; pupils natural; the pulse very rapid and weak after the rigor.

22*nd*.—Had fever last night, and one shivering fit; vomited once. In trying to get out of bed she fell down insensible. The bowels have been freely moved; much pain in the head; pulse 130, very feeble. The wound still preserves a healthy appearance, but there is less discharge.

Vespere.—Pulse 160; she is in a state of nervous agitation; partially delirious, and sobbing violently; no more rigors, but chilliness; very restless; pupils slightly dilated; constant inclination to vomit.

23*rd*.—Very restless during the night; wandering; pulse 140; temperature in axilla 105°. Answers questions imperfectly when spoken to. The bowels have acted since last report; no more rigors. I saw her at this time, and, taking all the symptoms into consideration—the rapid pulse and respiration, rigors, high temperature, and delirium tending towards coma, with the pain in the head and the exposed bone, which had a rather suspiciously dry and dull appearance about the centre of the denuded portion—and finding that the symptoms were aggravated, and her condition hourly becoming worse, it appeared to me that suppuration must be taking place either in the diploë of the skull or between the bone and the

membrane; and as the signs of pressure were not marked, the probability was in favour of the former, especially as all the symptoms of pyæmia were setting in with great violence. I therefore applied the trephine over the portion of bone that I have mentioned as being dry, and on reaching the diploë gave exit to a quantity of fetid pus, which gushed out round the instrument. On completing the section of the bone there was no pus found between it and the dura mater, nor did the appearance of the membrane suggest the existence of any pus beneath it. There was no improvement after the operation. She remained for a time much in the same condition, the breathing grew more hurried, the temperature continued high; she became unconscious, the sphincters relaxed, and she died the same evening.

A post-mortem examination was made on the following morning. On removing the calvarium it was found that the frontal bone was in a complete state of diffused osteo-myelitis, the diploë being infiltrated with fetid pus. There was also a quantity of thin pus under the dura mater diffused over the surface of that side of the brain, but there was none between the skull itself and the dura mater. Two pyæmic patches were found—one on the surface of the middle lobe of the right lung, the other on the left lung; they were rather larger than a pea. Portions of each lung were congested, but a considerable portion of each was anæmic and emphysematous. The right auricle and ventricle were plugged with firm adherent fibrinous clots, extending into the pulmonary artery. The liver was healthy; the kidneys and spleen also presented no sign of disease.

Remarks.—This is a good example of osteo-myelitis or diffused suppuration in the cancellated structure of the frontal bone. Death was caused by septic absorption and the consequent devitalised condition of the blood. It would be absurd to suppose that the small pyæmic patches in the lungs were the cause of death, as they were quite incipient. The patient succumbed to other more fatal pathological conditions before the

changes in the lungs had time to proceed very far. The actual cause of death was no doubt the interrupted pulmonary circulation, as proved by the presence of firm fibrinous clots in the right side of the heart, and the blanched and emphysematous appearance of portions of the lungs. The condition that gave rise to this state of the blood was the septicæmia produced by the suppuration in the diploë of the skull. Such cases as this in former years were said to give rise to abscess in the liver; no doubt they did so occasionally, but the reason why was not then understood as it is now. As in most other cases of osteo-myelitis, the disease set in some time after the injury, and came on insidiously; and in this situation it is most fatal, for it is impossible to remove the affected bone. The most we could hope to do would be to give the pus a free drain, in the chance that the suppuration might be limited in extent. I fear we cannot avoid the conclusion that nosocomial influences have much to do with the causation of such cases as this. The woman was healthy enough at the time of the accident, and there was no visceral disease to induce any unfavourable change in the blood. It is a good example of the necessity of closely watching and caring for all wounds involving the scalp, especially where the bone has been exposed—not so much in reference to intra-cranial mischief as to this suppurative inflammation of the diploë, which is so fatal when it does occur.

Case IV.

Amputation of the Arm.—Osteo-myelitis.—Pyæmia.—Death.

Sookan, a Hindoo Bunyah, aged about forty, was admitted on May 6th, 1867, with a lacerated wound on the inner aspect of the left elbow-joint. The wound was about three inches long, transverse, and situated below the internal condyle of the humerus. It had been inflicted with a pickaxe. The muscles arising from the internal condyle were divided, and the ulnar nerve was also cut across. The joint was not opened; sensa-

tion in the little and ulnar side of the ring finger was diminished. The wound was closed, and the arm was placed on a rectangular splint.

May 10*th.*—The arm is much swollen; part of the lips of the wound united, but a collection of pus has formed in it. The integument of the arm is inflamed. He has been in a feverish state during the last two days. The wound was opened out, and free exit given to the pus. A poultice was applied, and a solution of nitrate of silver painted on the inflamed skin. Quiniæ gr. iij., tinct. ferri muriatis gutt. xv., every four hours. Bowels to be freely opened.

15*th.*—Swelling of the limb somewhat diminished; discharge from the wound more healthy; some burrowing of pus down the forearm; no fever to-day.

19*th.*—Bowels loose; there is profuse purulent discharge from the wound. On examining its depth, the probe now passes into the cavity of the elbow-joint. Quiniæ gr. iij., pulv. ipec. c. gr. x., every six hours. He has port wine ʒiv. in addition to his ordinary diet daily.

20*th.*—His motions are of a dysenteric character this morning—red gelatinous mucus, and mucus discoloured by bile. The discharge from the joint is profuse. He is weaker. Omit the former medicines. Ipecac. gr. xx., bismuthi gr. v., now, and repeat in three hours. Turpentine stupes to the abdomen.

22*nd.*—The dysenteric symptoms are better; motions feculent. The discharge from the wound is much the same. He is weak and feverish at times, but as yet he has had no shivering. Repeat the quinine and Dover's powder. The arm is kept quiet on an angular splint, and carefully dressed twice a day.

25*th.*—He had rigors, and after them fever, yesterday. There was evidently no hope of preserving the arm, or of his general health improving whilst it was keeping up irritation; so that, as the best chance of saving his life, indications of pyæmia having presented themselves, amputation was performed through the lower third of the humerus. The tissues about

the joint were too much disorganized, and his condition was too low to justify excision. The bone seemed healthy where it was divided.

28*th.*—The feverish condition, with rapid pulse, has continued, especially towards the evening. He now complains of pain in the left side of the chest. Percussion note in the left infra-axillary region dull. Respiration harsh under the left mamma, and in the right chest sonorous rhonchus. Quinine and sulphate of iron, gr. iij. and gr. ij., have been given every fourth hour. Sinapisms or stupes to the thorax; beef-tea and port wine every two or three hours.

30*th.*—Pulse 112, temperature 104°. Has a cough and thick mucous expectoration. Free discharge from the stump, flaps are suppurating. Improving. Continue the medicine, wine, and food.

31*st.*—Pulse 128, temperature 105°. Had a rigor last night. The thoracic symptoms remain much the same. The bone examined in the stump; medulla not protruding; a portion of the end of the bone denuded of its periosteum.

June 2nd.—No more rigors; pulse and temperature keep the same. The ligatures are separating; the medulla of the bone is now protruding slightly, and the end of the bone is discoloured.

5*th.*—Has had rigors again; respiration is quick and difficult; pulse 140 and small,; temperature 103°. The wound looks flabby; all the ligatures have come away; heart-sounds weak, and action irregular. Died at 5 p.m.

Post-mortem Examination following morning.— Lungs œdematous and emphysematous; the right lung congested posteriorly, but otherwise both were pale; the left lung contained three pyæmic patches of dead lung-tissue, which, when cut into, were ashy-coloured, and saturated with puriform sanies, surrounded by an areola of congestion, one being on the anterior margin, and two on the surface of the upper lobe. The left pleural cavity contained about five ounces of serous fluid, with flakes of aplastic lymph. The upper lobe

of the left lung covered with a thick layer of aplastic lymph. Pericardium natural. A firm decolorized clot occupied the right auricle and ventricle, passing far into the pulmonary arteries. The liver was pale, and slightly enlarged; the spleen was considerably above the natural size, as had been diagnosed before death—a condition so common in the natives of this malarious delta, and often so serious an obstacle to recovery after surgical operations. The kidneys and other viscera were apparently healthy. The bone contained pus, infiltrated throughout the medullary cavity.

Remarks.—Such is an example of the cases we are so often called on to treat in Calcutta hospitals, and such is the result that may so frequently be expected. The diseased condition of the spleen in this case was no doubt a great predisposing cause of the unfavourable progress of the wound, and of the stump after the operation. Death occurred from pyæmia, due not only to osteo-myelitis, which ultimately made its appearance, but to the septic condition engendered before the amputation was performed, and which, in the enfeebled constitution of the patient, rendered the operation unavailing. But the immediate cause of death was the formation of fibrinous coagula in the right cavities of the heart, and the consequently interrupted pulmonary circulation. The condition of the lung was in this case that which we nearly always find in fatal cases of pyæmia, especially from osteo-myelitis, and it gave evidence not only of the results of the pyæmic condition as observed in the dead patches (which I have so often described, and have pointed out to be, not abscesses but portions of dead or disorganized lung-tissue infiltrated with puriform, not purulent sanies), but also of pulmonary embolism, as observed in the emphysematous condition and partially blanched appearance of the lungs, which, though they had been furnished with an ample supply of air, had been deprived of blood through the pulmonary arteries. This condition of plugging of the right side of the heart no doubt often takes place in exhausting and blood-spoiling diseases, as I believe was pointed out by Dr. Richardson; and

it may be said that in such cases it is merely one of the latest events in the history of a life destroyed by the disease. But it is, I think, of even greater significance, for it may set in after a surgical operation, and of itself prove fatal; and I have seen cases, that gave every hope of recovery until this condition supervened, rapidly succumb under the embarrassed pulmonary circulation.

Case V.

Amputation of the Thigh and Re-amputation at the Hip-joint for Osteo-myelitis—Death from Toxæmia and the Formation of Fibrinous Coagula in the Right Side of the Heart.

P., aged 21 years, was admitted June 24, 1867. Twelve days ago, when cutting grass, he injured his right knee with the instrument—a sort of trowel with which the grass is partly cut and partly scraped from the earth. He either opened the joint at the time, or the wound ulcerated and exposed the cavity shortly afterwards. He can give no very clear account of his condition, excepting that he had great pain, rigors, and fever. On admission it was ascertained that he had an ulcerating wound about an inch in length, just at the upper and inner edge of the patella, which had exuberant granulations and produced a sanious discharge. The knee-joint was somewhat swollen, and very painful when moved. On examining the wound carefully with a probe, it was found to communicate freely with the joint. The cartilages, especially that of the under surface of the patella, felt rough. He was feverish and restless, skin hot, and pulse quickened. Put him in bed with the limb at rest on a splint.

June 25th.—7.30 a.m.: Pulse 128; temperature 106°; had a rigor; pain in the knee diminished; had an opiate last night. 5 p.m.: Pulse 128; temperature 106°; had a rigor at 3 p.m.; urine, sp. gr. 1·017, alkaline, neither sugar nor albumen.

June 26th.—7.30 a.m.: Pulse 120; temperature 104·5°; no

rigor last night; very little discharge from the wound; pain slight. 7 p.m.: Pulse 120; temperature 106°; no rigors.

28*th*.—7.30 a.m.: Feels better; temperature 101°; pulse 100; less pain; bulb of a thermometer passed gently into the joint, gave a temperature of 102°. 4 p.m.: no rigors; pulse 108; temperature 104°.

30*th*.—7.20 a.m.: Discharge from the wound increased; no rigors. 4 p.m.: Pulse 108; temperature 104°.

July 1*st*.—7.30 a.m.; Much discharge; temperature 104°; pulse 128. 5 p.m.: Pulse 130; temperature 106°; no rigors; has a slight cough. During all this period he has taken a light diet moderately well, and the bowels have been kept open.

2*nd*.—Pulse 132; temperature 103°; much discharge of a puriform character and fetid odour. 10 a.m.: Amputation by the modified form of circular operation was performed at the lower third of the thigh. Fourteen ligatures were applied and about six ounces of blood were lost. As the bone, where divided, was found to be stripped of its periosteum by the slightest manipulation, it was divided again about two inches higher up. The knee-joint was found to be filled with pus, the cartilages rapidly disintegrating, the ligaments softened, and the leg infiltrated with pus. There was a harsh respiratory murmur on the upper and right side of the thorax, with some dulness on percussion, and with crepitant rhonchus, for which turpentine stupes had been applied. 2 p.m.: he has vomited several times, probably the result of chloroform. Pulse 120. 6 p.m.: Pulse 120; temperature 105°. No bleeding from the stump. Had a slight rigor since last report, which lasted for a quarter of an hour.

3*rd*.—4 a.m.: Bowels loose, moved four times since last report. Has not slept well, though he had an opiate. 7 a.m.: Pulse 124; temperature 101°. Slight oozing from the stump on pressure.

4*th*.—This morning I find that he is not doing well. Pulse quick; skin hot. Had rigors during the day yesterday. Breathing hurried; dulness at the upper right side of the chest,

with moist râles. The stump is somewhat distended with blood, and the dressings are blood-stained. He appears to have had considerable venous oozing during the night. Opened the flaps, and removed blood clots; found the bone protruding, and stripped of its periosteum, the adhesion of that membrane being so feeble that the retraction of the muscular fibre had stripped it from the bone; the medulla protruding, and, no doubt, suppuration commencing in the medullary cavity. The symptoms of toxæmia are already well marked and rapidly increasing—so much so that removal of the entire bone by amputation at the hip-joint seems to offer the only, though but a small, chance of saving life.

In consultation with my colleagues, the operation was decided on, and performed at 9 a.m. of July 4. The patient was brought under the influence of chloroform, and the limb removed by the antero-posterior flaps. He was very low during the operation, though he lost but little blood, the artery being commanded by Professor Partridge, whilst the limb was managed by Professor Colles.

Just after the operation, his pulse was 140, and very feeble; temperature 98°. He remained in a depressed state until about noon when imperfect reaction set in. When I saw him in the afternoon. his pulse was 140; temperature 104°.

5th.—7 a.m.: He is not doing well; passed a restless night, although he had an opiate; has taken some nourishment and stimulants; is delirious, and tries to take off his bandages. Pulse still 140, and at times it rises even higher; temperature 103°; breathing rapid, and the lung-sounds much as they were yesterday; no hæmorrhage from the stump; general tenderness over the abdomen; his tongue is moist and blanched; he is restless, and has a tendency to delirium. Stimulants and nourishments ordered to be given frequently. 3 p.m.: He is much in the same condition, perhaps weaker; pulse very rapid, over 140; temperature 103°; has had no rigors since the operation. Shortly after, his breathing became very hurried, and he sank at 11 p.m.

Post-mortem Examination at 9 a.m., July 6th.—Decomposition, owing to the great heat and dampness of the weather, proceeding rapidly. Thorax: Pleuræ contained some fluid, but there were no evidences of inflammation. Pericardium also contained more than the natural quantity of fluid. Heart healthy in structure; left ventricle contracted, and contained neither blood nor fibrinous clot; right ventricle contained a firm, flattened, and adherent decolorized clot extending far into the ramifications of the pulmonary arteries. The right auricle was stuffed with a firm white clot, supplemented by a more recent one. The obstruction evidently lay here. The lungs were blanched, some portions of them being quite exsanguine, others containing a little blood. They were both emphysematous and œdematous. No change of structure anywhere in either the lungs or liver. Abdomen: no signs of peritonitis; no extension of inflammation or suppuration into the abdominal cavity along the crural canal. Pelvic fascia raised; no suppuration found anywhere in the pelvis; liver and abdominal viscera pallid, but healthy. Nothing remarkable in the stump. Bone examined after amputation; medulla infiltrated with pus. Reaction after the hip amputation was never thoroughly re-established, and in this condition obstruction rapidly occurring in the right side of the heart, terminated life.

Remarks.—The immediate cause of death in this case appears to me to have been the formation of coagula in the right side of the heart, a pathological condition likely enough to supervene in the state of exhaustion—due to blood-poisoning in the first instance, and the shock of the amputation in the second—in which the patient was placed. The firm adherent decolorized clots in the right cavities of the heart, the plugged pulmonary arteries, together with the blanched emphysematous and œdematous lungs, clearly indicate this to have been the case. The earlier pathological condition of toxæmia was due, no doubt, to osteo-myelitis in the femur, setting in after the amputation at the lower third of the thigh. The absence of any structural change in the viscera leads me to suppose it possible that, had

the formation of coagula in the right side of the heart not occurred, and had reaction been more fully established, he might have recovered, as happened in the case of a young man whose thigh I removed at the hip-joint for osteo-myelitis some years ago, when the symptoms of pyæmia had well set in, but who recovered after the re-amputation, and is now alive and well. The occurrence of these clots is not unfrequent in pyæmic cases, and is the immediate cause of death in many; and it may be regarded as one of the dangers to be apprehended in cases where blood changes have taken place after surgical operations or wounds, and it is probably a frequent cause of death in those rapidly fatal cases of pyæmia in which no structural changes are found in the lungs, liver, spleen, or kidneys. No doubt death may occur from the intensity of the poison alone, without the presence of these fibrinous clots, or of the gangrenous patches and puriform collections we generally see in the lungs and other viscera; but I think that if such fatal cases were carefully examined it would be found that the fatal event might be traced to obstruction of the pulmonary circulation in the right side of the heart, more frequently than to the direct toxical effect on the blood and nerve centres. With reference to the modified form of circular amputation, I may remark that my method of performing it is as follows:—I cut through the integument an anterior and a posterior flap, exactly similar in form to those which would result from the double flap operation. The integument having retracted freely, aided by a few touches of the adherent bands of areolar tissue with the scalpel, I lay down that instrument, and with an amputating knife cut from without inwards, obliquely upwards, until very near the bone; I here, with one or two circular sweeps of the knife, divide the remaining muscular fibre and the periosteum, and next saw through the bone. This makes an excellent stump, without any redundance of muscle in the flaps; and it may be performed, in the absence of an amputating knife, with an ordinary scalpel. In making the posterior flap, it is necessary to raise the limb up in a vertical position in order to enable the operator to get

freely at the posterior part of the limb. I apply this principle in most amputations, and find that it answers admirably.

Case VI.

Amputation of the Arm at the Shoulder-joint for Osteo-myelitis—Death from Fibrinous Coagula in the Right Side of the Heart.

The following case is an exceedingly illustrative one, not only as to the disease in the bone, but of the pyæmic condition thereby induced. It shows how rapidly blood-poisoning may result from osteo-myelitis, and how necessary it is that the surgeon should be constantly on the alert, to detect the earliest symptoms of constitutional mischief, lest the time for re-amputation may pass, and the patient be left in a hopeless condition, with lungs or other viscera disorganized, and thus beyond the reach of surgical aid.

The disease, I am happy to say, has been comparatively rare in the hospital for the past eighteen months, and the present case is the only one that has occurred for a considerable time, showing, I think, that the diminution of the number of beds from 24 to 16 in each ward, and the introduction of other sanitary improvements, have had the effect of reducing this fertile source of pyæmia and death.

I do not assert that the hygienic improvements alluded to have been so effective as to remove all sources of surgical fever, or that the causes of blood-poisoning have altogether disappeared—far from it. I and my colleague Professor Partridge have observed that, whilst certain forms of disease that lead to toxæmia have diminished, such as osteo-myelitis, others remain as prevalent as formerly. Pyæmia from other sources still occurs; and that condition where death results from the formation of cardiac coagula is, if anything, more frequent than before.

The recurrence, occasionally, of a well-marked case of osteo-

myelitis and consequent pyæmia shows that the original causes, although much in abeyance, are not altogether extinct; and it also suggests the thought that even under favourable hygienic conditions, just as happens with other diseases, it may sometimes occur. To say that pyæmia only appears under unfavourable hygienic conditions, and in hospitals, is to say more than the truth. I have known the most flagrant examples of it to follow operations in isolated cases, treated under the most favourable circumstances, and where its causation could not be referred to any such origin.

The diffused form of suppurative inflammation in the medulla of a bone may, like other morbid conditions, occur sporadically, and when the patient is placed under the most favourable hygienic conditions; and therefore, after all operations involving section of bone, it is right to bear in mind the possibility of its occurrence, and to be prepared to recognise and deal promptly with the earliest symptoms. The danger is of interfering when it is too late. This interference is nothing less than the complete removal of the affected bone by amputation at or above the next joint, as amputation through the bone itself will rarely, I may almost say never, succeed in saving life.

B. L. B., a Hindoo boy of 9 years of age, was admitted May 21st, 1869, with a fracture of the radius and compound fracture and dislocation of the lower extremity of the right humerus. A portion of the articular surface of the humerus had been removed before admission, and the denuded and irregular extremity of the bone protruded from a lacerated wound in front and to the inner side of the joint. The lower end of the humerus was stripped of its periosteum for about an inch; but as the denuded bone looked pink and healthy, only the rough and irregular articular extremity was removed just above the condyles. The ulnar nerve was found stretched over the protruding bone, and was in a doubtful state of vitality. The brachial artery had escaped injury. The end of the bone having been removed, the fracture was reduced, and the wound

was dressed, the arm being placed on an angular splint on the radial side of the limb. His friends stated that fever came on daily in the afternoon, but on admission he was free from it. The edges of the wound were partially sloughing. It was dressed with petroleum, a substitute for carbolic acid that I have been using freely lately, and with very satisfactory results. Under this dressing the wound soon cleaned. On the 23rd water dressing was applied under the petroleum. He had also been taking salines when feverish, and quinine during the intervals. He was apparently doing well. On the 24th, in the morning, he had a rigor, and after it his temperature rose to 105°; this fell to 102° in the evening. Again on the 25th, at 1 a.m., he had another rigor. The temperature again rose to 105°, but at 7 a.m. he was quite free from fever, and the temperature had fallen to 98°. On the 26th, he had another rigor followed by delirium, which lasted half an hour. The temperature rose to 103°. On the 27th he had another rigor at 4.30 a.m. Although the wound and the bone looked healthy, I felt satisfied that pyæmia was rapidly setting in, and I suspected the bone, notwithstanding its healthy appearance, might be the cause of this; and I regret that I did not act on that suspicion on the first rigor making its appearance.

I amputated the arm on the 27th at 9.30 a.m. at the upper third, prepared to remove it at the shoulder-joint if necessary. On dividing the humerus, which looked perfectly healthy, I found the medulla full of pus, which evidently extended to the head of the bone. I at once amputated at the shoulder-joint. He bore the double operation well, and lost very little blood. The fever gradually subsided by evening, the temperature falling from 103° to 98° at 5 p.m. The following morning he had a return of fever, but the temperature did not rise above 101°, the pulse remaining soft and weak. He did not improve after this; the pulse continued rapid, the respiration hurried, and the temperature high (102° to 104°) until the 31st, when it began to decline. He had no rigors after the operation, but he complained occasionally of a sense of chilliness. The

tongue was generally coated and dry. The bowels acted freely, and diarrhœa occurred on the 30th. The abdomen became tender and tympanitic, peritonitis evidently setting in. The respirations were quick and irregular, and on the 31st the diarrhœa ceased. The kidneys acted well throughout. The urine contained no albumen and no phosphates, but a considerable quantity of bile pigment, and was slightly acid—sp. gr. 1·010. He sank, with hurried respiration and all the symptoms of cardiac coagula and of complete exhaustion, on the 31st at 4.30 p.m.

The post-mortem examination took place sixteen hours after death. Thorax : Bloody serous effusion in the left pleura and pericardium. Firm fibrinous decolorized clots in the right cavities of the heart. The left cavities contained some frothy black blood. The right pleura filled with a puriform fluid. There was a patch of dead lung of about one and a half inch square and an inch deep at the base of the left lung, and a number of smaller patches, varying from the size of a pea to a sixpence, scattered throughout the lung. These were of an ash or puriform colour, surrounded by areolas of condensed and congested lung-tissue, some suppurating, and all when cut into giving exit to fetid sanies and puriform fluid. In some there was a dark nucleus. These are the so-called pyæmic abscesses, and are described as such by Dr. Braidwood and others. They certainly do present the appearance of abscess in some cases, and when cut into real pus as well as puriform fluid may exude. The true pus is that which is formed round the dead tissue in the centre, when an effort is made to throw it off, the pus being the result, not the cause, of the death of the lung tissue. These local deaths are found also frequently in the liver and other viscera ; and to those who have had the opportunity of studying them in this climate, it seems odd how they can be confounded with ordinary abscesses, as is still so frequently the case. The surface of the lung was adherent to the parietes by a yellow, puriform, shaggy-looking lymph. The right lung contained a few patches of dead tissue, but not so many as the left. The

left axillary vein was not thickened, and it was healthy from the spot where it had been divided. Peritonitis of a low form was incipient. The bone was examined on the 27th, directly after the amputation, a section being made from end to end of the pieces. The medulla was full of pus up to the line of the epiphysis, but there it stopped. Here and there, where the cancellated tissue had broken down, there were small collections of fetid pus of the size of a split pea. The arrest of the suppuration was remarkably well shown at the line of the epiphysis. Part of the shaft was stripped of periosteum, but where it remained it was found to be thickened.

Remarks.—It appears to me that this is as typical a case of osteo-myelitis as we are likely to meet with. Unfortunately it has formerly been of very common occurrence here, and has given us ample opportunities of studying its pathology. That it is a certain cause of pyæmia there can be no doubt, and if it be not detected early, and treated promptly, the pyæmic (I use the conventional word) condition it induces is certain to cause death ; and the post-mortem appearances in this case well illustrate the nature of the pathological changes that precede death. These changes are effusion into the thoracic cavities, the formation of fibrinous coagula in the heart and pulmonary circulation, and the local death (not abscesses) of portions of the lungs, liver, other viscera.

FIBRINOUS COAGULA IN THE RIGHT SIDE OF THE HEART, AS A CAUSE OF DEATH AFTER SURGICAL OPERATIONS.

When a patient who has suffered from a serious injury, or who has undergone a severe and protracted surgical operation, succumbs within a few hours, we have no difficulty in assigning the cause of death to shock, nervous exhaustion, or prostration from loss of blood, and the concomitant injuries or wounds he has sustained. There is, also, nothing in the post-mortem appearances to indicate that any structural change, beyond the diminished quantity and impoverished quality of the blood, has preceded death; though, no doubt, were we capable of recognising them, physical changes, commensurate with the exhausted nerve force, would be found. Fortunately this is not a very frequent cause of death in civil hospitals, but on the field of battle and in military field hospitals, during action, it is of more frequent occurrence. It happens, however, sufficiently often to have been seen by most surgeons, and is one of the great sources of anxiety when we are compelled, by the urgency of the cases, to perform capital operations on those who from any cause have been previously much exhausted. I believe that if the accounts of such cases as have proved fatal after serious wounds or surgical operations, and are recorded under the headings of Shock or Exhaustion, could be thoroughly analysed, and the post-mortem examinations carefully revised, it would be found that a certain number of them were not due to the immediate effects of shock or nervous exhaustion, but to a pathological condition of quite a different nature, one which

has been but little studied as a cause of death after surgical operations and severe injuries.

Pyæmia, shock, gangrene, tetanus, and secondary hæmorrhage are the formidable complications which, even to the layman's mind, render all surgical proceedings replete with dread, and terribly does the first of these interfere with our success. But that a patient may have recovered from the shock and first effects, and subsequently perish from another cause differing from any of these, and yet directly traceable to the operation, is hardly generally known, and even professionally has received but little consideration. The cases I append are good examples of what I refer to, and merit consideration. The chief points of interest for consideration are that, in persons previously in fair health, a condition of the blood may be induced as the result of the effects of a severe injury, wound, or operation which has a tendency to cause the formation of fibrinous coagula in the cavities of the heart, which may, and do, prove fatal. Such being the case, what are the peculiarities in the individual, or his case, that predispose to this fatal alteration in the blood? And what measures can we adopt to prevent it? Can we in any way predicate the cases in which it may be looked for, and if the symptoms have occurred, can we do anything to arrest, obviate, or lessen the danger?

The condition to which I refer is that of obstruction of the right side of the heart, produced by the formation there of firm, white, fibrinous coagula by which the pulmonary circulation is embarrassed, and finally arrested, causing death. That these fibrinous coagula do form in the heart before, and that they cause death, there can be no doubt. It has been pointed out by Dr. Richardson, and I believe by others, that in the advanced stages of exhaustive diseases, such as diphtheria, cholera, pyæmia, &c., they frequently occur and rapidly prove fatal. Here, however, they are regarded as one of the results of the toxæmic condition, and not as the sole cause of death.

But what I wish particularly to point out is that, without the concurrence of ichorous toxæmia, and where in all other respects,

saving the effects on the system of the injury or operation, the patient is considered to have been in fair, if not good health, these fibrinous coagula may form, and slowly but certainly, and sometimes suddenly, destroy life, leaving no post-mortem evidence of disease, beyond their presence in the cavities of the heart and pulmonary vessels, with lungs often blanched from want of blood, and sometimes perhaps shrunken from the gradually diminishing quantity supplied to the obstructed pulmonary vessels.

It is to this condition then, as a cause of death independent of other complications, that I refer; and I propose to notice the symptoms by which it indicates its progress, and the appearances left when it has caused death.

I would repeat that as a condition supervening in the advanced stages of pyæmia, we are familiar with it among surgical hospital patients. It frequently indeed in such cases proves rapidly fatal; but in that form, uncomplicated with ichorous toxæmia, it is fortunately more rare.

In the first two of the following cases there was nothing peculiar in the individuals to suggest the probability of this result. They were, it is true, neither very vigorous nor young persons, but they were quite as young and strong as many who recover without an unfavourable symptom from operations not less severe. The loss of blood, it is to be observed,—and this I think is a point of importance,—was in each case rather more than usual, and was much felt. The operations themselves were also, owing to the hæmorrhage, somewhat unusually protracted. It will also be observed that death did not occur in either case until the eighth or ninth day after the operation, though the symptoms of obstruction made their appearance very early.

The symptoms of this form of obstruction differ somewhat from those of the form which supervenes in pyæmia or other blood disease. There is less heat of skin in these cases. The temperature did not at any time rise above 102°. There are wanting all the constitutional symptoms of pyæmia, the rigors, sweats, and peculiar tinge of the skin, with the changes in the

urine, and excretions from the lungs and skin. But there is sometimes a peculiar appearance of hebetude or fatuity in the countenance, accompanied by incoherence, and even delirium, with great restlessness. A feeble and irregular pulse, excited though feeble action of the heart, dyspnœa and hurried respiration, all tell of the struggle nature is making against an enemy that is rapidly sapping and taking possession of the very citadel of life itself. After death, the post-mortem appearances reveal the coagula firmly impacted in the auricle, ventricle, and pulmonary vessels, like the branches of a tree, entangled in the cords or moulded on the valves, leaving it a mystery how the circulation had been carried on thus far. That such changes should take place in cases of blood-disease, where from hyperinosis, lowered vitality, or other causes, a preternatural tendency to clot exists, and where the natural nutritive relation between the tissues, the blood, and the innervation must be disturbed, does not, though it may be unexplained, seem strange; and the fibrinous coagula which intervene and carry off the patient, are regarded as one of the events to be expected in the course of the disease. But when, as I have before said, a person previously healthy so suffers after a surgical operation or severe injury, we cannot avoid the conclusion that the shock of the operation, the relative or absolute loss of blood, and other changes which consequently occur in the tissues, must have much to do in bringing about this dangerous disease. It is also highly suggestive of the necessity for ascertaining the state of our patients' health, and their freedom from the complications of visceral disease, before we submit them to the chances of this danger. I am now alluding to that form of obstruction in which the right side of the heart is affected. With that of the left, and the arterial system, I am not at present concerned, though it is a subject equally worthy of attention. Obstruction, as it happens in the right side of the heart, may occur partially, to a slight extent, and be recovered from. It may be more extensive, and slowly but surely destroy life. It may be sudden and complete, and prove suddenly fatal, by withdrawal of blood from the pulmonic circu-

lation, syncope or cardiac apnœa carrying the patient rapidly off. It is to the second class of cases that I am now referring, as they are illustrated by two examples, each of the greatest interest.

In such cases as these now recorded, death is, I fear, generally the result. In the minor cases, death may also occur at a later period, when the coagulum has been disintegrated and washed away as *débris*, which, as smaller emboli, finally obstruct the capillary pulmonary circulation, and cause local death, suppuration, œdema, or hæmorrhage of the lung. Such indeed are the frequent results of this form of obstruction as it occurs in pyæmia. I intentionally avoid any allusion to embolism or thrombosis in other parts of the venous or arterial system, although there is much of interest to be said on that subject, and the history of puerperal patients especially furnish many facts not less interesting than important. The sudden deaths from causes apparently altogether inexplicable, the phlegmasiæ, cellulitis, abscesses, phlebitis, partial or entire paralysis, aphasia, and other forms of disease which we so frequently meet with, or hear of, will, in many instances, receive their best solution by the study of embolism in one or other of its venous or arterial forms.

The earliest symptoms of clotting in the heart should be sought for in all cases of operations on debilitated persons; and such remedies as the pathological condition suggests, should at once be administered, though, I fear, but with little prospect of success. Stimulants and such agents as may be, however slightly, expected to aid in producing solution of the coagula, or in resisting their further increase, should be freely and frequently given, the strength being supported by the most nutrient diet, and the hygienic conditions of the patient rendered as favourable as possible—brandy, ammonia, ether, eggs, and animal broths, with counter-irritation over the heart and a current of galvanism to increase its failing action; for, no doubt, its diminished movements, with cavities imperfectly emptied of blood, and but partially contracting at each hurried systole, together with a preternatural tendency of

the blood to clot, have much to do with the commencement and subsequent growth of the coagula.

According to Dr. Richardson, all the alkalies have this solvent effect to some extent, and he especially recommends the carbonate of ammonia in frequent and full doses, for its double properties as a powerful stimulant of the heart and muscular systems, and a solvent of fibrine. This is very admirable in theory, but it requires confirmation. In those cases where the dangers of complete obstruction of the pulmonary circulation have passed over, and there is yet the *débris* of the disintegrating coagula to be disposed of, there is still danger of capillary embolism, and the train of perils it involves, to be provided against. The use of the same class of remedies is again indicated; quinine, iron, and other tonic and invigorating drugs, with such local and constitutional measures as may tend to obviate the evil results, must be freely resorted to.

For the present, as I have before said, I have confined my remarks to the dangers of complete obstruction of the right side of the heart in persons who have undergone severe operations or sustained serious injuries, and in whom the tendency to this destructive formation of fibrinous coagula owes its origin apparently to the operation as the prime cause.

Case I.

Gooray Shaik, aged 50 years, a Mahomedan husbandman, was admitted on the 26th January, 1866, with elephantiasis of the scrotum, said to be of 25 years' growth.

Stated that it had been growing rapidly for the last five years, but the fever which occurred formerly once in a month ceased to recur three or four years ago. The fever was not in this case synchronous with the lunar changes, but with each accession the scrotum inflamed. This was much hypertrophied, and was nodular on the surface, the right side being larger than the left. The penis was embedded in the mass of the tumour. The patient was an elderly-looking man, and said that his general health was otherwise good.

He was kept under observation till the 1st February, when, nothing contra-indicating, the operation for the removal of the tumour was undertaken. It was completed within two or three minutes, but the patient lost a good deal of blood during the ligature of the vessels, some of which bled freely. The tumour weighed 4 lbs. About sixteen vessels were ligatured. There was no hydrocele on either side. Tinct. opii ℥ss., brandy ℥ij., and beef-tea Oj. to be given during the day.

5 p.m.—There was much bleeding from the wounded vessels; secured by ten more ligatures; pulse weak. Repeat brandy and beef-tea.

2nd.—Pulse 128, very weak; tongue dry; vomited three or four times; no more bleeding. Brandy and beef-tea to be given during the day.

3rd.—Pulse barely perceptible; is very low; tongue dry; extremities cold. Brandy ℥ss., ammon. sesqui-carb. gr. v., in beef-tea ℥j. every hour.

4th.—Pulse 128, but very weak; respiration 29; skin of natural temperature; tongue moist; took very little food. Continue medicine.

5th.—Is apathetic; pulse same as before; wound looking healthy. Continue.

6th.—Pulse 128; respiration 32; no cough; respiration natural; heart's action weak and irregular; no murmur with the heart-sounds; pulse more distinct, but soft and intermittent; appetite bad. Continue medicine; mustard plaster over the heart.

7th.—Pulse barely perceptible; is very restless; occasional hiccup; tongue smooth, and inclined to be dry. Continue medicine every half-hour.

8th.—Same as before; complaining of a pain on the right hypochondrium. Continue.

9th.—Died at 4 p.m.

On post-mortem examination there were found whitish decolorized clots in the right auricle and right ventricle of the heart, extending into the pulmonary artery, and into all its

minute ramifications within the lung. These, when removed and spread out, had a beautiful arborescent appearance. The pulmonary veins were also plugged with similar clots, which extended into their branches and filled the left auricle. The other organs were healthy. There was no disease of the viscera, and nothing to indicate pyæmia.

Case II.

Jadoo, a Hindoo, aged 45 years (looking more than 50), was admitted, on the 24th August, 1866, with a scrotal tumour of two years' duration. It commenced with an attack of fever, when the scrotum inflamed. The fever subsided and the pain in the scrotum passed off, but the swelling remained. With each access of fever the bulk of the scrotum had increased, until it had reached the size of an adult head, when he came for relief. Had been attacked by fever twice in a month, which occurred generally, he said, at about the period of the lunar changes.

The patient was an elderly, nervous-looking man, fidgetty and restless in manner. General health pretty good. The urine was examined: reaction neutral, sp. gr. 1007, no albumen, no sugar. Whilst under observation he became impatient to be operated on. The tumour was removed on the 3rd September. It weighed 3 lbs. 1 oz., besides the hydrocele fluid on the left side, which amounted to about 10 ozs.; 25 ligatures were applied; lost much blood; spermatic cords elongated; testicles healthy; pulse was weak during and after the operation, and he took chloroform so unsatisfactorily that it had to be intermitted once or twice on account of unfavourable symptoms. Tr. opii ℥ss. statim; brandy ʒiv., beef-tea Oij. during the day.

6 p.m.—Slight bleeding from the wound, arrested by the application of three ligatures. Pulse of pretty fair strength; no fever. Took his food.

4*th*.—Pulse 104 in the morning, and 136 in the evening, small and weak; tongue dry; no more bleeding. Brandy and beef-tea. Continue milk and sago.

5*th.*—Pulse 120 in the evening; temperature 101°; tongue pale and moist; occasionally delirious; nervous and incoherent in manner; no sloughing of the wound; no stool.

Ordered.—Ammon. sesqui-carb. grs. x., brandy ℥jss., beef-tea ℥ij. every two hours; cathartic enema; sinapism over the heart.

6*th.*—Frequent attempts to get out of bed; limbs shaky; talks incoherently; no stool; pulse weak as before. Continue medicine and diet.

7*th.*—Wandering continues; not boisterous, except at the time of dressing, when he shouts loudly, tries to bite the dressers, and obstinately resists; wound looking pale; pulse weak, 120; temperature, 102°; two stools; takes food badly. Continue.

8*th.*—Pulse 132; temperature 102° at evening; saccharine odour from the body; tongue dryish and furred; delirious occasionally. Continue medicine every 2 hours. Brandy ℥j, spt. ether sulph. ℥ij, beef-tea ʒss. as an enema every 6 hours. Mustard plaster over the heart, and galvanism frequently.

9*th.*—Pulse 128; temperature 102°; respiration 38, same as before; no cough, no tenderness over the liver; heart-sounds weak; air entering freely into the lungs. Continue.

10*th.*—Pulse barely perceptible; was very noisy in the night; respiration hurried; speaks with difficulty.

Died at 11 a.m.

Autopsy.—A firm, yellow clot in the upper vena cava extending into the right auricle, which was pretty nearly filled by it. The clot extended into the right ventricle, through the tricuspid valve, and thence into the pulmonary artery and all its branches. The pulmonary veins were filled with similar clots, which passed also into their ramifications and filled up the left auricle; left ventricle empty. There was a clot in the aorta, which was adherent to the sigmoid valves and ended in a free extremity beyond the origin of the left subclavian artery, where it was floating loose within the calibre of the vessel. The lungs were blanched and seemed rather shrunken. Other organs healthy, except the kidneys, which were pale and flabby.

The following are other examples of fatal termination from this cause :—

Case III.

Opening of a Sinus in the Gluteal Region.—Speedy Collapse.—Fibrinous Coagula in the Right Side of the Heart.

A Hindoo shopkeeper, named Indo Narain, aged 38 years, was admitted the 27th March, 1867, suffering from a deep sinus running under the gluteal muscles. He gave the following history of his case :—About a year ago he had a bubo in each groin ; they suppurated and were opened. The wounds were healing, when about two months later, a swelling appeared in the lower part of the right gluteal region. This was opened, and a quantity of pus and blood evacuated. The sinuses in the groin healed, that in the gluteal region continuing to discharge. He was a sickly-looking man, but in tolerably fair condition. Seemed to be suffering much from the sinus, which was situated at the lower margin of the right gluteal region, and through which a long probe passed for four or five inches under the gluteus maximus. As pus appeared to lodge, and as the discharge was also profuse, and the end of the probe when pressed coming so near the surface as to be felt beneath the skin, I made a counter opening, and to encourage the outward drainage of pus, drew a tape, to act as a seton, through the sinus.

During the next two or three days he had fever, which had passed off by the 31st. The pulse was weak. Deep fluctuation was felt below the great trochanter, and an incision gave exit to some fetid pus and gas.

April 1st.—Pulse weak and soft ; no appetite. Discharge fetid and thin. Incision enlarged. Brandy and beef-tea frequently, and bark with ammonia every four hours.

2nd.—Pulse 112. Respiration 103. Tongue moist and clean. During to-day he vomited frequently, and gradually sank, dying soon after 4 p.m.

The post-mortem was performed the following morning. Left lung much congested. Right lung contained a small tubercular cavity at its apex. No pyæmic patches. No pleuritic effusion. The right auricle and ventricle of the heart completely stuffed with firm fibrinous coagula, extending into the pulmonary arteries. Left lobe of the liver much enlarged; its substance soft and fatty. Spleen much enlarged; kidneys flabby and their capsules easily detached. The sinus was laid open; it ran under the gluteus maximus, and had no communication with the bone. The tissues in the neighbourhood were in a state of decomposition.

Remarks.—The fatal termination of a case of this kind, apparently so simple and unimportant, is well calculated to impress on one the fact that dangers of the gravest character may result from surgical operations; and it proves not only how important it is that everything connected with the hygienic condition in which the patient is placed should be duly considered, but that his individual peculiarities should also be studied. It has been truly said that, taking the average results of all operations into consideration, a patient who is placed on the operating table undergoes greater risk than that to which a soldier is exposed in the most sanguinary battle, and this probably rather understates, than exaggerates, the danger. The immediate perils are by far the least important, and the mortality arising from them is infinitely less than that from the more remote and secondary accidents to which surgical patients are liable; and the importance and influence of which on the death-rate after operations and accidents have been more and more studied and appreciated since Dr. Chevers, then a young physician of Guy's Hospital, drew attention to them twenty-five years ago. No subject, probably, has been more investigated of late years than this, and a vast amount of information has been collected, and light thrown on it, by German, French, and English pathologists.

The tendency, however, it appears to me, in the present day, is to attach too much importance to causes external to the individual, such as defects of hospital hygiene, and too little to

individual peculiarity; although to deny the influence of the former or their due share in causing the mortality in question, would be to reject evidence that is simply incontrovertible. So far from undervaluing it, I regard the question of hospital construction as one of the greatest importance, and which, if neglected, must be attended with the worst results. But I am satisfied that, when all has been done that science and experience can dictate as essential to the perfect construction of a hospital, or of a single ward, much still may remain in the condition of the patients themselves, that will go far to frustrate our best endeavours, and interfere with success; and that, do what we may, to ensure their well-being, a certain class of diseases, resulting from changes in both the vascular and nervous systems, will, in a certain proportion of cases, still occur. That these will be less frequent when the hygienic conditions, under which the patient has previously lived and is actually placed, are favourable, there can be no doubt; and hence the urgent necessity of insisting on the most perfect hospital accommodation that can be obtained. But it is equally necessary that the condition of the individual should also be known, for on the integrity of his vital organs, not less than on the circumstances in which he is placed, depends the issue of an operation.

Of the large group of pathological conditions by which death is caused after surgical operations and accidents, it would be interesting, and profitable for our future guidance, to ascertain why one should prevail in a certain hospital or locality, whilst in another, perhaps apparently similarly circumstanced, a different class may set the surgeon's efforts at defiance—why, for example, in one hospital gangrene, in another erysipelas, in a third, pyæmia should prevail. These conditions are, no doubt, closely allied to each other, and the discrimination might not be of any great practical importance, unless it enabled us to do away with the evil; but still any light thrown on the subject would be valuable, and might lead to a better appreciation of the real nature of ochletic disease.

The formation of fibrinous coagula in the cavities of the heart, or in the great vessels, is a condition which we know is liable to occur in the later stages of numerous diseases, and probably it is the actual cause of death in many, being itself due to the altered and hyperinotic condition of the blood—perhaps to some extent to the diminished vitality of the tubes and cavities in which it circulates, and to altered or defective nerve force. It is not only to its occurrence under these circumstances that I now allude, but to the fact that it is a danger to be apprehended after any severe,—indeed not always severe,—operation or injury, and may occur independently of those signs which indicate the toxæmic state of the blood we so frequently see in hospital patients in large cities, where not only are the hygienic conditions defective, but the people themselves are anæmic and wanting in vital energy. It is right, therefore, that this source of danger should be borne in mind, and that in any case where a tendency to exhaustion or anæmia exists, particular attention should be paid to the diet, and administration of such remedies as may tend to counteract the spanæmic condition, which we may fairly assume to exist when these symptoms appear. In the preparation of patients for an operation, as well as in their treatment afterwards, it should be borne in mind that iron and nutrients should be freely given to improve the condition of the blood. Hyposulphites, according to Polli, alkalies, according to Richardson and others, are indicated; the former to limit the development of poison germs, the latter to obviate the tendency in the blood to clot. Above all, plenty of fresh air, to oxygenate the blood and tissues. Such, no doubt, are the measures of a therapeutic and dietetic nature from which we may hope to derive benefit, and in these are implied not only proper aliment, but all favourable hygienic conditions. In many cases, the supervention of this obstructed condition of the right side of the heart is the precursor of speedy death, but not necessarily always so; and doubtless a certain amount of clotting is frequently recovered from, or its effects are seen in a secondary form in the changes which occur in the lungs, as the result of

the capillary embolism to which its *débris* may give rise. In those cases wherein it proves fatal, the end is speedily brought about by the rapid and sudden withdrawal of blood from the pulmonic circulation, syncope, or cardiac apnœa closing the scene. The earliest symptoms of weakness, failing pulse, coldness of the extremities, with rapid action of the heart, pallor or lividity and hurried respiration, should receive due attention; and in some cases, I believe, that, provided no other changes have occurred in the viscera, as a result of septic absorption or obstruction, the timely administration of remedies such as I have indicated may avert the danger and save life.

The case I have noted here is a sufficiently illustrative example of the conditions I have been describing. It is true there were post-mortem evidences of visceral changes of a chronic nature, but they were principally such as tend to induce the condition in which fibrinous clots are most likely to form, by interfering with the due elaboration and development of healthy blood. For if there be any one condition more than another unfavourable to such development, it is that disordered state of the blood-making organs so frequently found in this and all malarious countries. It is, I believe, only right that in estimating the respective influences of the various causes by which life may be endangered or lost, after surgical operation, that we should take into consideration the malarious state of the climate, and its effects on the people; and, whilst I admit that much of the mortality may be due to intrinsic causes, I feel strongly, more than ever, the paramount necessity of having hospitals to treat such people in that will, at least, place no obstacle in the way of their recovery.

Case IV.

Gangrene of the Integument of the Leg from a Contusion.—Fatal termination due to Splenic Cachexia and the formation of Fibrinous Coagula in the Right Side of the Heart.

A Bengali student named P. D., aged about 20, was admitted on the 15th of April, 1870, suffering from the results of a contusion on the right leg. He stated that he tripped and fell over some bricks eight days before admission, and thus bruised himself, but was not seriously hurt. The part became painful, the leg swelled, and being unable to walk, he came to the hospital. He had been suffering from frequent attacks of malarious fever, and enlargement of the spleen, for the last five months; his appearance confirmed this statement.

The surface of the contused and abraded integument had been weeping a bloody sanies for three days, and for four days he had been unable to rise from his bed. The leg and knee were œdematous. The bruised portion, which was just below the knee-joint, looked as though it were becoming gangrenous. The temperature was low, and sensation was diminished, the limb being generally painful. He was depressed; pulse small and feeble. No diarrhœa. He was ordered stimulants and quinine. Carbolic oil dressing was applied to the seat of injury.

He remained in this state for two days, during which time the injured part became gangrenous to the extent of about two inches. The respiration began to be hurried on the 18th: slight return of fever in the evening, but the temperature in the axilla not being above 99°·4, and generally much lower. Ammoniacal stimulants were given both by enema and in the usual way, but there was no improvement. The respiration became more gasping and hurried; no murmurs were heard over the pulmonary artery. The heart's sounds became more feeble, the respiratory sounds gradually diminished; and in a state of extreme cardiac apnœa, he died at midnight of the 20th.

The post-mortem examination was made on the 21st. The liver was of normal size, but discolored from commencing decomposition. The spleen was much enlarged. The kidneys healthy. The lungs were somewhat congested hypostatically, and a portion of the lower lobe of the right lung was consolidated. On opening the heart, a firm fibrinous coagulum was found extending from the right auricle, where it was reddish, into the ventricle, where it was straw-coloured, and thence, firm and fibrinous, into the pulmonary artery and its minute subdivisions. A similar one was found in the left cavities, extending into the aorta. The integument was gangrenous for several inches down the leg. The knee-joint was not compromised, and, on being laid open, its structures were found to be normal.

Remarks.—There was certainly not sufficient in this case, in the mere gangrene of the integument of the leg, to account for death in an ordinary individual; but in a person suffering from malarious blood-poisoning and enlargement of the spleen, it was more than sufficient. Probably in no condition of disease is the formation of fibrinous coagula more likely to occur, on the least disturbance, than in splenic or malarious cachexia. In a marked case, such as this, where the spleen was four or five times its natural size, it may be said that there is nothing remarkable in its termination; for do we not see such almost daily in the cases of cancrum-oris, sloughing ulceration, and necrosis, that are unhappily so common in Bengal, and probably in other localities wherever that condition called "malaria" is rife? The imperfect condition of the blood-making organs, and the impoverished character of the blood they elaborate, are amply proved and demonstrated in the anæmia, and in the great tendency to disintegration and death of the soft tissues and bones. The evil results of hyperinosis are seen in the limbs or other parts of the body, which become gangrenous from embolism when it occurs in the systemic or arterial circulation, and œdematous or gangrenous, when it occurs in the venous system; or still worse, in the multiple deaths of portions of the viscera which are so frequently observed in the so-called pyæmic con-

ditions generally met with after wounds and injuries, though by no means unfrequently, idiopathically.

But it is the formation of the fibrinous coagula at the very fountain-head, in the cardiac cavities themselves, that I would especially notice, and particularly that form of it which, occurring in the pulmonary side of the circulation, is so frequently fatal to life. I have repeatedly called attention to the subject, as one of great importance in a surgical point of view; for it is not only in cases where an enlarged spleen renders almost any operation impossible, and causes almost any wound to prove fatal, but in many others, whether of wound or injury, where there is no obvious disease of the spleen, and where all seems to be, and to promise well, that this may and often does supervene and rapidly carry off the sufferer. The condition is one most common in exhaustive diseases, and it is, no doubt, often one of the latest pathological phenomena manifested by the moribund; but it is more than this, for, as I have said, it may set in where there is no appearance of exhaustion, when repair and nutrition are going on satisfactorily—and within twenty-four or forty-eight hours carry off the patient, whose body presents no solution of the cause of death beyond a firm, white adherent clot in the right auricle, or ventricle, or it may be just at the ostium of the pulmonary artery, which is indeed the *janua vitæ*.

This condition of fibrinous coagulation taking place in the right side of the heart or in the pulmonary artery, is one of the dangers that the subject of a surgical operation, wound, or injury has to encounter, and not merely as the last act of a series of pathological processes—the result of exhaustive or prolonged disease—but as an original and dangerous consequence of some blood-change that has taken place as a result of the operation. What the nature of this change may be I am uncertain. It is an imperfect, or rather a post-perfect, condition, that may perhaps arise out of the presence of matters retained in the blood that should have ministered to the nutrition of the part removed, in cases of amputation or ablation of parts of the body—a con-

dition somewhat analogous, perhaps, to the retention in the body of a secretion that should have been eliminated. Or in cases where no removal of parts has occurred, it may be due to some disturbed condition of innervation, in which the blood itself is imperfectly elaborated, and rendered prone to this fibrinous coagulation. I have a strong suspicion that climatic influences are not without influence in originating this dangerous state. In Bengal, all are more or less under the influence of malaria; it is true, happily, that in a large majority of persons its effects are not generally perceptible, and malarious or splenic cachexia, though common, is not universal. Still no doubt all are more or less affected; and, as I have on another occasion remarked, an attack of ague and fever is perhaps one of the least common ways in which it expresses itself. As we know that in aggravated cases of malarious poisoning, death of tissue and hyperinosis are common, so it is very possible that a more or less malarious state of the blood may determine their supervention in many of the cases that occur in this country after wounds or operations. My recollection of the causes of death in Europe after operations and wounds is not sufficiently accurate to enable me to institute any comparison from personal experience; but from what I have read and noted of what is said on this subject by authorities, I am inclined to think that either this cause of death is very unfrequent there, or has been but little noticed.

I do not wish it to be understood that I regard this as altogether due to a malarious condition of the blood. I know that, although it may not have been noticed as a result of surgical operations, Dr. Richardson long ago pointed out its tendency to occur in exhaustive diseases, under circumstances which, however low and depressing, were not, at all events, suggestive of what we understand by malaria in this country. But I cannot help thinking that a pathological state capable of producing so many important changes as malaria does, may have something to do with this one also.

In considering the question of a surgical operation here, one of the first and most important inquiries made is, whether there

be any indication of malarious blood-poisoning, as evidenced by anæmia, enlarged spleen, or liver. Such conditions being present, no operation that is not necessary to preserve life from present and imminent danger is to be attempted. And if the urgency of the case should be such as to demand an operation; or if in those doubtful cases where one has to balance between the present inconvenience and the remote dangers of some surgical condition, or the evil chances of a state of health which, though perhaps not absolutely indicative of malarious poisoning, is not free from a suspicion of it, we do operate, we know that either gangrene of the wound, some pyæmic condition, or the sudden, rapid, and fatal fibrinous formations in the right side of the heart are to be dreaded.

In the number of the *Edinburgh Medical Journal* for April, 1870, p. 883, I noticed the following remark by Mr. Annandale, one of the most scientific of the rising generation of surgeons, in reference to an amputation at the hip-joint:—

"The disease in this case was a cancerous tumour affecting the lower third of the femur, and the patient lived until the fifth week, when he was suddenly seized with difficulty of breathing, and died forty hours after. The post-mortem examination of this patient showed a partially decolorized clot in the pulmonary artery. The surfaces of the flaps were firmly united; there was no abscess in the acetabulum; there were no morbid traces of pyæmia."

I have no doubt that if Mr. Annandale will remark the causes of death in all fatal cases that occur after great operations, especially where there is a constitutional cachexia, or where a large portion of the body has been removed, he will find that this one is not unfrequent. If such be the case, we can easily understand how it is that the group of unfavourable conditions, making up what Sir James Simpson calls "hospitalism," with malarious cachexia superadded, may determine the occurrence of these coagula; and an additional reason is furnished for the isolation and segregation of surgical patients who have to undergo, or who have undergone operation, as also for the

necessity for most watchful care and prophylactic treatment, both before and after the operation.

Case V.

Urethral Fever.—Death from Fibrinous Concretion in the Right Side of the Heart.

W. H., æt. 39, an English sailor, living in Calcutta, a powerful, muscular man, and apparently in perfect health previous to the 18th of June, 1870. On that day he suffered from retention of urine, which he attributed to a slight excess in drinking a day or two before. On the morning of the 19th he applied for relief at the out-patient department, and said he had suffered from slight stricture for the last five or six years, and that, on several similar occasions, he had had retention of urine. No. 8 catheter was passed without difficulty, and the urine drawn off. He would not remain, although invited to do so, for treatment of the stricture. In every other respect he appeared, and said he was, perfectly well. He was a remarkably fine-looking man, and very intelligent.

He returned to the hospital at 3 p.m., saying he felt very ill, and was in great but undefined distress about his stomach. He was at once admitted, and the following account was given of his condition since the morning. Soon after the catheter was passed he had a chill (probably a rigor) and then became feverish, very restless, and so delirious that his friends were obliged to bring him to the hospital. It appears that he had passed some urine tinged with blood after his return home; his bladder was apparently empty on admission. He was feverish and restless, evidently in great distress, complaining of intense thirst and pain across his abdomen or lower part of the chest. There was some tympanites and the tongue was coated. A cathartic enema and hot fomentations to the abdomen appeared to give him relief. Two cathartic pills were ordered at bed-time. On the 20th

the pain seemed to have localized itself in the right hypochondriac region, and there was excessive tenderness on pressure over the liver; his breathing was hurried, and his countenance anxious; he still seemed in considerable distress.

He had had several loose but scanty motions during the night; no urine had been passed since admission, but he may have passed some at stool. There was now found to be dulness on percussion over the base of the right lung. The breathing was hurried and gasping, but air entered freely into the lungs. Turpentine fomentations. Effervescing draughts with etherial and ammoniacal stimulants were freely given. Sinapisms were applied over the heart.

The distress rapidly increased; the breathing became more hurried and gasping, and he complained not only of this, but that something was choking him. A stimulating emetic was given, which acted slightly. At about 10.30 p.m. he passed water. No improvement, however, took place; repeated stimulants were administered by the mouth and rectum. The difficulty of breathing increased, and he died, as the house surgeon's notes have it, "in a sudden fit of gasping," a few minutes before midnight. He was perfectly rational and conscious from the time of admission to the moment of his death, and his struggle for breath was most distressing to witness.

The weather being very wet and damp, the body was examined ten hours after death. The lungs were hypostatically congested, the right most so, and one portion of the middle lobe was solidified, and contained a small patch, the size of a pea, like a pyæmic patch. The lower lobe was also hepatized. There were one or two very small patches of tubercular deposit in the apices of the lungs; with this exception, they were healthy and crepitant throughout. The pericardium contained a small quantity of straw-coloured serum. The heart was normal, but its cavities contained firm adherent fibrinous clots. That in the left side extended from the auricle into the ventricle and into the aorta for about three inches. That in the right was larger,

and extended from the auricle, through the ventricle, into the finer ramifications of the pulmonary artery. The pleuræ were normal.

The liver was rather large, but apparently otherwise normal. There was no sign of inflammation in its substance or on its surface. The spleen was natural. The kidneys were congested, and large; their capsules easily separated, and granular degeneration was apparently commencing. The other viscera and the peritoneum were perfectly healthy. The bladder was somewhat thickened, and the urethra was slightly strictured, in front of the bulb. There was no wound, but it was a little congested, where it had bled after the catheter. There was no false passage. The prostate was natural, as were the tissues about the neck of the bladder.

Remarks.—This is a very striking and interesting as well as instructive case. A man in the prime of life, in good health, with the exception of a slight stricture, which was only troublesome when irritated into spasm by such irregularities as that of taking a little more beer than usual; a steady, intelligent, and otherwise temperate person, suffers from retention of urine, due to a slight excess a day or two previously. He applies for relief at the hospital, and is relieved at once by the passage of a No. 8 catheter. He returns home, feels chilly, has rigors, rapidly followed by fever and delirium; he passes urine tinged with blood after his return home. The fever is attended with intense restlessness and distress; severe pain in the right hypochondriac region and pit of the stomach follows. Rapid, deep, and gasping breathing, with the greatest præcordial distress increase, and go on getting worse and worse, until the patient dies in great agony of breathlessness about forty hours after the catheter had been passed. His intellect was perfect to the last; urine was secreted and voided not long before death. It is clear therefore that the symptoms were neither due to uræmic nor cholæmic poisoning nor to any cerebral disorder.

There was nothing to point to cholera or other exhaustive disease as the cause of death. Air entered the chest freely, and

his voice was natural to the last. He did not die of asphyxia. The sounds of the heart were normal, and heart disease was not present. There was evidence of neither peritonitis nor other acute inflammation. What, then, was the cause of death?

The post-mortem examination revealed a congested state of the base of each lung with consolidation of a small portion and a patch of broken-down tissue about the size of a pea. The pleuræ were healthy, and the pericardium contained a small quantity of fluid. Neither of these conditions were sufficient to cause death. The abdominal viscera it is true were not absolutely healthy, for the liver was slightly enlarged, and the kidneys were congested and in an incipient state of degeneration. The bladder, prostate, and the tissues about its neck were generally healthy. The bladder was somewhat thickened, in consequence of a slight stricture situated just in front of the bulb of the urethra. Through this an instrument had been passed. There was nothing in the abdomen to account for death. But on opening the heart, it was evident that the diagnosis was correct, and that the formation of fibrinous coagula had destroyed life. They were firm, decolorized, and adherent, and on the right side not only obstructed the auricular, ventricular, and arterial openings, but extended far into the subdivisions of the pulmonary arteries, ramifying like the branches of a tree.

I have repeatedly noticed this condition as a cause of death in surgical cases, but I have never seen one more striking or more uncomplicated than this, and it is another illustration of a pathological law of great interest. I have before expressed my suspicions that malaria has much to do with inducing the condition of blood in which this fibrinous coagulation occurs, as a result of some disturbance of the innervation by a surgical operation. In this case the simple act of passing a catheter through a slightly strictured urethra was the exciting cause. The patient cannot be said to have been, strictly speaking, in a healthy condition, although he appeared in perfect health, and no lesion was discovered that would account for death. Sufficient, however, existed to suggest how, with the addition of the shock

of the operation, and the consequent urethral fever, the fatal blood-change and consequent cardiac apnœa were brought about.

Something was said about his having recently suffered from intermittent fever, but there is no precise information on the subject recorded. Be that as it may, he had none of the appearances of a person suffering from malarious cachexia. But no one in Bengal can be said to be exempt, especially at that season of the year; and I am convinced that this malarious influence which affects all, more or less, is in persons of irritable constitution, and especially in those suffering from stricture, a predisposing cause of that dangerous condition, urethral fever, in which, under certain conditions, fibrinous coagulation is likely to occur.

It has long been known that death may occur rapidly from this cause in puerperal patients, and that in diphtheria, croup, cholera, and other exhaustive diseases, it is not by any means unfrequent; and in such cases, where the blood must necessarily be in an altered condition, and the muscular fibre of the heart weak, although the precise nature of the change may be unknown, it is not difficult to understand why the fatal result should occur. But in cases such as the preceding, and in many others where fatal cardiac apnœa has supervened suddenly from fibrinous coagulation, obstructing the pulmonary circulation after surgical operations, when the patient appeared to be doing well, it is more difficult to comprehend.

I allude especially to that form of cardiac apnœa, due to obstructed pulmonary circulation from fibrinous concretion in the right cavities of the heart, occurring in persons in whom there are no obvious indications of cardiac disease. That it occurs in such persons is the more reason why, in a hot and exhausting climate, it should take place in those who are the subjects of fatty degeneration of the heart, when the heart, though not itself adipose, is loaded with fat externally, or where there are either pleuritic or pericarditic effusions, or the ventricles are dilated and the muscular fibre atrophied. In such persons, indeed, the presence of fibrinous concretion may not be needed

to bring about the fatal apnœa. The temperature of a night in May or June, in Calcutta, the shock or after-effects of an operation, may be sufficient, and the patient, after a short and distressing struggle of breathlessness, perishes, notwithstanding every effort that can be made to save him. But I would repeat that, when it occurs, as it occasionally does to a person in the prime of life, and in whom there is no reason to suspect any such predisposing cause, it becomes a subject of very important inquiry as to what is the determining cause of this dangerous condition, and it indicates another among the many recognised dangers to be apprehended by the surgeon.

Case VI.

Recto-vesical Fistula, and Vesical Calculus.—Death from Pyæmia, and the formation of Fibrinous Coagula in the Right Side of the Heart.

Conductor H. was admitted on the 16th December, 1868, suffering from the effects of a severe accident which happened to him eight months previously. He was, notwithstanding, all the suffering he had undergone, a stout, healthy-looking man, apparently of steady and temperate habits. The history of his case, up to a short time before leaving Darjeeling, is so well described in the following statement, that I give it in detail, as it came to me :—

"Conductor H., æt. 43, and twenty-six years resident in India, of temperate habits, generally enjoyed good health. On the night of the 15th May, about ten o'clock, he was returning to his home, at Jellapahar, Darjeeling, but owing to the darkness missed his way and slipped down the hill-side a few feet, alighting on a stake, which pierced the right gluteal region and penetrated the bladder. Through fear that if he moved he might fall down a precipice, he remained where he fell for several hours until he could see his way home, and although

faint from loss of blood, he managed to crawl home, and arrived at three o'clock the following morning.

"Assistant-Surgeon M. reports, that he visited him at nine o'clock the same morning, and found him in great suffering. There was a large irregular wound in the fold of the nates at the right side, about one and a-half inch from the anus. Patient stated that he had been to stool and passed some fæces and bloody urine through the wound, causing much pain. Pulse 100° and small, and he seemed greatly prostrated and despondent. He was at once placed in a warm bath, and the parts affected well fomented and cleansed.

"He was again visited at 1 p.m., and complained of tension and pain in the gluteal and pubic regions. A No. 10 silver catheter was passed, and about 5 ozs. of bloody urine drawn off. He was placed in a warm bath, and after half an hour an opiate was given; he was put to bed, rest enjoined, and milk diet ordered. At 6 p.m. he expressed himself very much easier; he had passed a quantity of urine through the wound; no pain complained of with the exception of a little tenderness in the hypogastric region. Pulse 88° and soft; skin moist. A hip-bath was ordered, in which he sat for half an hour, after which a spongio-piline epithem was applied between the folds of the nates, and a draught, containing tinct. hyoscyami ordered at bed-time.

"17*th May*.—Passed a very restless night, going frequently to stool, but passing little from the bowels; some urine came through the wound; no pain in the abdomen or gluteal region. A catheter was introduced and a small quantity of bloody urine drawn off; the catheter retained in the bladder. His tongue is clean, pulse 88° and soft; says he feels very easy. To take ext. opii gr. 1 ter in die.

"22*nd*.—Going on well; the urine passed mostly by the urethra, and is always of a deep red colour; no irritation of the neck of the bladder. Tongue clean, appetite good. He takes rice and custard pudding with tea and toast as his diet.

"2*nd June*.—Passed more urine than usual through the

wound; he fancies the passage is stopped by clotted blood. A large silver catheter passed and some bloody urine drawn off.

"6*th*.—Much improvement; wound looking healthy; the urine comes almost entirely through the urethra; appetite indifferent.—Habeat infus. chirett ℥ij. omni mane.

"1*st July*.—For the past month he has been progressing most favourably; there does not as yet, however, seem much chance of the wound healing. His appetite and general health are good.

"11*th*.—Still passes urine through the wound, and yesterday a great deal of blood came away, and a small piece of membrane covered with salts passed through the urethra, which somewhat alarmed him.

"13*th*.—Assistant-Surgeon M. made over charge of patient to me about the 13th July. He then suffered from great scalding and pain during micturition; the urine was highly acid, and deposited uric acid when allowed to stand; the lining membrane of the urethra was thickened and congested; a catheter of medium size could be passed, but caused pain, and several minor strictures were encountered, owing to the inflamed and thickened state of the membrane. Ordered liq. potass. ♏ xx. ter in die and aq. hordei ad libitum; warm hip-baths and a tonic acid and glycerine injection for the urethra.

"10*th August*.—Rather better; his rest is not so much disturbed at night, and the pain during micturition is not so acute, but there is still considerable irritation of the bladder and urethra, and he passes a large quantity of mucus with the urine. The formation of little abscesses in the follicles of the urethra gives him pain and constricts the passage, so that, occasionally, there is difficulty in introducing a No. 5 gum-elastic catheter. Leeches were applied to the perineum a few days ago and gave some relief; he takes a hip-bath daily and injects the urethra with an acetate of lead wash. The liq. potass. was omitted to-day as the acidity of the urine is corrected.

"29*th*.—No improvement; the irritability of the bladder and urethra continues; a large quantity of mucus, and occasionally

blood, accompanies the urine. As these symptoms might indicate stone, a silver catheter was introduced with difficulty, and search made for stone, but without success. Patient suffers very much at night from tenesmus and a desire to micturate. A gum-elastic catheter was passed, and through it warm water thrown in to wash out the bladder, and the following was injected: —Nit. argent. gr. ij., acid nitric ♏iv., aq. calid, ʒiij. To have sol. morphi ♏xxv. in a draught at bed-time. Ext. belladonnæ to be smeared over the perineum, and an opium suppository introduced.

"31*st*.—The nit. argent. injection has been repeated, and, under the use of the opiates, more sleep procured at night. The tenesmus, however, is not completely removed, and he is obliged to get up at about intervals of one hour and a-half to micturate, some urine still coming away by the fistula. With a view to relieving the inflamed state of the genito-urinary mucous membrane, the following mixture was ordered :—Copaibæ ʒss.; liq. potass. ℥iij.; spt. ether. nit. ℥ij.; tinct. hyoscyam. ʒjss; aq. camphoræ ʒiv. A tablespoonful thrice a day.

"*2nd December*.—This treatment was attended with the best effects; the irritability of the bladder subsided, and the mucus which accompanied the urine disappeared. The nit. argent. injection was used every third or fourth day for some weeks and then omitted; but the patient still takes the copaiba mixture. When the sores in the urethra had healed and he could bear the introduction of a catheter, it was ascertained that he had a permanent stricture at the membranous portion of the urethra. This was treated by gradual dilatation, and would appear to be cured, as he can now introduce a No. 9 catheter with ease.

"The fistula is still patent, as urine flows through the anus when he micturates in the standing posture. The wound at the side of the rectum would appear to be healed, and there is now only the direct opening from the bladder into the rectum behind the prostate. Patient has probably some enlargement of the middle lobe of the prostate, as the urine passes only by the

urethra when he micturates lying on either side; but, as beforementioned, some drains away by the anus when micturating in the upright position."

On admission, 16th December, he was apparently in fair general health, but he complained of an incessant desire to pass water, with much pain at the neck of the bladder. The long and tedious journey had fatigued him and irritated the parts. He was ordered sedatives, demulcents, and a mild aperient, as his bowels were confined. After rest and quiet for a short time, I passed a full-size catheter into the bladder and detected the presence of a calculus.

The recto-vesical fistula was still unhealed; there was a prominent thickening at the orifice where it opened into the gut; the ischio-rectal wound had quite healed, the cicatrix showing how serious it had been. The urine was highly acid, sp. gr. 1018. A deposit of mucus, occasionally slightly mingled with blood; no other abnormal condition of urine. On the 7th January the lateral operation was performed, and a friable calculus removed which broke down completely under the forceps, the *débris* weighing about 140 grains. There was very little hæmorrhage and no difficulty in the operation, which was performed in the usual way. From this date until the 9th of February, when his friends removed him for change, he was not well; he had frequent feverish attacks and diarrhœa, and on the 11th of January especially, he had a sharp attack of ague. This was followed on the 12th by pain in the right testicle and cord. On the 30th the right inguinal region was swelled and painful. On the 2nd of February an incision was made into the right inguinal canal and a deep-seated collection of pus evacuated. The lithotomy wound was perfectly healthy, and he was free from pain in the perineum and about the bladder. After the incision he was relieved, and appeared to be doing better, the lithotomy wound rapidly healing, and the urine still flowing by the fistula, as well as by the urethra and lithotomy wound. Feverish symptoms returned, and another deep-seated collection of pus about the cord was evacuated. On the 9th he had again

become better, and was apparently slowly convalescing, when he went home for a change of air.

The treatment had been adapted to the symptoms: quinine, as he had been much exposed to malaria on his journey; astringents, to check diarrhœa; opiates, when necessary, to give rest; and a nourishing diet with a moderate quantity of wine. Alkaline and diuretic remedies were given when the urine was more acid and irritating than usual.

He returned to the hospital on the 17th February, having become much worse. He had had severe rigors and fever; and when readmitted was very much prostrated. His voice was low and depressed, pulse feeble and rapid, respiration gasping and hurried. Stimulants and sinapisms were ordered; quinine with hot brandy and water was given frequently.

18*th*.—The hospital record says:—"Axillary temperature 105°; pulse extremely feeble; hiccup; extremities cold. He has vomited some dark-coloured fluid; passed some turbid urine; motions loose and dark coloured."

The breathing became more hurried and gasping; intense cardiac apnœa preceded death, which occurred at $2\frac{1}{4}$ a.m.

The body was examined the following day.

Lungs much congested posteriorly, no pyæmic patches, no effusion into the pleura, and no lymph on its surface. Firm decolorized clots in the right cavities of the heart extending far into the ramifications of the pulmonary artery. No other abnormal condition in the thorax. Liver considerably enlarged; contained very numerous pyæmic patches of the size of peas. These so-called abscesses were patches of dead liver-tissue, around which no suppuration had as yet occurred. They were simply dead tissue with puriform decomposed fluid in the interstices. Spleen congested and softened. Kidneys somewhat congested. Mucous membrane of the bladder congested and thickened. Lithotomy wound healed. Recto-vesical opening still unhealed; tissues about it thickened, and considerable thickening and adhesion about the parts generally.

Remarks.—This was an exceedingly interesting as well as

instructive case from the beginning. His recovery from so grave an accident, in the first place, was very remarkable. A stake driven through the gluteal region and rectum into the bladder might well have proved rapidly fatal, and the result wonderfully illustrates the reparative power inherent in the constitution of a man in the vigour of health. He had so far recovered in about seven months as to be able partly to resume his duty. The formation of the calculus may be accounted for, no doubt, by the condition of the bladder injured by the wound—a nucleus having formed, determined by the roughened and irregular surface of that part of the bladder where the fistula opened, and perhaps by the entry of some hard substance from the rectum, the concretion rapidly gathered round it and produced the calculus detected on his admission. No part of the stake with which he was injured could be found in the bladder, though carefully looked for.

His subsequent condition was not less remarkable. There can be little doubt, I think, that the train of unfavourable events which preceded his death were mainly due to the influence of malarious poisoning to which he was exposed on his way to Calcutta from Darjeeling in December, a month when some parts of the Terai are most dangerous. The fever that supervened after the operation was most probably of malarious origin, and the blood already thus poisoned was more readily affected by the toxical conditions excited by the operation. The fibrinous coagula in the heart, which were the immediate cause of death, were, no doubt, due to the same causes. That the absorption of septic matter in this case took place mainly through the portal circulation is indicated by the state of the liver, which was studded with local deaths of tissue; and the enlarged spleen tends to support the theory that malarious poisoning was much concerned in inducing a state of the blood generally, which predisposed the patient to yield to pyæmic influences, and finally accelerated the fatal result by determining the formation of fibrinous coagula in the right cavities of the heart.

Case VII.

Slight Injury of the Head followed by Death from formation of Fibrinous Coagula in the Heart, in an English Child aged 4½ years.

It appears that on the 15th July he fell and cut the back of his head slightly; it bled rather freely, but his mother applied a piece of sticking-plaster, and the bleeding ceased. The wound was small, to the left of the mesial line, and just below the upper curved line of the occipital bone. He cried at the time, but soon got over the pain, and was well and cheerful afterwards. The accident was so trivial that I was not asked to see the child, and nothing suggestive of any unfavourable consequence rendered it necessary that I should do so. Throughout the week following the accident he was considered to be in his usual good health and spirits, but the native nurse says that for the last two days he had sometimes said he was not quite well; but he ate well and slept as usual, being a naturally restless child at night.

He went with other children to spend the day next door. Mrs. —— says that she noticed, when playing with the children, that he squinted occasionally, and did not, on one or two occasions, reply to questions; she thought it odd, and mentioned it to her husband. He was quite well in the evening, and went to bed in good spirits. At 3 a.m. his aunt was called to see him, and found him restless and feverish; she gave him some fever mixture, and sat by his side till he went to sleep. After this he became more feverish and was sick. When she saw him again in the morning he was very feverish, restless, and light-headed, and there was a peculiar twitching of the muscles generally. He had a calomel powder and an enema given him, which acted freely. I did not see him till about 11 a.m. He was then delirious; the muscles were constantly twitching; his skin was hot; his pulse was quick and rather weak; the

pupils were dilated; and he had a peculiarly unconscious stare. I immediately examined the head, and found the occipital region boggy and œdematous. It was then that I heard for the first time of the accident. My thoughts were immediately diverted from malaria, tubercular meningitis, &c., to the wound. I shaved the head, and examined it very carefully. A piece of black court-plaster was removed from the wound, and a drop or two of healthy pus made its exit. The wound itself was about the size of a split pea, and looked quite healthy; it was deep, the probe passing down nearly, but not quite, to the pericranium; the bone could not be felt. The scalp all round the wound from the upper occipital curved line to the neck was swollen and œdematous; it was boggy, but not red; no erysipelas had as yet supervened. I examined carefully for suppuration in, or under, the scalp; it was thickened and infiltrated, but no positive evidence of the presence of pus existed. I observed that the respiration was much hurried.

The symptoms rapidly became worse; the delirium increased, and he soon began to be violently convulsed. He rejected all that was given him, and passed from a state of incoherent delirium into silence. The respiration became excessively hurried, 80 in a minute; pulse very feeble and irregular; head rather hot. Air entered the lungs freely, but apparently the pulmonary circulation was greatly embarrassed; it was evident that fibrinous coagula were rapidly forming in the right cavities of the heart. He was quite unconscious; eyes staring; pupils widely dilated; lips at times became quite livid, again, for a moment, becoming red.

I had a poultice applied over the wound and swollen parts, and ordered cold wet cloths to the head; chicken broth to be given frequently, and the enema to be repeated. Stimulants were now freely given by mouth and rectum, with quinine. Quinine had also been given at the first. Not the slightest benefit resulted beyond the occasional slight raising of the pulse. The child rapidly grew worse, and the embarrassed heart ceased to beat at 4 p.m.

The cause of death here was evidently the formation of coagula

in the right cavities of the heart. The origin of the condition that induced this can only be attributed to the mischief which had insidiously supervened in the occipital region. It is very remarkable that it should have manifested itself so long after the accident, and that it should have proved so rapidly fatal. The swelling of the scalp was not noticed until I accidentally put my finger on it in examining his head, and there is every reason to believe that it was quite of recent occurrence. For a moment the question of the trephine was suggested, on the supposition that pus might have formed between the bone and dura mater. But the evidences of constitutional mischief were so marked, and the chances of relief so very faint, that it was at once abandoned.

The body was examined on the 23rd July, about fourteen hours after death. The back and other parts of the body were already much discoloured by suggilation.

Head.—The scalp was reflected; all round the wound it was thickened and infiltrated with a dark red serous and probably partially purulent fluid. This occupied an area of an inch in each direction; beyond this and down to the neck it was infiltrated with yellow turbid serum. All this part of the scalp was œdematous. The wound itself was healthy, and reached nearly, not quite, to the pericranium, which was unwounded. The pericranium was detached from the bone for about a square inch, corresponding to the site of the superjacent wound. The bone was bare, but did not appear dead. The bones of the cranium were healthy; the section revealed no suppuration in the cancellated texture.

The longitudinal and other sinuses were distended with blood, and contained coagula. The brain was much congested on the surface; the vessels between the convolutions were engorged; the surface of the base, especially over the wound, was slightly ecchymosed under the arachnoid. There was no indication of meningitis; nothing suggestive of tuberculosis. The brain substance, when cut, was not congested; the ventricles were normal; the membranes were also healthy.

Thorax.—The lungs were pallid, almost blanched, except just at the back. They contained little or no blood, but more air than usual.

Heart.—Pericardium natural; heart firmly contracted; the right auricle and ventricle contained a peculiarly tough decolorized fibrinous clot, which was firmly wedged in the auriculo-ventricular opening. It did not extend into the pulmonary vessels, but it did worse, by obstructing the pulmonary circulation at the very outset. There was also a small quantity of post-mortem clot in the right ventricle, and in the left cavities of the heart. The pleuræ were natural.

Abdomen.—Viscera healthy.

Case VIII.

Malarious Poisoning.—Carbuncular Condition of the Cheek.—Death from Fibrinous Coagula in the Heart.

Shama Churn Ghosal, a sircar, aged 28 years, native of Burdwan, was admitted 20th October, 1871, with a carbuncular swelling on the right cheek, involving the lips and the lower eyelid of the affected side. The corresponding mucous membrane lining the cheek was covered with a croupous-looking exudation. The disease was attributed to a slight cut received in shaving about eight days ago; his general health had been much debilitated from malarious enlargement of the liver and spleen, but he was a moderately stout and well-nourished man. On admission, some small incisions were made in the cheek and lower lip, from which purulent matter found exit. Tincture of steel and quinine, with nutrients and wine, were prescribed, and hot fomentations and solutions of nitrate of silver were applied to the inflamed cheek. A patch of the exudation was also removed from the cheek. His pulse was 140, and feeble.

On the 22nd, his pulse, 145, still continued very feeble. The swelling had increased, but there was no fever; stimulants and nutrients had been carefully given. His respiration began now

to become very hurried. He was restless and delirious. Bark and ammonia with wine were given freely, and his strength supported as much as possible; more punctures were made, and free exit given to matter which infiltrated the tissues.

On the 23rd he was worse, the apnœa being extreme; he was restless and exhausted; sinapisms were applied to the chest, and the ammonia and bark continued. He died at 3 p.m.

Post-mortem.—The tissues of the cheek were in a carbuncular state and infiltrated with pus; the pharynx and membrane of the mouth deeply congested. The lungs were hypostatically congested. No pyæmic changes. The right ventricle was filled by a firm fibrinous clot, extending from the auriculo-ventricular opening into the finer ramifications of the pulmonary arteries. A similar but smaller clot occupied the left ventricle extending into the aorta.

The spleen and liver were both enlarged, the former weighing 3 lbs. 8 oz. The other viscera appeared normal.

Remarks.—This is a good example of a pathological condition which is very frequent here. The blood poisoned by malaria is in a hyperinotic condition, in which fibrinous coagula readily form, causing, as in this case, rapid death from plugging of the pulmonary artery; in other cases gangrene from embolism of other arteries takes place.

The supervention of carbuncle in this state of debility no doubt increased the tendency to fibrinous coagulation. In many exhaustive diseases, such as croup, diphtheria, cholera, and typhoid conditions generally, this state of the blood is apt to prove suddenly fatal by inducing cardiac coagula. The danger is all the greater where the disease occurs in those whose blood is already spanæmic from malaria, whatever that may be. It is sometimes said that these coagula are merely the accompaniments or consequence of the act of dying, and that they are not the cause of death; probably in some cases it may be so. But I am satisfied that this condition is a common cause of death in itself, and that intervening, it carries off patients who otherwise would have recovered.

Case IX.

Carbuncular Condition of the Cheek.—Death from Fibrinous Coagula in the Heart.

N. M. C., aged 27, a native of Burdwan, was admitted on the 8th January, 1872, having a carbuncular swelling of the left cheek, the lining membrane of the lip on that side being also affected with diphtheritic exudation. The affection, he stated, commenced eight days before as a small, painful pimple, situated at the entrance of the nostril. His general health had been much reduced by malarious enlargement of the spleen. His pulse was 120, and small. On some small incisions being made into the cheek, only a thin sanious fluid issued. Quinine and nutritious diet were ordered, and a strong nitrate of silver lotion was applied to the cheek.

On the 9th there was slight fever, the pulse rising to 130, and the temperature to 102°. Port wine and beef-tea were ordered, as well as tonics. Next day he was still worse, his respiration being laboured and very rapid, while the tumour of the cheek increased in size. He gradually sank, and died of apnœa.

At the autopsy, the heart was found somewhat small, its muscular structure being pale and flabby. A large coagulum, partially decolorized, occupied the right auricle and ventricle, extending some distance into the pulmonary artery. The lungs had scattered through their substance dark deposits, varying in size from that of a pea to a walnut, the larger ones being situated chiefly at their bases. On incision, these exhibited a dark brown and smooth surface, some being solid throughout and others beginning to be soft. There was malarial enlargement of the liver, and the spleen was also somewhat enlarged.

GANGRENE FROM ARTERIAL EMBOLISM.

In the spanæmic inhabitants of malarious districts, and especially in those whose pallid mucous membranes, enlarged spleens, and congested livers betray the blood dyscrasia from which they suffer, a hyperinotic condition of the blood, due to its imperfect elaboration owing to these causes, is often a source of extreme danger, not only when the febrile paroxysm or other active malarious manifestation is present, but in the intervals, or after it has passed away.

The abnormal tendency of the blood, in this condition, to form coagula whilst still circulating through the heart and blood vessels, is the source of the danger to which I refer; and its evil results may be manifested either by sudden and rapidly fatal cardiac or pulmonary symptoms, or by others, which, though more insidious and chronic, are scarcely less prejudicial, often inducing gangrene of the extremities, or other parts of the body.

I have already spoken of fibrinous coagula occurring in the pulmonary circulation, and of the dangers attending their formation in the right cavities of the heart and pulmonary arteries, and also of very important pathological changes which are apt to result from the consequent embolism in the lungs and other viscera, when the source of the thrombosis can be traced to septic conditions of the blood which are liable to occur in surgical fever after wounds or operations, or in malarious cachexia, or in that which is the result of many exhaustive diseases. It is, however, the tendency to thrombosis and embolism in the arterial system, a result of the hyperinotic state of the blood engendered by malarious blood-poisoning, to which I

now refer, and especially to that form in which it either threatens, or actually causes, gangrene of the limbs or other important parts of the body—a condition of disease which is but too common in our hospitals.

No doubt there are other evil consequences, arising from the formation of fibrinous coagula in the left cavities of the heart, and thence carried on into the arterial circulation, or from clots spontaneously formed in the vessels themselves (autochthonous), and the urgency of which will depend on the size and position of the vessel or vessels plugged; but at present I confine my remarks to spontaneous gangrene, such being a common form in which arterial embolism manifests its dangerous effects. The following cases sufficiently demonstrate the fact that the large vessels of the extremities may be so affected, and that gangrene is an almost equally frequent result.

The gangrene, though frequently, is not always of the dry kind. It partakes, in many cases, as in senile gangrene, both of the dry and moist forms. It is a combination of death from inflammation and a diminished supply of blood, occurring in tissues whose vitality is already seriously affected; and the line of demarcation, which in many cases happily supervenes, defines the portion that has succumbed to the combination of starvation and inflammatory action. The tissues, in many cases, slowly perish, leaving a hard and blackened foot and leg, or the soft parts separate entirely, leaving the bones protruding from the conical stump thus naturally formed.

Gangrene, then, especially in the most debilitated, is liable to occur; but I would observe, that it is by no means the case that the impaction or formation of an embolus, in the main or even in one of the principal arteries of a limb, is necessarily followed by gangrene. In some cases, especially in persons of previous vigour of constitution, either the circulation of the limb may be partially kept up by the anastamotic circulation, or the clot may only partially occlude the vessels, or it may shrink and undergo absorption. The natural course of the circulation may thus in time be restored, the limb meanwhile having been

in great peril, as evidenced by œdema, diminished temperature, and occasionally excessive pain, which probably indicate inflammatory condition of the arterial coats, induced by the presence of the embolus.

Case No. 16 illustrates this condition, and shows that, under favourable circumstances and timely treatment, the danger of gangrene may be averted. It is not at all improbable that many of the miserable creatures, who, saturated with malaria, present themselves with limbs dropping off from spontaneous gangrene, might, had they been placed earlier under more favourable circumstances, have escaped in a similar manner.

In the above remarks I have referred only to the malarious origin of arterial emboli that cause spontaneous gangrene, because it has a special bearing on the lower classes of this part of the country. But similar conditions may be produced by other dyscrasia, and, as a result of the imperfect (or what has been called post-perfect) condition of the blood consequent on many exhaustive diseases, such as cholera, typhoid fever, croup, diphtheria, the exanthemata. And probably their formation may be favoured by that disordered condition of the general health which, although placed under no specific nosological designation, expresses debility and imperfect performance of the functions of all the important organs of the body, implying a depressed condition of the blood and tissues consequent on irregular habits, dissipated living, and existence sustained in an unhealthy climate or under unfavourable hygienic conditions.

Cases of Spontaneous Gangrene.

1. Panchkory, a Hindoo peasant, æt. 31, admitted the 21st September, 1863, with gangrene of the left foot and leg, which began six months previously with a pimple on the left ankle. The toes first separated, and the foot soon after; the gangrene spreading upwards, the lower third of the tibia and fibula were laid bare about two months before admission. The stump was

then conical, with the bones projecting. There was no history of either syphilis, mercurialism, or fever; but he came from a malarious part of the country. The leg was amputated below the knee on the 23rd. No ligatures were required, as all the larger vessels were plugged. He remained in hospital for some time suffering from diarrhœa and fever. The ends of the bones necrosed, and were removed on the 16th November. The stump was healing by the 24th, and he was discharged cured on the 1st January.

2. Rameshwari, a Hindoo maid-servant, æt. 36, was admitted the 23rd December, 1863, with gangrene of both feet, which came on during malarious fever about a fortnight previously. She was very low, almost moribund, having had constant recurrences of malarious fever. She sank from exhaustion on the 25th.

No post-mortem examination was allowed.

3. Hurry Mohun, a Hindoo carpenter, of cachectic appearance, æt. 60, admitted the 27th March, 1864, with moist gangrene of the outer and superficial parts of the left leg, of three weeks' duration. The foot was not affected, nor the deeper structures of the leg. It commenced in the middle of the leg, with fever, and rapidly spread. No history of previous attacks of fever. The gangrene was chiefly confined to the upper part of the leg, and was clearly defined on admission. He came in low; the gangrene spread downwards to the foot, and he died on the 11th April.

No post-mortem examination was allowed.

4. Parbutty Churn Mozoomdar, a Hindoo marksman, æt. 25, admitted the 4th January, 1865, with gangrene of great toe, of twenty-five days' standing. Had been suffering from rheumatic pain for some time. Gangrene supervened spontaneously, with pain and want of sensibility in the toe. The line of demarcation appeared within a few days. The second toe perished soon after admission. The great and the second toe were removed on the 14th February. He was discharged cured on the 12th March.

This was most probably due to plugging of the vessels.

5. Goburdhun, a Mahometan labourer, æt. 25, admitted the 4th June, 1865, with gangrene of his right foot and the lower two-thirds of the leg. Had malarious fever six weeks previously, which lasted for about a fortnight, and was followed by gangrenous inflammation of the foot. A line of separation soon formed, and was well marked on admission. The leg was removed at its upper third on the 15th. No ligatures were required for the larger vessels, as they were all plugged. He was discharged cured on the 17th October.

6. Ooggur Kant, of Furridpore, a Hindoo sicar, æt. 40, admitted the 25th January, 1866, with grangrene of the left foot. Had syphilis thirteen years ago, but no secondary results. About seven months before an ulcer broke out on the dorsum of the foot between the third and fourth toes, and it gradually spread upwards. For this he was salivated, without improving the condition of the sore; it was followed in about a month by gangrene of the third and fourth toes; soon after, the second and fifth toes also perished, and had separated about a month before admission. There was a depressed cicatrix at the upper and anterior part of the left leg, due to an application of actual cautery about seven years ago. The great toe was gangrenous on admission, and the line of separation pretty distinct. The left thigh was atrophied and shrivelled, but the pulsation of the femoral was normal. He was anæmic from malarious poisoning, but not emaciated, and there was no enlargement of the spleen. The pulse was quick, but he had no fever, nor was there any history of fever previously to his admission. Had a fit of shivering on the 16th February, followed by fever. Chopart's operation was performed on the 19th without any arterial hæmorrhage from large branches, but nine ligatures were applied to small vessels. The flaps began to mortify on the 22nd, gangrene spread upwards to the leg on the 26th, and a line of demarcation appeared by the 1st of March. But he gradually sunk, and died on the 3rd.

Post-mortem examination.—The femoral artery could be injected down to the ham, where the popliteal was found

obstructed and plugged with tough coagula. Other organs not examined, as permission to do even so much was obtained with difficulty.

7. Mutty, a Hindoo, æt. 50, admitted the 4th May, 1866, with large gangrenous patches on the left thigh, leg, and foot. Had suffered much from malarious fever twenty days before: she was brought in moribund, with incessant diarrhœa and without any distinct line of demarcation defining the mortified parts. She died on the 6th November.

No post-mortem performed.

8. Soondari, a Mahometan female, æt. 50, admitted the 19th December, 1866, with dry gangrene of the toes of both feet of five days' standing—the result of elephantoid fever, both legs having been affected with elephantiasis for a year. She was almost moribund when admitted, suffering also from diarrhœa. She died exhausted on the 17th January.

No post-mortem allowed.

9. Harree, a Hindoo mat-maker, æt. 40, admitted the 28th December, 1866, with dry gangrene of both feet, extending up the lower third of the leg. Line of separation apparent on admission. Pulsation of both femorals normal. The gangrene followed within a week of an attack of fever about a month ago. The feet separated at the ankle joint on the 7th January, the projecting ends of the leg bones were removed on the 24th April, exposing a healthy granulating surface, and he was discharged with a good stump on the 28th July.

10. Dino, a Hindoo carpenter, æt. 26, admitted the 25th January, 1867, with dry gangrene of the whole of the left foot in front of the ankle. It came on spontaneously about seven or eight weeks before, with a pimple on the toe. He had not been suffering from any particular complaint, but was anæmic from malarious cachexia. There was no enlargement of the spleen. The pulsation in the left was less than in the right femoral artery; a line of demarcation was well formed when he was admitted. The dead portion was removed by disarticulating at the calcaneo-cuboid articulation, on the 31st. This

wound granulated, and he was discharged on the 3rd June with the stump healed.

11. Hurry, an Oorya, carpenter, æt. 43, admitted the 20th March, 1867, with gangrene of the scrotum of ten days' duration. He had been suffering from elephantoid fever for three or four years, and the last attack of it, a fortnight before, continued till the day of admission, and had caused gangrene of the scrotum. He was anæmic from malarious cachexia; no line of demarcation formed. Both knees had been swollen for the previous six weeks, and there was distinct fluctuation. He died of tetanus on the 31st.

Post-mortem examination.—The knee-joints only were examined. There was pus in the left, none in the right.

No further post-mortem proceedings were permitted.

12. Brahmo, a Hindoo female, æt. 30, admitted the 1st May, 1867, with dry gangrene of the toes of both feet. Had an attack of malarious fever about two months before, which lasted for five days, and was followed by gangrene, commencing at the little toe. Line of separation distinct at the root of the toes on admission. The femoral pulsation was normal, and she had no fever. The toes began to separate on the 12th. The heads of the metatarsal bones were removed on the 10th June. She was doing well until the 20th July, when she succumbed to an attack of cholera.

No post-mortem examination allowed.

13. Bhojohurry Doss, a Hindoo tradesman, admitted the 17th May, 1867, with gangrene of the middle finger. A month previously he received a cut on the finger, which blistered, but soon healed. Other blisters appeared, and gradual mortification of the whole finger ensued. The middle finger was removed, with the head of the metacarpal bone, on the 20th, and he was discharged on the 15th June, with the stump nearly healed. Gangrene in this case was probably due to malarious cachexia.

14. Jududputty Holdar, a Hindoo, æt. 25, admitted the 11th September, 1867, with gangrene of the penis, following an attack of intermittent fever three weeks previously. The

spleen was enlarged, and he had fever almost daily for some time. Half the penis had perished on admission; a line of demarcation soon formed, and the organ separated by the 22nd. The stump granulated well, and he was discharged on the 30th with a healing sore.

15. Beharyloll Banerjea, a Hindoo student, æt. 13, admitted 22nd July, 1868, with gangrene of the right middle finger, of seven days' duration, resulting from malarious fever, for which he had been under treatment in the medical wards. He was anæmic and cachectic. The spleen was enlarged, and the feet and legs were œdematous. The finger was gangrenous. Diarrhœa supervened on the 2nd August, and he died exhausted on the 4th September.

No post-mortem performed.

16. Some time ago I was asked to see an English officer who resided in a malarious district, and who had suffered for some weeks from constant recurrences of malarious fever. The fever had, however, intermitted for some days, but he was said to be suffering from severe neuralgic pains in one lower extremity. He was looking pallid, anæmic, and much reduced. On exposing the leg for examination, I found the whole limb swelled, glazed, and of a peculiarly white appearance, very like phlegmasia dolens after parturition. It was intensely painful and œdematous, and felt colder than the other leg, but I did not ascertain by the thermometer whether it was really so. On placing my finger on the anterior and posterior tibials there was no pulsation, and on examining the femoral artery in the groin, its pulsation was found to be materially diminished. This condition had existed for some days, and caused intense suffering. It was evidently due to embolism of the iliac, which was interfering seriously with the circulation in the limb, and threatening gangrene. By the careful and judicious management of the medical officer under whose care I found him, he recovered, though slowly, and did not thoroughly regain the natural condition of the limb until after the lapse of a considerable period of time, part of which was

spent in a sea voyage. The treatment consisted in the administration of quinine, iron, nutritious but not stimulating diet, carefully protecting the limb by enveloping it in cotton and flannel, and avoiding all stimulating applications, with change of air and a sea voyage as soon as he could be moved. He ultimately recovered his health, but the limb continued weak for some time.

There can be no doubt, I think, of the pathology or cause of the symptoms, and had he not been originally a vigorous and healthy young man, free from visceral defects, I believe the entire limb would have passed into a state of gangrene, which might have rapidly proved fatal.

Of treatment, there is not much to be said: constitutionally, it is that of malarious and splenic cachexia generally—quinine, iron, arsenic, good food, a moderate amount of stimulants, change of air and climate as soon as it can be effected. In those cases where gangrene is impending, but has not yet occurred, care should be taken that neither by local nor constitutional stimulation shall the failing part be precipitated into the condition from which we desire to preserve it. Where gangrene has occurred, support is eminently needed, and should be freely given, until the strength be such as to warrant surgical interference, which, as a general rule, may not be until after nature has clearly pointed out, by a line of demarcation, where the vitality of the part has ceased to exist.

As these cases are often attended with severe pain, opium is necessary, and the measure of the quantity is the toleration of the patient. It should be freely given until pain be removed, sleep gained, and constitutional disturbance and irritability allayed.

As to local treatment, the application of antiseptic poultices and washes to encourage the separation of the dead and dying parts, and to destroy fetor, is very desirable. When the line of demarcation is fully formed, if the strength have improved, and fever be absent, and the spleen not enlarged, amputation may complete what nature has begun. And in those cases

where the soft parts are already separated, leaving only the bones protruding, if the strength warrant it, amputation may be performed above the conical stump, in which case it will probably be found that no large arteries require ligature, all being obliterated and plugged, though the numerous smaller branches that keep up the vitality of the limb require to be tied.

In cases of rapidly spreading gangrene in this state of splenic and malarious cachexia, it is, I believe, useless to amputate until a line of demarcation has formed. This occasionally will never occur, and death results; but in some, by the judicious use of opium, nutrients, and local soothing applications, the mischief may be arrested, and later the surgeon is enabled to complete what nature has begun.

Photograph of a Patient who recovered, the particulars of whose case have been mislaid.

Case 9.

[*To face p.* 140.]

FATTY DEGENERATION OF THE MUSCULAR FIBRE OF THE HEART.

Having described some of the causes of death which are due to pathological conditions, developed after surgical operations, and which are more or less influenced by certain circumstances external to the patient, I now wish to notice another pathological change, which is of great interest to the surgeon, and requires his attention in considering the question of operation upon certain individuals. The case related fairly illustrates the symptoms, progress, and results of the disease in question. There can be no doubt, I think, that when degeneration in the structure of the muscular tissue of the heart has set in, and especially when it has made any progress, that the subject of it is much less capable of bearing the shock of an operation, and of rallying and effecting repair of the wound afterwards, than one who has the heart free from this fatty metamorphosis. I am not aware that there are any signs that can be pointed to as absolutely pathognomonic of the disease. No doubt in many cases it is sufficiently evident from changes going on elsewhere, which point to a general degeneration of all the tissues; but it may exist in men of advanced years, who have otherwise the appearance of robust health, and who only manifest the weakness which has insidiously crept on, when any sudden or urgent demand is made on the vital energy, and the heart's action. Such persons, Sir James Paget has said, "may be fit for all the ordinary events of calm and quiet life, but they are unable to resist the storm of a sickness, an accident, or an operation."

This pathological state is not a mere increase of the fat, which, to a certain extent, naturally exists about the heart; it is not simply a deposit of adipose matter in the connective tissue which lies between the muscular fibres, or connects the pericardium with the subjacent muscle—though it may be that this state of pinguescence may so far intrude on the muscular structure as to destroy it by the atrophy resulting from pressure. It is not, in short, a fat, but a fatty heart that I now speak of—a condition in which fat not merely displaces but replaces muscle, and where a true metamorphosis may be said to have taken place. The natural appearance of the banded or striped muscular fibre is lost, and for it is substituted a granular deposit of oily or fatty matter. It is not my purpose to speak of the effects of the pathological change generally, nor of the various ways in which it may cause death; for, proceeding beyond a certain stage, fatal it must inevitably be, and in a lesser degree, no doubt, it is often the cause of death in diseases from which, under other circumstances, the patient might have recovered. My object is to direct attention to it as a cause of failure in surgical operations, and to the obvious necessity, therefore, of endeavouring to ascertain its presence by any sign, and, if possible, so to improve the condition of the patient as to enable him to support what he has to undergo; or, if needs be, to warrant the surgeon in altogether declining an operation that, under the circumstances, incurs too great a risk of life, or offers too little prospect of success to be justifiable. Among the numerous points to be considered in deciding the question of a surgical operation, none is of more importance than the subject now under consideration, and attention should be carefully directed to it in all cases where it appears probable that this degeneration may be going on.

As I have remarked, in some persons there is enough in their general condition to make us suspect the presence of this degeneration of the heart's muscular fibre. The wasted flabby muscles, the arcus senilis, grey hair, and general debility, with a feeble, perhaps slow and irregular pulse, hurried respira-

tion, and weakened heart-sounds—all significantly suggest the changes that are going on.

But there are cases in which, notwithstanding the absence of these indications, the heart may be the subject of fatty degeneration, and although quite equal to the ordinary emergencies of life, yet is unfitted for the strain thrown upon it by a surgical operation or severe wound.

I am not aware of any symptom by which we can certainly diagnose such cases, and it is only by watching and carefully noting the state of the patient, both before and after the operation, that we can understand his real condition. In persons advanced in life, with a tendency to adipose deposits generally, though otherwise hale and robust in appearance, with a pulse rather slower than usual for the period of life (say 50 to 60 years of age), occasional vertigo, perhaps a fainting fit after some slight exertion or change in the weather, a general want of tone, loss of appetite and spirits, with imperfect sleep at night, and a feeling of dyspnœa or malaise about the thorax —our suspicions should be aroused. Such are the indications that should call our attention to the heart's action, direct our observation to its rhythm and sounds, especially to that of its diastole, and make us postpone any impending surgical proceeding, such as the removal of a calculus, or the ablation of a tumour, or warn us not to interfere at all in a case where the operation is not one of necessity or for the preservation of life. They also show the necessity for an invigorating diet, and the administration of tonic and strengthening remedies, by which not only tone might be imparted to the impaired muscular fibre, but force to the nervous energy; and they warn us to be more than usually careful in the administration of chloroform, and to save loss of blood or protracted shock during an operation as much as possible. They would also add to our anxiety after the operation, and make us less hopeful of a successful result; would urge the necessity for the most watchful care, when any symptom of exhaustion or debility gave rise to the inference that the weakened heart

was beginning to fail under its extra labour; and would lead us to insist on the necessity for support of every kind.

Ram-pershad, aged about 60 years, a Hindoo sweeper, from Oude, but many years resident in Bengal, was admitted on the 15th February, 1867, for the treatment of elephantiasis of the scrotum, from which he stated that he had been suffering for the previous ten years. It began with an attack of fever in Calcutta, the scrotum enlarging and becoming painful. This state of things recurred at periods of three months during the first seven years, the fever and swelling lasting for a day or two, then subsiding, but each attack leaving the scrotum somewhat larger than before. During the last three years its growth had been more rapid, and the recurrence of fever more frequent; but for the last four months he had had no fever, and hearing of the removal of tumours of this nature, he came to submit to surgical treatment. He was a stout healthy man, looking about sixty years of age, with white hair, general good health, no fever, and moderately good pulse. The heart's sounds were natural in rhythm, but not heard very distinctly beneath the layer of adipose tissue covering the thorax. The scrotal tumour reached nearly to the knees, and appeared solid and heavy. Urine examined; no albumen; specific gravity 1020. He was placed on a mild and nutritive diet on admission, and watched for five days.

On the 20th February the tumour was removed, under chloroform, in the usual way, by a vertical incision made down to the penis, through which that organ was detached from the mass and held upwards; a second and third over the cords, by which each testis and cord was similarly reflected; and then a series of circular sweeps with the scalpel, detaching the tumour from the perineum. Twenty-six bleeding points were ligatured. The testes were healthy, and there was very little blood lost—eight ounces at the most. He bore the operation well, the cutting part of it lasting about 150 seconds, and the ligaturing of the vessels about five or six minutes. His pulse was fair when removed from the table. He had an opiate directly

afterwards, and was ordered milk and sago, with some brandy. Like most men of his caste, he was accustomed to stimulants (though not in excess) and animal food.

6 p.m.—When warm in bed thirteen more ligatures had to be applied, as he lost a little blood from fresh bleeding. After this he vomited several times and felt weak.

21*st*.—Better; no more bleeding; tongue moist; vomiting ceased; bowels confined. Continue a nutritive diet.

22*nd*.—No hæmorrhage; did not sleep well; takes his food poorly; bowels acted once.

23*rd*.—Bowels acted; pulse rather better; some appetite.

6 p.m.—Pulse 120, and feeble; no fever. Bowels slightly loose; tongue moist; has hiccup. Stimulants, mustard poultice to the epigastrium, and astringents for the diarrhœa.

It is not necessary to detail the daily progress. He gradually became weaker, never thoroughly rallied, and had occasional hiccup, diarrhœa, sickness, weak and irregular pulse, with depressed appearance and dyspnœa. Towards the end rapid breathing, with a feeble pulse and very weak heart-sounds, supervened, the breath-sounds being on the whole natural. He had no pyrexia, indeed the temperature was rather below the natural standard. At times he rallied so far as to make us think he would recover. All the time the wound looked well, and before his death considerable progress towards repair had been made. On the 23rd March, after some hours of hurried respiration, with cold skin and rapid pulse, the thorax being resonant and the breath-sounds natural, he died.

On examination of the body we found that there were large deposits of fat generally, and the heart was very fatty and flabby. The muscular fibre under the microscope presented a granular oily appearance, the natural structure being almost altogether absent. The wall of the right ventricle was unusually thin. Its cavity contained a firm, white, fibrinous clot, which extended far into the ramifications of the pulmonary artery. The formation of this clot was, no doubt, the immediate cause of death.

In this case the heart, though equal to the ordinary emergencies of life, enabling the patient to maintain a stout and vigorous, though somewhat obese, state of body, was unequal to the call made upon it after the operation. It gradually failed, and the supervention of a variety of signs of exhaustion indicated its inability to maintain a vigorous circulation, such as was needed under the circumstances to enable the patient to rally from the shock and effect repair. It continued to fail until, finally, fibrinous coagulation precipitated the fatal event.

ON THE USE OF CERTAIN ARTICLES IN SURGERY.

1.—*Carbolic Acid.*

I HAVE already* stated my opinion as to the great utility of this substance as a local application, and will only add a few observations as to the mode of its employment in the Medical College Hospital. We there use it either in its pure form, diluted with five parts of oil or glycerine, or as a lotion of the strength of from one to four drams to a pint of water. In the concentrated form it is applied to the surface of wounds or ulcers, either to coagulate albuminous fluids, contract and close vascular openings, or deodorize and modify decomposing fluids and tissues. By its action hæmorrhage is arrested, septic absorption impeded, and the spread of death of tissue by the contact of dead with living structures prevented. With glycerine or oil, it is applied on lint or cloth as a simple dressing, which either prevents the access of air, or allows it to enter freed from its organic impurities. As a lotion it is used for a similar purpose, and also as a cleanly and stimulating wash. The concentrated acid doubtless causes some pain, which passes away speedily, and as it is generally applied under the influence of chloroform, this need hardly be considered an objection. The glycerine and oily dilutions are not irritating, and pain is not caused by their application. The lotion is not more pungent than ordinary stimulating washes. It would appear that the whitish substance formed on the surface is

* Pages 11 and 30.

capable of being absorbed, and does not seem to interfere with the healing of a wound.

The chief value of this antiseptic mode of treatment appears to me to be found in its application to open fractures; and here our experience in this hospital is certainly favourable, for we have had unusual success in the treatment of severe cases of compound fracture since we began to use the carbolic acid. If it have the power of obviating in some small degree the tendency to osteo-myelitis—one of the great causes of pyæmia—or excessive suppuration, mortality will be abated, and the advantage obtained undeniable. That such is the case, I think, is almost certain, and although my experience is still limited, I feel satisfied that it has been sufficient to justify the conviction. I know that my colleague, Professor Partridge, is of the same opinion; and as we have now been watching the effects of carbolic acid thus applied for some time, we feel satisfied that it has contributed to an amount of success in the treatment of compound fracture that has hitherto been unknown in this hospital. We have observed that some compound fractures have recovered which, we believe, would have otherwise terminated in amputation or death; and we have satisfied ourselves also that wounds, accidental or surgical, have suppurated less, and healed more rapidly than usual; that abscesses, sloughing, and unhealthy sores have more readily assumed and maintained (when aided, of course, by proper constitutional treatment) a healthy reparative action; and that the sanitary condition of the hospital generally has been benefited.

2.—*Petroleum or Earth-oil as an Antiseptic.*

I have made some trials of petroleum as an external application, on the antiseptic principle, in the treatment of certain surgical cases, and I subjoin a brief abstract of a few of those so treated, which, I think, so far warrant the conclusion that it has been applied with benefit, as it possesses some, if not all, of the advantages assigned to carbolic acid

for this purpose. The petroleum in question is a dark oily-looking fluid, with a peculiar, though not unpleasant, aromatic odour. It struck me that this hydro-carbon might be as efficacious as carbolic acid for surgical purposes; and as it is produced in Burmah, it might be obtained in large quantities and at a smaller cost than carbolic acid, and I have no doubt its use might be extended over a wide range of hygienic purposes. The present memorandum has reference merely to its employment as a surgical application on the antiseptic principle of purifying the air that obtains access to the affected surface. This petroleum is also produced, I am told, in large quantities in Assam, and from this source, no doubt, an ample supply might be obtained, should it prove, after experiment, to be useful for therapeutic and hygienic purposes.

I have used it undiluted, or diluted with equal parts of oil or glycerine, and whilst it certainly has some deodorizing power, it appears also to have that of limiting suppuration, and of restraining the development of septic miasmata in the discharges, the decomposition of which it probably retards. It is also useful as a stimulating and detergent application in sloughing and ulcerating surfaces, and I have remarked, especially in a case of carbuncle, that it proved most efficacious as an external application. It is not irritating, or very slightly so, to raw surfaces, and I have not heard any complaint made beyond that of its causing slight smarting when applied to granulating and ulcerating wounds. The evidence of its virtue is as yet but limited, but it is such as to suggest the advantage of making further trial of what may prove to be a valuable addition to our surgical resources.

Cases.

1. Judonath, aged 30, had a large ulcer above the right ankle, with a sinus leading to the bone. The ulcer had been treated with carbolic acid dressing. Subsequently the earth-oil was applied, and the ulcer granulated healthily, was much con-

tracted, and cicatrized rapidly, with very little discharge. The dressing caused no pain.

2. Darai Sidar had a cystic tumour, the size of a walnut, removedfrom the root of the nose on the 12th April. The earth-oil dressing was applied immediately after the operation. The wound had nearly closed without any suppuration by the 25th. The integument being redundant, however, a portion was removed on the 4th of May, and this wound was dressed with earth-oil. It healed satisfactorily, and he was discharged about the 18th. A small portion of integument sloughed; but there was almost no suppuration.

3. Degum, aged 35, admitted on the 10th May, 1869, with a deep cut in the upper and inner side of the right arm. No arteries of importance divided. The wound was dressed with petroleum, and it healed rapidly, with very slight suppuration.

4. Rajeshwary, a Hindoo woman, aged 65, admitted with an ulcer of considerable size on the right leg. There was a profuse ichorous discharge with considerable pain. It was dressed with the petroleum. The discharge diminished, and the sore assumed a more healthy aspect. To remove thickening round the ulcer liquor lyttæ was applied, and after this it rapidly granulated, with very slight discharge.

5. M. M., aged 49, an East Indian, admitted 12th May, 1869, with sloughing of cellular tissue of the palm of the right hand. Petroleum was applied, and the sore assumed very rapidly a healthy action. The wound by the 8th June had nearly healed.

6. Ghurmo, a Hindoo female, admitted 29th March, 1869, with a deep excavated ulcer exposing necrosed bone, near the left olecranon. She was evidently syphilitic. The wound was dressed with the petroleum, whilst internally potass. iod. and cod liver oil were administered. The sore healed rapidly, and the diseased bone separated.

7. Hurrish Chunder, aged 50, had a scrotal tumour removed on the 16th March, 1869. The wound at first was dressed with carbolic oil, under which it was doing well. On the 30th April petroleum was substituted, and the wound con-

tinued to cicatrize most favourably, and without almost any suppuration.

8. Mosum Ally, aged 35, had a moderate sized scrotal tumour removed on the 13th April, 1869. Carbolic oil dressing was at first used. On the 30th the petroleum was applied, and the wound granulated healthily, and with very little discharge.

9. Soorendro, aged 10, admitted on the 14th May, 1869, with iliac abscess. This was opened by making incisions through the abdominal parietes. The earth-oil was applied as a dressing, and the discharge was very slight. It increased on the 17th, but subsequently diminished, and the boy was discharged convalescent a few days later.

10. Khosal, aged 35, admitted 10th May, 1869, eight days after receiving a very severe sword wound on the left hand; the metacarpal bones, except that of the thumb, were all divided. The wound was suppurating when he came in. He did well under petroleum. A collection of matter formed in the fore-arm, which was let out, and the wound in the hand cicatrized. Other slighter wounds in the arms were dressed in a similar manner, and they have done well.

11. Chummun, admitted 8th May, 1869, having had his left great toe crushed by a carriage-wheel. Earth-oil was used from the beginning, and the sloughs separated 15th March, and the wound healed up with little discharge.

12. Babu Sheik had his ring finger removed with the head of the metacarpal bone, for an injury, on the 26th April. The earth-oil was used after the 29th. There was never any great discharge from the wound, which began to suppurate on the 30th. Granulations formed so rapidly, that by May 6th most of the iron wire sutures were seen half imbedded within them. Sutures removed on the 7th, and cicatrization began on the 9th, and he was discharged on the 20th cured. He never complained of much pain from the oil.

13. J., aged 40, transferred from the medical wards May 10th, 1869, for an ulcer on the left shin. Earth-oil was applied, and the sore completely cicatrized, with hardly any discharge.

14. A., aged 30, admitted 2nd May, 1869, for ulcers in his right leg. Earth-oil was used from the beginning, and liquor lyttæ applied on the 10th. The sores healed, though on admission they were each about two inches square.

15. G. H. M., aged 28, admitted 6th May, 1869, for a cut in the popliteal space dividing the hamstring tendons. Earth-oil was used from the beginning, and the flaps adhered without suppuration.

16. H., aged 25, admitted 7th May, 1869, for an incised wound below his right breast about six inches long. Dressed with earth-oil from the beginning, and completely cicatrized. He complained of but slight burning.

17. A European had a lacerated cut about two inches long on his forehead, which healed in about ten days without any discharge.

18. J. R., aged 39, received two contused wounds on the head on 12th May, 1869, which were dressed with the earth-oil on the next day. The sloughs separated on the 17th with some bleeding, and the wounds healed with slight discharge.

19. Acham, a Chinese, aged 34, came in for a large carbuncle on his back of a fortnight's duration; it was full of dark sloughs, and there was much pain. It was dressed with the oil and he ultimately recovered completely.

20. A native, aged about 45, was admitted in June, with a wound in the left iliac region. A bull had gored him with his horn, and opened the abdominal cavity. The intestines protruded, but were returned. He recovered rapidly with petroleum dressing, without a single bad symptom.

3.—*Opium in the Treatment of Ulceration.*

G. W. W., aged 28, an English engineer, was admitted February 21st, 1866, with a sloughing ulcer on the upper and internal surface of the left foot. It commenced as a small pustule, which excited much inflammation in the foot,

seven months prior to his admission. It cicatrized over in the Moulmein Hospital, but broke out shortly afterwards on his voyage to Calcutta. The ulcer, on admission, was irregular in outline, and about two inches in length. It was very painful, the surface was of an ashy colour, and the margins were swollen and inflamed. He had syphilis about a year and a half before, but says that he did not suffer from the constitutional disease. He had been in the occasional habit of opium-smoking seven or eight years previously, but had left it off completely since then.

Under the influence of potass. iodid., poultices, and rest on a splint, healthy granulation sprang up, and a portion of bone that was exposed became covered. The ulcer had contracted to the size of a shilling, when, on March 30th, a tendency to spread was observed at its posterior margin.

The ulcer had an inflamed, irritable look, and continued to spread, when, on April 16th, the following was ordered:—Opium, gr. j. every four hours; the leg to be suspended in a cradle, and dressed with toddy poultice.

21*st*.—No improvement. Increase the opium to gr. jss. every four hours. Acid. nitric. dil. ♏ x.; tinct. opii ♏ x.; aquæ ℥j. as a lotion for dressing, instead of the poultice.

30*th*.—Ulcer less painful, but still looking irritable. Opium, gr. ij. every four hours. Opium lotion, gr. v. ad aquæ ℥j. as a dressing. Arg. nitrat. gr. x. ad ℥j. as an application.

May 1*st*.—Does not feel sleepy; ulcer no better. Opium, gr. iij. every four hours. Continue dressing.

6*th*.—Healthy granulations beginning to make their appearance in different parts of the ulcer. Opium, gr. iv. every four hours. Continue dressing.

9*th*.—Ulcer covered with healthy granulations and cicatrizing. Continue pill every three hours.

13*th*.—Pupils natural; feels sleepy occasionally during the day. Opium gr. v. every three hours. Continue dressing.

26*th*.—Much itching of the body; feels sleepy; pupils natural; ulcer again looking unhealthy at the margin. Continue pill. Quinine gr. ij. every four hours.

June 2nd.—Ulceration extended. Continue pill. Ol. terebnith. ♏ xx.; spir. æther. nitric, ♏ xxv.; aq. camph. ʒ j. ter die. Omit quinine.

6*th.*—Ulcer no better. It is extending and deepening, and the cicatrix-tissue giving way. Omit opium. Continue dressing.

7*th.*—Not so sleepy. Has no pain. Appetite bad. One opium pill, gr. v., at bedtime. Quiniæ gr. iij. ter die.

8*th.*—Slept badly. Complaining of much pain in the ulcer. Inclined to vomit. Feels very uneasy. Opium gr. ivss. every four hours. Opium poultice as a dressing.

11*th.*—Ulcer has an ashy appearance. Continue pill every three hours. Balsam of Peru for dressing.

16*th.*—Ulcer has spread over the whole external aspect of the foot. Tendons sloughing. Is despondent. Wishes to have the foot amputated. Opium gr. v. every three hours. Opium lotion for dressing.

17*th.*—Ulcer looking worse. Opium gr. vj. every three hours.

19*th.*—Feels easier, Destructive process arrested. Sloughs separating. Opium gr. vjss. every three hours.

July 7th.—Ulcer contracting and much smaller. Healthy granulations rising all over it. Opium gr. vj. every three hours. Cod-liver oil ℥ij. once.

August 19*th.*—The margins look suspicious. Opium gr. vij. every three hours.

29*th.*—No more ulceration of the cicatrix. Bowels regular. Appetite good. Opium gr. vijss. every three hours.

September 4*th.*—The ulcer has nearly cicatrized.

6*th.*—Left the hospital to go to sea.

The strength was supported throughout with nutritious diet, port wine, and beer, and the bowels were kept open when necessary by cathartic enemas.

Remarks.—This case is interesting from the extraordinary toleration of opium evinced by the patient. He was not addicted to excessive use of stimulants, and, though he confessed to having smoked opium for a short time some years previously, there is no reason to suppose it had become a habit, for he had entirely

relinquished the use of it for several years. It is also a good example of the benefit of opium in the treatment of ulceration in an irritable constitution; and I have little doubt, from the progress of the case, that, had we not pushed the use of the remedy, the foot, if not life, would have been lost. He was of a peculiarly irritable constitution and fretful temper, much broken down by exposure and hardships, and, I fear, a debauched life. The ulcer was, I have no doubt, of a syphilitic nature, and probably his statement that he had no other previous indication of constitutional syphilis is to be accepted with hesitation. In my experience nothing is so effective in checking ulceration of a phagedænic character in constitutions of this nature as opium freely administered, and the amount to be given can only be deduced from the results of the first few doses. The lesson to be derived from this case appears to me to be the necessity of studying the effects of the drug on the patient, and of not being influenced by the quantity alone. I usually commence with doses of a grain every second or third hour, and increase or diminish the quantity according to its action. Its effect is generally most satisfactory; the destructive process ceases, healthy granulations appear, and contraction and cicatrization begin. The quantity may be somewhere between one grain and five or six grains. In no case would it be prudent to begin with more than two, though the case cited shows it may have to be increased to much more. Seven and a-half grains were given every three hours, with the best effect. The local applications are also of the greatest importance, especially in sloughing or phagedænic ulceration; and in my experience none is better, or indeed so good for this, as strong nitric acid. The dead tissue is immediately decomposed by its action, and the dead and decomposing animal matter, which is most injurious to the living tissues with which it is in contact, is thus removed. The action of the putrid dead tissue kept in contact with the living is most prejudicial, and hastens the death of the parts with which it is in contact. The application of nitric acid, though very painful for a time, is followed by healthy action in the part. The pain diminishes,

and repair rapidly begins, and, under the influence of opium, progresses until cicatrization is completed.

4.—*Horse-hair Sutures.*

It is not, I believe, generally known that the common horse-hair makes a most excellent suture. Metallic sutures, introduced by Dr. Marion Sims, have almost entirely superseded silk and hemp, over which, when made of properly annealed and allotropized metals, they have many advantages. The resilient, un-annealed oxidizable iron-wire generally supplied has, however, so many disadvantages, that it is doubtful whether one might not, as far as it is concerned, return with benefit to the silk; for its rigidity and tendency to "kink," and the difficulty experienced in withdrawing it when no longer required—not to speak of its liability to oxidation in the wound, and its aptness to cut itself out when there is any tension in the parts brought together—are very unfavourable circumstances as a set-off against its advantages. Soft, properly annealed iron-wire makes a good suture; silver wire, similarly treated, is even better; and other metals, such as gold, platinum, lead, may be used, but their costliness or want of cohesion prevents them from being of general application.

Well-selected white hair out of a horse's tail is in many respects better than any suture hitherto devised. It has all the advantages of metal in its smooth and unirritating surface. It has strength enough to keep the lips of ordinary wounds in apposition, or it may be doubled if the tension is great. It is not liable to decompose, or to excite decomposition or suppuration. It can be removed without causing pain or hæmorrhage, and its extreme pliancy and delicacy render it peculiarly applicable in all wounds or parts where fine and frequent sutures are required. For wounds of the face, eyelids, or indeed any part of the integument, and in plastic operations, it is peculiarly suitable. It does not leave the disfiguring linear cicatrices, nearly always caused by the wire suture; and when it has done its duty, it

may be removed by snipping with a pair of scissors, and withdrawal by an ordinary pair of forceps, with infinitely less of the trouble, pain, or bleeding that so frequently attend similar proceedings with wire. It can be applied with the common needle, and if knotted in the usual surgical way it does not slip.

I recommend it strongly, after some years' experience, to the profession in India, where it is likely to be of even more satisfactory application than in cold climates. Horse-hair sutures have been in constant use in the Medical College Hospital for several years, and I have invariably found them to be a most valuable contribution to minor surgery. Economy is hardly a point to be considered in sutures that are to stitch the human body. But as it may have to be thought of, and as it is not improbable that the fitting wire suture may not always be at hand, it is well to know that we have an efficient substitute in horse-hair. That from the tail of a white or grey horse is the best. I hardly know why it should be so, but I find the white is better than the black hair.

The matter may appear a trifle, but it is nevertheless an important trifle; for if one can avoid the alleged inconvenience and even danger, from suppuration, from the hemp and silk ligature, or the disadvantages of the wire, the subject is sufficiently interesting to be worthy of consideration.

CASES OF ANEURISM.

Case I.

Femoral Aneurism.—Ligature of the External Iliac Artery.

A West Indian negro, named F. W., aged 34 years, was admitted on the 10th of September, 1869, with a femoral aneurism. He was a tall, well-made, active, muscular, and healthy-looking man, and gave the following history of his case:—About three years since he sprained his toes in falling from his horse, but he does not attribute his present disease to that accident. Six or seven months ago, he and another man were lifting a weight of about 200 lbs., when he felt something give way in his thigh, just about the site of the tumour, but no notice was taken of it and the sensation passed away. About three weeks since he observed a slight swelling, and he admits that for, perhaps, three weeks before that, he had felt a sense of uneasiness in the spot. This swelling gradually increased till he could feel it pulsate, and about eight days before admission he began to feel numbness in the limb. There had been more or less pain from the commencement of the swelling, but it increased to such an extent, and the limb became so painful, accompanied with fever, that he was confined to bed at last and applied for relief at the hospital. On admission he was weak and feverish. The aneurismal tumour was found situated in the middle third of the anterior aspect of the left thigh. It was ovoid and fusiform, and its apex was within half an inch of the profunda. The diameter of the tumour was about that of a fowl's egg, and in size and shape it was very much

what would be produced by placing a body of the size of an egg under the integument. The pulsations were very strong, and there was a loud bruit synchronous with the pulsation. It was very tender to the touch, and from his description was evidently increasing rapidly. Pressure on the femoral above the tumour completely commanded the pulsation.

He was put to bed, and perfect rest enjoined. The limb was bandaged and some aperient medicine ordered. A belladonna plaister relieved the pain in the tumour, and a sedative draught gave him rest at night. He was restless and feverish during the first two or three days after admission; but simple treatment and rest relieved him. The pain and swelling in the leg abated, and in all respects he was much better. During the first three days the tumour diminished in size and impulse.

On the 15th I found him worse, the tumour having increased considerably without any apparent reason, for he had not left his bed. I decided, in consultation with my colleagues, to place a ligature on the external iliac artery, as the disease extended too high up the thigh to give any reasonable hope of success from ligature of the superficial femoral; and as to the common femoral, I prefer the ligature of the external iliac as a safer operation. Accordingly, at 8.30 a.m., of September 15th, the artery was tied, under the influence of chloroform, in the following manner.

At the junction of the inner and middle thirds of a line drawn from the anterior superior spine of the ilium to the symphysis pubis, and about half an inch above Poupart's ligament, I commenced an incision which extended, slightly curved, for about four inches parallel to the ligament, and terminated a little above and about two inches from the anterior superior spine of the ilium. The first incision divided the skin and part of the superficial fascia, and having completed the division of the fascia, I next divided to the same extent the aponeurosis of the external oblique. The superficial epigastric vein was divided with the fascia, and required a ligature, but no arterial branch was wounded. The internal oblique and transversalis, and the fascia

transversalis having been divided, the peritoneum was next carefully separated with the intestines. It bulged forwards but was kept out of the way by Professor Partridge, who also pressed the spermatic cord aside and kept the wound dilated with his finger and a copper spatula. The contents of the pelvis were pushed aside until the artery came into view, lying on the psoas muscle.

The internal epigastric artery came plainly into view; it was very large, being quite as big as an ordinary quill. Dividing the sheath, and being very careful not to include anything but the artery in the ligature, I passed the aneurism needle from the inner side of the vessel, and tied the ligature firmly, leaving both ends to hang out of the wound. Pulsation ceased in the tumour, which appeared immediately to shrink in size; in a few minutes it increased again to its original size, but without pulsation. Not a drop of blood was lost after the superficial epigastric vein was tied. The operation was almost as bloodless as though it had been done on the dead body; and I confess I was surprised at the ease with which the various steps of it were accomplished. The peritoneum separated more readily than it does in the dead subject, and the artery, being distended with blood, looked larger. The iliac vein was not the least in the way. The sheath was most readily divided, and the ligature easily passed. The day was dull and cloudy, and the light consequently not very good.

The lips of the wound were next brought together with wire sutures, and it was dressed with the carbolic oil dressing. It was remarked by all that before the patient was removed from the table, the temperature of the limb had fallen considerably. About ten minutes after returning to his ward, he had quite recovered from the effects of the chloroform, and was complaining of pain in the left side of the scrotum and left testicle, as well as in the left iliac region shooting down the left thigh. I feared the genital branch of the genito-crural nerve had been included in the ligature.

3.30 p.m.—Has had considerable pain in the scrotum, all down the inner side of the left thigh and leg, and up the left

side of the trunk; pulse 100. He is restless and uneasy. Has had two half-drachm doses of liq. opii sed., which have given some relief. The limb has been wrapped in cotton and flannel. To the touch it feels now quite as warm as the sound limb, but the thermometer makes it two degrees cooler, 95° to 97°. In the axilla it is 100°. Repeat the opiate with saline draught at night.

16*th*, 8 a.m.—He is better; had some good sleep, and the pain in the scrotum and thigh is much less. But below the knee he has a sense of great pain, although when touched there it feels benumbed. He was feverish during the night, and now complains of griping pains. The wound looks well, but from about the ligature a quantity of sero-sanguinolent fluid runs out. This, no doubt, is from the sub-peritoneal areolar tissue. He has had since the operation 30 drops of liq. opii at 10 a.m., 25 drops at 1 p.m., 2 grains of opium at 4 p.m., and 2 grains at 7 p.m. The foot, as well as the leg and thigh, feels warm. There is some tenderness about the wound. The bowels are to be relieved by an enema of tepid water, soap, and oil. The tumour is perfectly quiet, and free from pulsation. It is apparently smaller than it was.

Temperature—This, which has varied in the axilla between 100° and 102°, was on the 15th, at 4 p.m., 100·2° in the right, and 97·8° in the left ham; and at 10 p.m., 101·6° in the right, and 100·6° in the left ham. To-day it was, at 3 a.m., 99·6° in the right, and 98·8° in the left ham; at 9 a.m., at 101° in the right, and 99° in the left; and at 7 p.m., 101·3° in the right, and 100° in the left ham.

17*th*.—He is doing well; had a restless night, having been disturbed by starting pains about the wound. Pain in the foot and toes, and what he calls a gnawing pain in the shin bone. His pulse is now 112. His tongue coated.

Temperature—in the axilla, 100·8°; right ham, 98·2°; left ham, 98°; and at 4 p.m., it was 102° in the axilla, 99·1° in the left, and 99·4° in the right ham; 93° in the left toes, and 95·8° in the right.

There is slight tympanites; the enema acted freely yesterday.

No pain in the thigh now; but there is still numbness in the left foot. The edges of the wound look puffed and swollen. There is rather a profuse sero-purulent discharge from about the ligature. Washed out the wound, especially about the ligature, with a solution of carbolic acid ʒj to water Oj. He has had no opium since yesterday. Has taken beef-tea, milk, and sago. Let him have a dose of castor-oil. It was thought that faint pulsation could be felt in the left posterior tibial artery yesterday evening. The pain due to the genito-crural nerve has all passed away, but he complains of pain in the loins and also in the stomach.

18*th*, 8.30 a.m.—He is doing well; pulse 92; no fever; perspired freely last night; tongue still coated; bowels acted freely; has some appetite.

Temperature—in axilla, 99°; left ham, 98°; right ham, 97°; left toes, 94·5°; right toes, 97·8°. At 4 p.m. it was 100·2° in the axilla, 97·6° in the left, and 97·8° in the right ham; 94·2° in the left, and 97·2° in the right toes.

The foot and leg are enveloped in cotton and flannel. The pulsation of the posterior tibial is fainter. About two drachms of thin purulent discharge came from about the ligature to-day. Washed out the cavity with the carbolic acid solution. There is neither pain nor tenderness in the tumour, which is quite quiescent.

19*th*.—He looks well; says that his sleep was disturbed by starting pains in the wound. There is a tolerably free thin purulent discharge from about the ligature. The cavity was again washed out with the carbolic acid solution. The ligature on the epigastric vein came away. The wound is uniting, excepting about the ligature. His pulse is now 92. Tongue still coated; bowels acted freely. Takes his food fairly. Pain diminished; numbness in foot less; says that the general feeling of the limb is still one of numbness, but that this is decreasing.

Temperature—in axilla, 99°; left ham, 97°; right ham, 97°; left toes, 91·8°; right toes, 94·4°. At 4 p.m. it was 100·2° in the

axilla; 97° in the left, and 97·8° in the right ham; 95° in the left, and 95·2° in the right toes.

20*th*.—He looks well; bowels moved twice yesterday; tongue still coated; no fever yesterday or last night.

Temperature at 5 a.m. to-day was—axilla, 99·8°; left ham, 97·2°; right ham, 97·4°; right toes, 96°; left toes, 96°. His pulse this morning is 96. Still some pain in the ankle and shin. Has occasional starting pain in the wound About three drachms of pus came from the wound to-day. The aneurismal tumour is becoming smaller, and more consolidated; no tenderness on pressure. May have solid food and two measures of port wine daily.

21*st*.—Pulse 92; tongue still rather coated; had very little sleep last night, notwithstanding three one-grain opium-pills. Pain in the leg diminishing. Toes still feel somewhat benumbed.

Temperature at 7 a.m. to-day—in the axilla 99·2°; left ham, 96·9°; right ham, 96·5°; left toes, 94·6°; right toes, 94·8°. The sutures are separating, and the wound is granulating healthily. He takes his food well, and is in good spirits.

22*nd*.—Is doing well; bowels open; discharge healthy; pulse 92. Says both legs feel much the same now, but there is still some numbness in the left foot.

Temperature at 7 a.m.—in the axilla, 98·4°; left ham, 96·8°; right ham, 96·8°; right toes, 94°; left toes, 94°. There can be no doubt that the anastomotic circulation is established. The aneurismal tumour is gradually shrinking.

23*rd*.—Does not look quite so well to-day; pulse 96. Complains of pain in the tumour and along the course of the femoral artery, and also in the left testicle. The discharge is healthy, and decreasing in quantity. I found that, notwithstanding the strictest prohibition, he has been getting out of bed to go to the night chair.

Temperature this morning—in the axilla 98·4°; left ham, 95·4°; right ham, 95°; left toes, 93°; right toes, 92°. He says that the left leg now feels to him warmer than the right. There is

still some numbness in the foot and ankle, and along the shin.

24*th.*—Tongue clean; slept well; pulse 88; wound healthy. Still has pain in the tumour and along the course of the femoral artery, but rather less. He had no opium either yesterday or to-day.

Temperature this morning—axilla, 99°; left ham, 96·4°; right ham, 97·4°; left toes, 91°; right toes, 89°.

25*th.*—Pulse 96, but no fever. Wound looks very healthy, and the discharge is very slight. There is less numbness in the foot. The tumour and the femoral artery are less painful than they were.

Temperature the same as yesterday. He says he feels very well.

26*th.*—Feels well; slept well; tongue clean; bowels open; pulse 86. Very little pain in the wound. The leg feels better, but is still rather numb about the foot.

Temperature this morning—axilla, 98·4°; left ham, 96·4°; right ham, 95·3°; left toes, 91°; right toes, 87·6°; and at 4 p.m. —98·8° in the axilla; 97·2° in the left, and 96·8° in the right ham; 93·8° in the left, and 93·4° in the right toes. Thus the affected limb keeps at a higher temperature now than the sound one.

27*th.*—Looks well; tongue clean; bowels regular; pulse 88; wound healthy; discharge diminishing. There is still some numbness in the foot and toes. There is very slight pain in the tumour, which is gradually shrinking in size.

Temperature this morning—axilla, 97·8°; left ham, 96·4°; right ham, 95°; left toes, 91·4°; right toes, 90·5°. The affected limb thus maintains a higher temperature than the other. The cotton packing of the foot and limb may now be discontinued. The flannel bandage may be continued as a support to the limb.

29*th.*—Says he has more pain in the foot and toes and shin, and that it is of a burning character; otherwise all seems to be going on as well as usual.

Temperature this morning—axilla, 98·6°; left ham, 96·6°; right ham, 96·2°; left toes, 93°; right toes, 92·4°. He attributes the pain in the leg and foot to removal of the cotton. Let it be reapplied.

30*th*.—Tongue clean; pulse 92. Leg feels much the same as yesterday; bowels open; slept well; tumour still slightly painful. The ligature on the iliac artery came away to-day, being loose in the wound. It separated therefore on the fifteenth day.

Temperature this morning—axilla, 98·2°; left ham, 96·3°; right ham, 96·4°; left toes, 95°; right toes, 94·4°. The temperature is now nearly equalized in both limbs.

October 1*st*.—He is doing well; the wound is rapidly healing, and the discharge diminishing. I may remark that the healing of the wound has been somewhat delayed by the skin having ulcerated at the points of suture. It is now rapidly closing in with healthy granulations.

Temperature this morning—axilla, 98°; left ham, 96·5°; right ham, 96°; left toes, 95°; right toes 96·4°. The affected limb is still a degree warmer than the other. There is yet a little numbness in the toes, instep, and foot. Tumour also slightly painful. Pulse 88.

2*nd*.—Pulse 88. Did not sleep well; suffered from griping pains in the bowels, and pain in the wound from 6 p.m. to 4 a.m. The leg, he says, "felt as though it were on fire." This was relieved when the bandage and cotton were removed. The wound looks well, but not so florid as yesterday. The discharge is of a dirty yellow colour. Bowels acted twice in the night. He had a sedative draught. The pain has now passed off, but there is still some in the leg and foot.

Temperature this morning—axilla, 98·2°; left ham, 95·6°; right ham, 96·2°; left toes, 90·6°; right toes, 92°. The temperature of the affected has fallen again below that of the sound limb. His tongue is foul, and the bowels are probably out of order. A dose of castor-oil ordered.

3*rd*.—He feels better; slept well; pulse 88. Only slight

pains with numbness in the foot. No pain in the tumour, which is certainly much smaller.

Temperature this morning—axilla, 97·8°; left ham, 95·4°; right ham, 96·5°; left toes, 86·8°; right toes, 87°.

4*th*.—Doing well; slept well; no pain; pulse 88. Foot still rather numb. The wound looks very healthy, and is rapidly closing in.

Temperature this morning—axilla, 99°; left ham, 95·7°; right ham, 95·7°; left toes, 90°; right toes, 88°. The temperature of the limbs is again nearly equalized.

5*th*.—Doing well; slept well; tongue cleaning. No pain in the leg; still some numbness in the toes. No pain in the tumour, which has not changed during the last two days.

Temperature this morning—axilla, 98·4°; left ham, 93°; right ham, 92·4°; left toes, 91·1°; right toes, 90·3°.

6*th*.—Tongue cleaning; no pain on the limb; still some numbness in the toes. No pain in the tumour or in the wound. It is three weeks to-day since the operation was performed.

8*th*.—The night being very stormy and wet, the weather has affected him, and he has much pain in consequence. Tongue clean; pulse 94.

Temperature this morning—axilla, 98·6°; left ham, 96·5°; right ham, 96·2°; left toes, 93°; right toes, 93·4°. The temperature of the limbs is thus about equal. The wound closing rapidly.

11*th*.—Doing very well. Sat up in a chair, and walked a little yesterday; slept well; pulse 84. Had pain in the testicle after walking.

Temperature this morning—axilla, 99·2°; left ham, 95·6°; right ham, 95·8°; left toes, 91·6°; right toes, 91·6°. The temperature of the limbs is now equalized. Wound all but healed.

21*st*.—Temperature of the limbs equal, he walks with ease. There is a point of the wound still unhealed, but otherwise he is quite well, and is very anxious to leave the hospital.

26*th*.—He left yesterday, apparently quite cured: no pulsation

could be felt in either of the tibials; some thickening only indicates the site of the former aneurismal tumour. The temperature, size, and strength of the legs are equal. There is no tendency at present to hernia at the seat of the wound.

He was admitted on the 10th September; the artery was ligatured on the 15th; the ligature came away on the 30th; and he was discharged cured on the 25th of October.

He was brought to the hospital on the night of the 25th November intoxicated, and cut and bruised about the face from fighting. It was observed that the temperature of the legs was equal, and that he seemed to have perfectly recovered from the aneurism. There was still some thickening observed when the thigh was everted, with the knee flexed; and there was a small sinus at the upper extremity of the wound. No pulsation in the site of the aneurism nor in the tibial arteries of that limb. He had been drinking for some days, but otherwise was well and strong.

Case II.

Traumatic Aneurism from Gunshot Wound.

Mr. A. C., aged 17 years, who has recently arrived from Australia, states that on December 25th, 1869, he accidentally shot himself in the right leg with both barrels of a gun loaded with No. 6 shot. The muzzle of the gun, which fell from his shoulder, was close to the limb when it exploded. He does not give a very clear account of the extent of the injury, but it appears that both charges entered the limb. The tibialis anticus and long extensors were much injured, and in great part shot away. The tibia must have been injured, though probably not fractured across. The fibula was comminuted, and from the amount of new bone thrown out about it, as well as between the bones, both must have been much injured. There is a deep depression in the tibia in front, about the centre, which seems to show that the bone must have exfoliated. There is a large

cicatrix occupying the anterior aspect of the leg for an area of about four inches, and an open, circular sore with a clot adhering to it. There are also cicatrices at the back of the leg, and an imperfectly cicatrized wound, which show that the injury extended deeply, and that the shot must have nearly, if not quite, traversed the limb.

I saw him on October 19, 1870, and received from his friends the following account:—He was on the point of leaving Calcutta by rail. He had been on his legs a good deal that day; in the afternoon he complained of pain and throbbing in the leg, and it suddenly burst out bleeding, and a large quantity of blood appears to have been lost. The hæmorrhage was arrested by pressure, ice, and a bandage, and did not return during the night. He is a tolerably healthy-looking young man; rather pallid from the loss of blood, but otherwise well and in good spirits; no fever or pain. On removing the bandage I found the appearances I have described, and in the centre of the cicatrix a round aperture, with very thin margins. This was filled by a protruding clot of dark blood. The temperature of the limb was apparently natural, and there was not much swelling except about the wound, where the limb seemed distended. The posterior tibial artery was beating naturally; the anterior tibial could not be felt. I carefully removed the clot, and passed my finger into a deep cavity among the muscles of the leg between the tibia and fibula. There seemed to be a quantity of blood-clot and broken-down tissue, and much bone thrown out between the tibia and fibula. I became conscious of a firm and distinct pulsation all around my finger, and on examining the leg I found that the impulse was general round the wound. On withdrawing my finger, it was followed by a profuse effusion of arterial blood from the cavity. I immediately applied pressure and ice, raised the limb on a pillow, and the bleeding ceased.

In consultation with Dr. Partridge, we determined that it was a diffused or traumatic aneurism of the anterior tibial, and it was decided to attempt to ligature the artery.

On the morning of the 20th he was placed under chloroform

by Dr. Ewart, Dr. Partridge commanding the femoral artery. I made a vertical incision, about four and a half inches in length, in the line of the anterior tibial, the wound occupying the centre of the incision. I found the tissues completely altered in character, brawny, and consolidated; the integument and muscles were matted together above and below the wound, which opened into a cavity as big as a small egg. On extending the incision below the wound there was a sudden and violent gush of arterial blood, which was immediately arrested by compressing the femoral. Dissecting down, I came on bony matter, and it was evident that the blood came from a recess in the bone, on placing the finger within which the bleeding was commanded; at the same time the point of the finger could be felt pressing through the soft tissues at the back of the leg. The wound was enlarged, and a strong light thrown into it; it was carefully sponged and examined, but no trace of an artery could be found. The blood came entirely from below and in a jet, more like that from the subclavian than a small artery. I made many efforts to secure the bleeding part, but it was so completely involved in bone that this was impossible; plugging with lint was therefore resorted to, the lint being forced into the bony cavity and the bleeding thereby completely arrested. After a short interval the lint was carefully removed from the upper and fleshy part of the cavity; the walls were quite dry, and there was not a vestige of a bleeding point to be seen, though the upper end of the artery was again carefully sought for. On removing the lint from the deeper and bony part of the cavity, a repetition of the hæmorrhage occurred, and it was again plugged. Notwithstanding the greatest care and the most perfect management of the femoral, the loss of blood must have amounted to upwards of two pounds. It was, therefore, not considered desirable to make further search; and the wound having been thoroughly plugged and the hæmorrhage arrested, he was put to bed. As the limb was well supplied by the posterior tibial, and as the bleeding orifices were now completely exposed and subjected to pressure

against bone, it was hoped that cicatrization might close the opening altogether.

It is remarkable that the bleeding should have been so profuse from the lower end (though no doubt the bony cyst is the explanation of this), and that the upper end should have been so entirely obliterated. The tissues were completely altered in character—brawny, consolidated, and fibrous. Not a vestige of the anterior tibial artery or of the nerve could be found. In making the incision, the tissues were found very vascular, and one or two considerable arterial branches had to be ligatured. He has lost the power of extension of the foot, the tibialis anticus and common extensor of the toes having been so much injured by the wound.

5 p.m.—Doing well; no bleeding; no fever; temperature of the leg natural, but it is painful from the pressure of the lint in the wound. Ordered chloral hydrate at bed-time. I have no doubt that the anterior tibial is the artery affected, though the upper part of the vessel seems to be obliterated. The aneurismal sac in its lower part has become partly surrounded by bone thrown out from the fibula, and thus an opening has been formed, through which the bleeding took place; and it is a marvel that the boy has escaped so long without bleeding to death. Had he started in the train before the hæmorrhage came on the consequence might have been very serious.

November 2nd.—He has continued doing well; no fever after the first day or two; wound granulating healthily; the lint was extruded gradually, and this morning the last piece came out. There is a deep granulating cavity; no hæmorrhage. The wound is dressed with lint, and washed with a solution of carbolic acid and water. He eats and sleeps well, and sits up, the leg resting on a chair.

3*rd.*—This afternoon he was sitting in an arm-chair, with the leg raised, when he suddenly felt the limb ache and become heavy; it then began to bleed through the dressing, and in a few minutes he must, from the description, have lost about sixteen ounces of blood. The bleeding had been stopped by pres-

sure when I arrived; he looked pale and frightened. I took off the dressings, plugged the deep part of the wound, and put him to bed.

4*th*.—No pain; he slept well.

6*th*.—The wound was dressed to-day; there has been no return of hæmorrhage.

30*th*.—He has been doing very well since the last report; the wound is gradually closing. The plugs have all been gradually pushed out, and now he has only simple dressing with lint soaked in carbolic acid lotion applied.

December 12*th*.—The wound has now nearly closed, and contraction is aided by strips of adhesive plaster. His health remains excellent.

20*th*.—The wound has healed, and he begins to put his foot to the ground.

January 1*st*, 1871.—He is now quite well. The wound is reduced to a linear cicatrix. He walks well; but owing to the destruction of the muscles on the anterior surface of the leg, he is unable to extend the foot. The limb is, however, useful, and in time he will probably be able to use it nearly as well as the other.

March 15*th*.—I have heard of him lately; he has gone to another station. Is in good health, and has almost entirely regained the use of the limb, and is able to follow the occupation of an indigo planter.

When heard of some months subsequently, he continued well and strong.

Case III.

Traumatic Aneurism of the Popliteal Artery.

W. R., European, aged 32 years, a healthy, muscular man, of temperate habits, and who has been about ten years in India, was admitted at 9 p.m. on August 3rd, 1871, with traumatic aneurism of the left femoral artery, just above the knee.

It appears that about seven weeks before, when in the railway station, his attention being suddenly attracted by the passage of an engine close to him, he walked (having turned his head, without seeing it) against an iron rail that was projecting from the place on which it rested. He felt that he had sustained a severe blow on the lower and inner aspect of the left thigh, which came in contact with the rail. The pain was severe, but it soon passed away, and he resumed his occupation. For a week he felt little or no pain, but the lower part of the thigh then began to swell, and to have deep-seated aching pain. It disturbed his rest at night, and caused him much uneasiness; but still he continued to do his work as a foreman, until July 3rd, when the pain and swelling increased so much that he was compelled to lay up in bed, being no longer able to stand.

On July 27th he sought relief by admission into the Howrah Hospital. Three or four punctures with exploring needles, or a small trocar, were made, but only dark blood escaped. The swelling continued to increase. The leg and foot became œdematous; a sense of numbness in the leg, and a burning sensation in the swelling, caused him much distress. I saw him on August 3rd with Dr. D. B. Smith, when the leg and foot were swollen and œdematous, and colder than the other limb. He was in bed, with the limb slightly flexed at the knee, and resting on a pillow. There was an oblong oval swelling, commencing just above the inner side of the left knee, which extended upwards for about seven or eight inches, and transversely from five to six inches. It had a somewhat livid appearance, especially in certain patches. There was distinct fluctuation; it was elastic and tense, but there was not the faintest pulsation or thrill. It was considered to be rather rapidly increasing. The leg and foot, I have said, were œdematous and colder than the other limb, but the circulation was evidently well kept up, for there was no sign of gangrene, and he could feel perfectly in every part that was touched. Neither the anterior nor posterior tibial arteries could be felt, but their pulsation in the opposite limb was unusually faint.

The pain was so severe as to have rendered the use of morphia frequently necessary; and either this or the constitutional disturbance had produced irritability of the stomach, and a somewhat icteric tinge of the skin and conjunctivæ. His health, originally good, seemed worn by suffering and confinement. I stated my opinion that the tumour was due to the presence of blood, and the question of a deep-seated abscess was discussed. A small incision decided the question. A number of black clots were turned out of the cavity, and a warm gush of blood against my finger, on disturbing them, left no doubt as to the nature of the swelling. On passing the finger deep into the wound, the femoral, which was much thickened, could be felt pulsating distinctly. The finger came on the artery just where it became popliteal, having passed through the opening in the adductor magnus. I withdrew my finger, and applied lint compresses and a bandage until measures could be taken for more effective treatment.

In consultation with my friends Dr. D. B. Smith and Professor Cutcliffe, it was decided to remove him to the Medical College Hospital, where he would have advantages, in the way of the attendance of dressers and nurses, that were not elsewhere obtainable. He was easier after the puncture and evacuation of clots, and he reached the hospital safely; a slight oozing on the way, however, rendered it necessary that an immediate operation should be resorted to. I laid open the tumour by an incision in the course of the femoral artery, about seven or eight inches in length, and on turning out a quantity of clots, a jet of warm blood soon indicated the breach in the main artery, just where it lies near the bone, as it becomes popliteal. The opening in the artery was quite perceptible; it was oblong, and involved at least two-thirds of its calibre, and the inner coat of the vessel could be seen on that portion which remained intact. The artery was tied above and below the wound. No trace of the femoral vein could be found, but the tissues surrounding the artery and its sheath were so much thickened that it was considered that the obstructed vein pro-

bably might be included in the thickened mass. The femur was also exposed for a short extent in a situation corresponding to the breach in the artery. The interior of the large cavity was ragged and discoloured with dark blood, and the tissues were condensed and matted. The breach in the artery could not have been less than a half or three-quarters of an inch in length. The distance between the ligatures was fully an inch and a half. The lower end was the most difficult to tie. The cavity having been carefully cleaned out and washed, and all bleeding having ceased, the wound was brought together and dressed antiseptically, the leg being enveloped in cotton and a flannel bandage. The artery was so well compressed at the groin that very little blood was lost. Immediately after the operation his pulse was 96; and the temperature was—in the axilla 101°, left foot 99°, right 98°, and at both groins 100°. As his stomach was irritable, an opiate enema was given.

August 4th, 9 a.m.—He is doing well. Had some sleep; pulse 96; temperature in the axilla 101°, left foot 100°, right foot 99°. Slight oozing from the upper part of the wound, but merely of a sero-sanguineous fluid. 7 p.m.—Skin moist; is still nauseated, he says, from the morphia and chloroform. Bowels have acted freely. Looks bilious; no pain; great relief to the limb since the operation. Temperature of the left foot 101°, right 100°. Effervescing draughts, with hydrocyanic acid. He is in excellent spirits, feeling so much better.

5th.—Slept well; slight coloured oozing from the wound. Pulse 92; temperature in the axilla 101°, right foot 99°, left foot 100°. Is still inclined to nausea. Conjunctivæ tinged yellow. At midnight, when his bowels were acting, as he strained, hæmorrhage began. I saw him soon after, and found that he had lost very little blood, but that it was evidently necessary to interfere. I opened the wound, cleared out a considerable quantity of clot, and found that the bleeding was rather free from the lower end of the artery as well as from the collateral branches, the ligature having separated from the lower end by cutting through it. The upper end

of the vessel was not bleeding, and it could be seen and felt pulsating in the wound. The other ligatures had separated and lay loose in the wound. The tissues had become so much softened that they would not hold. The wound itself looked quite healthy. The upper end of the divided artery was evidently closed by a clot. No bleeding occurred from it whilst the wound was open, and the lower end was again secured by a ligature. Several new points also had to be ligatured. The hæmorrhage was soon checked, very little blood having been lost; and the wound was again dressed antiseptically, but was not closed with sutures. During the proceeding I ascertained that part of the femur was denuded of periosteum, the bone exposed being smooth and white, and probably not yet necrosed. The patient was restless and suffering from nausea; his pulse was quick, and his skin cool and moist, though it and the conjunctivæ were still tinged with bile. During the day, especially after taking food, he had vomited bilious matter. I took this opportunity of trying to find the femoral vein, but it was evidently consolidated in the thickened tissue of the arterial sheath. Temperature of the left foot and leg was 101°. The circulation had become completely re-established in the limb.

6th.—Slept after the operation; bowels have acted again. Temperature of the leg 101°; no pain. Stomach less irritable, but he still suffers somewhat from nausea. Repeat the effervescing draughts, and let him have champagne and beef-tea. Sinapisms have been applied over the hepatic and gastric regions. An opiate enema was given after the operation. Pulse good; temperature normal; skin moist. He looks altogether better.

7th.—Has diarrhœa; vomited several times, and did not sleep well during the night; pulse 112; conjunctivæ less yellow; temperature of the right foot 98·5°, left foot 99°. 6 p.m.—Diarrhœa continues; has vomited several times; took a fair amount of nourishment; pulse 120; tongue clean; says he feels better; no bleeding. The ligature at the lower end of the artery separated, and was reapplied for the third time

by the house surgeon; temperature in the axilla 101°, right foot 99·5°, left foot 99·5°; the temperature of the limbs is now equal, and all swelling and numbness are gone.

8th.—Had several loose bilious motions last night; slept a little; vomiting has ceased; complains of dryness of the throat, but says, though weak, he feels much better; pulse 92, rather feeble; no fever.

9th, 6 a.m.—Pulse 130, full; is feverish; had many loose stools during the day; no bleeding; wound looks pretty well; temperature in the axilla 101°, right foot 98·5°, left foot 100°. 6 p.m.—Pulse 124, full; still feverish; diarrhœa continues; complains of pain in the left chest; abdomen tympanitic; temperature in the axilla 104·5°, right foot 101°, left foot 100°.

10th.—Pulse 128; diarrhœa continues in spite of astringents; did not sleep; is still feverish; tongue dry and clean; temperature in the axilla 100·5°; feet 100°. 6 p.m.—Pulse 126, small; is very restless and thirsty; starts in his sleep; says his sight is failing; three loose motions during the day; tongue dry and clean; is slightly delirious; has had no rigor, nor has he ever complained of chilliness throughout his illness.

He gradually sank, and died on the morning of the 11th. The wound for the last twenty-four hours had changed in appearance, and the deeper portions of it were covered with a sloughy film of a dark colour. There was no recurrence of the bleeding, though all the ligatures had again separated, and were loose in the wound.

Autopsy, August 11th.—Lungs congested posteriorly and in the lower lobes, œdematous throughout. They were united in many places by old adhesions to the walls of the thorax. There were no pyæmic patches. Heart soft and flabby, not firmly contracted; a small white clot occupied the left ventricle, extending a short distance into the aorta; valves normal. Inner coat of the aorta somewhat rough—not atheromatous, but not having the appearance of perfect health, looking, as Dr. Chevers said, as though "it had been much worked." Right auricle contained a firm white clot, which passed into

the ventricle, and was moulded in the auriculo-ventricular opening. This clot extended also into the pulmonary artery, plugging the orifices, and was drawn out in the form of a tree, with many ramifications. Liver pale and fatty, but not otherwise diseased. The other viscera appeared normal. There was neither peritonitis nor symptom of any mischief in either iliac artery or vein.

On dissecting out the femoral vessels, it was found that the profunda was given off very high (just under Poupart's ligament), and was enlarged. The vein and artery were closely adherent after entering Hunter's canal, being firmly matted together amidst thickened tissue. The coats of the vein were much thickened, its calibre diminished, and its lining surface roughened. Within it lay a grumous-looking fluid, small clots protruding into it from collateral branches. Where the vein was injured, it also terminated abruptly, being closely matted to the artery, and about its ends were some clots and inflammatory products. The artery was also shrunken and rough on its inner surface; no clot was found in it, but about the end where the ligature had separated there were clots and inflammatory products. The lower end being dissected out, presented a similar appearance. The tissues generally about the wound were matted together by inflammatory products. The bottom of the wound looked sloughy on its surface, the upper margins being healthy. The small portion of the upper end of the artery, included in the last ligature, lay loose in the wound, showing how brittle and diseased the parts had become. No further dissection was practicable, as the patient's relations were much opposed to any examination.

Remarks.—The circulation had been thoroughly re-established, for the leg had returned to its normal size and temperature. I am convinced that this was the case before the ligature was applied to the artery. The femoral vein for some distance above, and probably below, the wound had become obliterated; but the circulation, both venous and arterial, had nevertheless been

re-established. About two inches of the surface of the femur looked dry and denuded, and probably would have exfoliated had he lived. There were no symptoms of osteo-myelitis. It is worthy of note that the weather, since his admission, had been most unfavourable—damp, warm, and oppressive to a degree, while malarious influences were most rife. He had no rigor, no fever; but during the last few days he looked depressed, and his countenance was pinched. He became rapidly emaciated, and had frequent diarrhœa and vomiting of bilious matter. Indeed, since the operation, he had forgotten the leg amidst his other troubles. Death was due to blood-poisoning, the septic matter probably originating in the femoral vein. Fibrinous clots in the right side of the heart were most probably the immediate cause of death. The condition of blood which gave rise to the formation of these fibrinous coagula was the result, most probably, of the septic condition produced by absorption of matter from the femoral vein and the evil influences of a peculiarly malarious season. Had the sudden formation of fibrinous coagula in the pulmonary circulation not carried him off, I have no doubt that the usual structural changes seen in Calcutta, in death from pyæmia, would soon have been manifested in the lungs, pleuræ, and elsewhere.

CASES OF TETANUS.

Case I.

Traumatic Tetanus treated by Chloroform, Hemp, Ice to the Spine, Opium-smoking, and Section of the Median Nerve.

A Mahometan, aged 25, was admitted on the 11th September, 1867, with a severe lacerated wound in the palm of the left hand, inflicted the day before by a piece of wood falling on it. The wound reached from a little above the middle of the wrist outwards and downwards to the inner aspect of the root of the thumb. It was about four inches in length. Another wound extended from the same point along the centre of the palm half-way to the fingers. There was considerable hæmorrhage at first. The hand and fingers were also much swollen. The wounds were dressed with carbolic acid and oil. Quinine and tinct. ferri muriatis were ordered.

In the course of a few days the swelling subsided; the wound suppurated, but not excessively. There was very little constitutional disturbance. The surface of the wound was granulating healthily, and all seemed progressing most favourably until September 30th, when symptoms of trismus set in. The muscles of the jaw and neck became rigid, and he complained of pain in the muscles of the back. A draught containing chloroformi ♏ x., ext. cannabis gr. ij., mucilag. ʒj., mist. camph. ℥j., was ordered every third hour, and an enema of ol. ricini ℥ij., ol. terebinth. ℥j., tinct. assafœtidæ, æther. sulph. āā ʒij. in a pint of tepid water every six hours. A nourishing diet of beef-tea and port wine to be given as freely as the contracting state of the jaws would admit of.

The trismus gradually increased, and the tetanic condition became general, the lower extremities being more rigid than the upper. He still retained the power of partially opening his mouth and swallowing fluids. He was made to smoke opium, and had ice applied to the spine.

Under this treatment he continued much in the same condition for seven days, when the symptoms became worse, for he had violent fits of tetanic spasm on the slightest irritation, when touched, or if a current of air came in contact with his body. In the hope of affording relief in this very critical state, I cut down on the median nerve above the wrist, and divided it. I was led to do this from having seen good results in a former and similar case, in which, as in this, it was evident that the median nerve was the channel by which the irritation was conveyed to the nerve-centres.

The improvement was not immediate, but on the second day it began to manifest itself. The rigidity diminished generally, the patient opened his mouth more freely, the number as well as the severity of the fits diminished, and the improvement continued, so that by October 23rd all tetanic spasm had ceased. During this time the chloroform, hemp, and opium-smoking, with a nourishing diet, were continued. The bowels were also kept freely open with enemata, and ice was applied to the spine. The wound healed, and had completely cicatrized by December 10th, when he was discharged. The cicatrix had contracted, and the hand was distorted, being flexed towards the forearm, with an inclination inwards. He had regained perfect sensation in the fingers, and could move them, but the hand is permanently crippled and partially atrophied. This is, no doubt, due mainly to the division of the nerve; and it is remarkable how little sensation seemed to be affected, both at and after the operation.

The same wasting and contraction took place in the former case to which I have alluded, and in time it was to some extent remedied; but a certain amount of distortion, I fear, is likely to be permanent in both cases.

I think there can be little doubt that the division of the median was beneficial, and I believe that if the particular nerve which conveys the irritation to the centre could be early isolated and divided, the treatment of traumatic tetanus would be more satisfactory than at present. The cases in which this isolation can be made certain are, of course, rare; but this one suggests the reconsideration of early amputation in this dreadful disease.

Due credit must be given to the powerful remedies that were administered throughout the treatment, but it is remarkable that improvement commenced and progressed only after the division of the nerve.

I would here remark, with reference to the employment of carbolic acid in the treatment of wounds or breaches of continuity, that its chief use is in the earlier stages before repair has commenced—that is, before healthy granulations have appeared. When this has occurred, I believe that, in ordinary circumstances, it is better to lay aside the carbolic acid, for it is detrimental to development, and retards, rather than expedites, repair. In the earlier stages of treatment of wounds, abscesses, etc., it is invaluable, and should be generally resorted to.

Case II.

Traumatic Tetanus.—Amputation of the Toe.—Recovery.

Shekh Tez Ally, a Mahometan coolie, aged 30, was admitted on the 23rd October, 1871, with a lacerated wound of the end of the right great toe, caused by a carriage wheel passing over it. The wound was dressed and the foot placed at rest on a splint. On the 25th symptoms of gangrene of the injured part were evident. A grain of opium was given every fourth hour.

On the 27th the toe was partially amputated, the distal and articular surfaces of the first phalanges being removed. The

wound progressed favourably, but on the 3rd November symptoms of tetanus set in, though not violently. Rigidity of the muscles of the neck and back, and the peculiar tetanic expression, were the first indications of its invasion. Hydrate of chloral, in fifteen grain doses, and enemata were ordered to be given every six hours.

On the 5th the tetanic symptoms became more severe. The remainder of the first phalanx was now removed, and the wound dressed with an opium solution. The dose of hydrate of chloral was also increased to twenty grains. Nutritious food and wine were freely administered. The pulse varied from 90 to 95, and the temperature from 99° to 101°. He was able to take food and medicine, as the trismus was less severe than the general tetanic spasm in the limbs, neck, and trunk. After the operation the tetanic symptoms gradually abated, and the wound healed rapidly.

Case III.

Traumatic Tetanus.—Amputation of the Finger.—Recovery.

Gunesh, a Hindoo coolie, aged 41, was admitted on the 11th October, 1871, with tetanic symptoms. Trismus and opisthotonos had set in four days before admission, and were apparently due to a wound in the end of the left index finger, which had nearly cicatrized. On the 12th the distal phalanx, including the cicatrizing wound, was removed, and tincturæ cannabis gtt. xx. with chloroformi gtt. xv. were ordered every four hours, the bowels to be relieved by enemata.

On the 13th the hydrate of chloral, in doses of gr. xv. every four hours, was prescribed, and the wound was dressed with opium lotion.

On the 14th the opisthotonos increased, the fits being more frequent and severe. The dose of hydrate of chloral was now increased to gr. xxv., and chloroform liniment was rubbed into the back after hot fomentations frequently applied.

On the 20th the tetanic fits had much abated, and he was able to open his mouth and take food more freely. His strength had meanwhile been supported by nutritious diet and wine. The pulse varied from 96 to 100, and the temperature from 98° to 100°.

By the 23rd the tetanic spasms had almost disappeared, and the wound had nearly cicatrized. The dose of hydrate of chloral was now decreased in quantity and frequency. He gradually improved, although rigidity and myalgia remained. For some days he walked with difficulty, with the aid of a stick, and his countenance presented a peculiarly aged and distorted appearance, the result of muscular spasm; his figure also became bent and aged in appearance. He was finally discharged cured, on the 10th November.

Case IV.

Traumatic Tetanus.—Removal of a Cicatrix.—Death.

R. R., an East Indian student, aged 16, was admitted on the 6th November, 1871, with a small cicatrizing wound on the dorsum of the right foot, said to have been caused by the falling of a beef bone on it. On the 7th the symptoms of tetanus, trismus, and pain in the back set in. Hydrate of chloral, gr. xv. every four hours, was ordered after his bowels had been thoroughly relieved. On the 8th severe tetanic fits occurred, and the cicatrix above mentioned was then carefully dissected away. The wound was dressed with opium lotion. The dose of hydrate of chloral was increased to twenty-five grains. He was diligently supported by wine and nutritious diet. On the 9th the tetanic fits becoming more severe, the dose of hydrate of chloral was again increased to thirty grains, and occasional inhalation of chloroform was ordered. The fits were distinctly opisthotonic. From this date his temperature began to rise from 99° to 103·5°. His pulse during these days varied between 112 and 116. From the 11th the fits became still more severe, at

longer intervals. The muscles of the jaw contracting to such a degree that he was unable to take any liquid food, nutrient enemata were ordered. Gradually the spasms became more violent, and the temperature rose to 104°. He died suddenly during a fit on the 17th November. No post-mortem was allowed.

Remarks.—Cases II. and III. recovered from well-marked symptoms of traumatic tetanus after amputation of the wounded part in which the disease originated. In Case IV. removal of the cicatrix was not successful, the disease progressed, and the patient died.

In the two former cases there could be no doubt that the origin of the disease was completely removed, for as the wound was situated on the digits, and those parts were amputated, the injured afferent nerves, viz., those which conveyed the evil influence to the nerve centres, were necessarily divided. The source of disturbance being removed, the symptoms subsided and the patients recovered. I have on a former occasion* recorded a similar case, in which a favourable issue resulted; and those now noted tend to prove that if the part whence the irritation commences, and which, if allowed to remain, excites that peculiar polar condition of the cord which results in the waste of nerve-force, tetanus, be removed early, the perturbation, though great, is not necessarily permanent, and may subside.

Though no one would scruple to amputate a finger or toe in such a case, most persons would hesitate to apply the same treatment in the case of a limb, until the symptoms of tetanic spasm became so severe as to leave no doubt as to the greater danger incurred from the disease. Unfortunately it is then too late, for the disease is thoroughly established, and amputation is as powerless to remove the results as any other remedy. In so dreadful a disease as traumatic tetanus, the most desperate remedies are justifiable, and I would suggest the advantage of resorting to amputation, even of a leg, on the earliest invasion of the symptoms. Amputation, I am quite aware, has often been practised,

* "Clinical Surgery in India," p. 511.

and with unfavourable results; but I am inclined to believe that it has not, as a general rule, been resorted to early enough to give it a fair chance of success.

No one would recommend amputation of the limb if the peccant nerve could be isolated and divided, as in the case of that leading from a finger or a toe. In a wound of the leg or arm it is almost impossible to indicate the branch or trunk that is the conductor of mischief to the centre, and therefore to secure its division the whole limb must be removed.

The hydrate of chloral may have had something to do with the recovery in these cases, but I have not found it successful, except as euthanasia, in similar cases.

Case V.

Fatal Case of Idiopathic Tetanus in a European.

On the 27th of March, 1870, I was requested to see Mr. D. S., a Greek gentleman, aged 36 years, of stout frame, lymphatic temperament, though with dark hair and anæmic complexion. He had returned to India about fifteen months before, after a visit of three years to Europe, having previously resided for six years in Calcutta, during which time his health had been moderately good. During his last visit to Europe he suffered from some severe abdominal disorder, probably enteritis, but he had regained his health when he returned to Calcutta. I found him suffering from a slight feverish attack, for which I ordered a simple diaphoretic, and enjoined quiet and rest at home for the day. He complained also of a pain in the right pectoral region, which was apparently muscular, as the stethoscope did not indicate any thoracic mischief. For this I recommended a sinapism and some simple embrocation. The weather had during the previous day or two become very hot, and a dry south-westerly wind was blowing.

On the 28th he was better, but not being well enough to go to his office, he was advised to remain at home. I observed

that his room was very close and warm, as the windows had all been kept carefully closed, and recommended more ventilation. He said that the pain in the chest was almost gone. I again made a most careful examination, and could detect no sign of either hepatic or pulmonic disorder. I recommended a better diet and some wine.

On the 30th he called on me at about 11 a.m., and said that he was not feeling well; he had a sensation of stiffness in his neck, which he attributed to a chill, the result of going out into the open air from his warm room, when he was perspiring freely. Otherwise he was better, having no fever, and his bowels being open. But he had a restless night, and he looked anxious and uneasy. I ordered an anodyne liniment.

In the evening I received a note saying that he was not better, and requesting me to go and see him. I did so, and found him alarmed and anxious about his condition. He was restless and uneasy, complaining of stiffness in the neck and jaws, and difficulty of swallowing, but, withal, no pain. He looked dark under the eyes; his skin was moist with cold sweat; and his pulse about 90°. He could open his mouth but imperfectly, and there seemed to be general rigidity of all the muscles of mastication and deglutition. I ordered hot fomentations, an anodyne embrocation, and sedatives. I saw him again at 7.30 p.m., and remained some time watching him anxiously. I prescribed cannabis indica and chloroform internally, with hot stupes to the neck and jaws, which gave some relief. He was thirsty, and drank iced water pretty freely, but with some spasm; he tried to take soup, but very little was swallowed. The rigidity of the neck and the occasional spasms of the masseters were increasing; the head was drawn backwards, and carried in a peculiarly stiff and erect position. My suspicions were now confirmed, and as I could find no history of any traumatic origin, it was evident that idiopathic tetanus was rapidly setting in. I expressed my fears for the result to his friend, and suggested further advice. Meanwhile, the fomentations and medicines were continued, and

beef-tea was administered frequently. The attempt to swallow it was always attended by spasm. The effort to expectorate viscid mucus had the same effect.

Drs. C. Palmer and Partridge saw him, and it was decided that the medicines should be continued. Belladonna liniment was applied to the neck, and nourishment given frequently. The bowels to be again acted on by enemata, and if the difficulty of swallowing became greater, the medicines to be given by enema. Nutrient enemata were also ordered, and the administration of chloroform at intervals was prescribed. Notwithstanding treatment, the tetanic spasms rapidly increased with renewed intensity. He was much exhausted after each, and his body bathed with cold sweat. The countenance became livid and distorted, as the respiratory and laryngeal muscles were involved, and during the paroxysms opisthotonos was severe. The pulse became rapid and feeble, at times very irregular and intermittent, pausing for a time, as though the heart itself shared in the general muscular spasm. His consciousness remained, and he occasionally tried to speak, and asked the nurse to open a window. The least touch brought on the spasm, which rapidly involved the abdominal and thoracic muscles, and left him quite exhausted. The last and fatal paroxysm occurred at about 11.30, and at 11.45 he died, completely exhausted by its violence. The pulse had failed, it returned again for a moment, and then ceased altogether.

Remarks.—Idiopathic tetanus in the adult European is a rare form of the disease, and comparatively seldom witnessed. This was one of the most severe and rapid cases I have seen. The only cause that could be assigned was the sudden exposure to a relatively cold atmosphere, when the body was relaxed by the heat of a warm room, and when the constitution was somewhat depressed after a slight febrile attack. The atmospheric influence at the time was no doubt evil, and favourable to the development and rapid course of acute disease. The setting in of the extreme heat is always most trying to the European

constitution, and at such times disease has a tendency to become rapid as well as acute. Idiopathic tetanus is not uncommon among the natives of India. I have observed that it has a greater tendency to occur at the changes of the seasons, when there are great and sudden alternations in temperature. It is not, as a general rule, so fatal as the traumatic form of the disease, and recoveries are not uncommon; although, as in the present case, it is frequently very severe, and rapidly fatal.

In the treatment of idiopathic tetanus, I have found a fair amount of success to result from the use of hemp, chloroform and quinine, together with a free action of the bowels, and a nutritious diet.

CASES OF GUNSHOT WOUNDS.

1.—*Four Cases of Gunshot Wounds of the Thorax.*

Gunshot wounds of the thorax are of comparatively rare occurrence in civil practice, and it is seldom that we have such opportunities of studying the pathological phenomena to which they give rise as were afforded in the following very interesting cases, which have been treated in my wards of the Medical College Hospital. The notes of these cases are taken from the hospital case-books, and are sufficiently faithful records of what occurred. In the first fatal case it is matter of regret that more elaborate details of the post-mortem appearances were not preserved, but in the brief report furnished by the coroner's proceedings we have ample explanation of the cause of death. In the second fatal case we have most accurate details, and its history both before and after death is interesting and instructive.

These four cases were all of a severe character, for in each the lung was perforated by the shot. In the last case the wound of the lung was complicated by wounds of the liver and diaphragm, a charge of large (No. 2) shot having penetrated the right side of the chest over the liver. In the first and third cases the patients recovered, and it was remarkable that the injury in each was attended with so little constitutional disturbance or interference with respiration. Recovery occurred under the simplest treatment, little more, indeed, than rest being required, no venesection or depletion having been resorted to.

In the first case the wounds were sealed by the application of gutta-percha dissolved in chloroform, according to the plan of

Dr. Howard, of the United States Army, to prevent the entry of air; but I doubt very much whether it was of any real benefit, or if the patient would not have done just as well with ordinary dressing.

In both the cases of recovery it is worthy of note that the bullet passed through and did not lodge, nor was there apparently any foreign body, such as wadding or clothing carried in with it. The velocity and force of the bullet was such as to make as it passed a tolerably clean wound, which no doubt contracted rapidly; and no great vessel being wounded, the effusion of blood was comparatively slight. The physical signs indicated a certain amount of consolidation and subsequent return to the natural condition. The dyspnœa was very slight, and the general disturbance excited by the injury was trifling.

They left the hospital perfectly recovered, and I saw one of them some time afterwards quite well, his health being as good as it was before the accident. In the second favourable case the left lung was perforated by a revolver pistol bullet, discharged, like the other, close to the patient's body. The bullet traversed the left lung and scapula, emerging just under the spine of that bone on the left side. It seems marvellous how more important parts escaped. In this case the wound through the lung must have contracted closely, and large vessels have escaped, as there was no hæmoptysis. The physical signs, as well as the direction of the bullet, proved that the lung had been wounded. In this case the mischief was rapidly repaired without any urgent or unfavourable symptoms, and he left the hospital in thirty-seven days quite well.

In neither of these cases was pneumonic or pleuritic inflammation excited. The uninjured lung also remained free from congestion, compensating by its increased action for the defect in power of the injured lung, which, it is to be observed, was in each case only partially interfered with—the portion immediately round the wound only being disabled. There was nothing to indicate the necessity for depletion or venesection,

and the treatment was addressed to such symptoms as from time to time suggested the necessity for the simplest remedies.

In cases of serious injury to one lung, where collapse or engorgement of it resulted, great dyspnœa would probably arise; and if on the disturbance of the circulation, which would necessarily follow, the uninjured lung became congested, the life of the patient would be in the greatest peril. In such cases I believe that, at whatever subsequent cost from loss of blood, life would only be preserved by its free and rapid abstraction; and this is a point of considerable importance, requiring judgment, as the condition in which it would be necessary is one not apparently suggestive of venesection. For the patient would most probably have a feeble and labouring pulse, a cold clammy skin, and a pallid or livid countenance. In such a case, if the true pathology of his state were not recognised, it is not difficult to understand that in these days of anti-venesection the young or inexperienced surgeon might lose the only opportunity of relieving the embarrassed pulmonary circulation and the chance of saving life.

In the first of the two fatal cases, injury of the spine was added to that of the contents of the thorax. Paralysis of the lower limbs indicated the one; hæmoptysis, and emphysema with the symptoms of partial collapse of the lung, indicated the other. Emphysema, of course, alone is not necessarily a proof that the lung is wounded; neither is the issue of air from the bullet wound, for it may be merely the result of air drawn in during the inspiratory movements of the thorax being either forced out again, or into the subcutaneous areolar tissue. Still, as it also may be caused by wound of the lung, it is, so far, confirmative, other symptoms of that injury being present. The hæmaturia in this case is not so easily accounted for, but I am inclined to attribute it to the catheter, with which the urine was drawn off from the paralyzed bladder. It is much to be regretted that the account of the autopsy says so little on the

nature of the internal injury or of the condition of the parts. The injury to the spine is not even noticed.

In the second fatal case—in which the patient was shot by the accidental discharge of his own fowling piece loaded with No. 2 shot, which penetrated the lower and right side of the anterior part of the thorax, passing through the lower lobe of the lung and the liver—there are many points of interest to be noted. The gun when discharged was almost touching his side, being in his own hand at the time. The explosion made a large ragged aperture, through which the charge passed, and the result showed how much the shot even then had scattered; for they were found in the liver, the lung, the diaphragm, loose in the thorax, under the integument of the thorax, and embedded in the costal cartilage. Comparatively few were found. The whole charge, his friends inform me (for they counted one), contained 180 grains of shot. Not more than the sixth of these were found, though, perhaps, had the liver and the remains of the lung been more fully explored, others would have been discovered. No part of the clothing or wadding was found in the wound. He brought no account of his case with him, and as he had been several days under treatment when he came in, it is possible that these, if lodged, had been removed. The changes passed through by the wounded lung resulting in complete collapse; the effusion into the thorax of quantities of bilious fluid, similar to that which was expectorated; the pericarditis, from which there seemed to be scarcely any hope of recovery, but which passed away, leaving the heart completely glued to its investing membrane; the coagula that formed in the right cavities of the heart, and terminated his existence; and the complication of the wound of the liver—were all very interesting as their progress was watched from day to day. At one time he improved so much that hopes began to be entertained of his recovery; but the extent of disease was too great, and he finally succumbed. Not the least remarkable feature in the case was the perfectly natural and unembarrassed manner in which the left lung continued

throughout to perform its functions, notwithstanding the excessive pericarditis and the destructive changes that were going on in the right lung, pleura, and liver. It was also remarkable that throughout the duration of the case the wound continued to granulate and cicatrize healthily.

Case I.

M., a Brahmin Durwan, aged 32, was admitted on the 4th January, 1869, at 7 p.m., with two gunshot wounds in the chest, caused by a pistol-shot about an hour and a half before admission. Both the wounds were circular, having irregular margins, and of the size of a four-anna piece. One was situated on the right side of the chest, in the infra-axillary region, and the other in front of the chest, on the left margin of the mid-sternum. The patient was admitted in considerable pain and with moderate bleeding from the wound, a feeble pulse, but no hæmoptysis. A morphia draught was ordered, and a draught consisting of gallic acid gr. v., sulph. acid dil. ♏v., with ℥j. of water, every two hours.

5th, 8 a.m.—I directed the wounds to be hermetically sealed by lint soaked in gutta-percha and chloroform. Percussion-note dull in the whole front of the chest, especially on the right side; respiration harsh, with bronchial râles; no hæmoptysis; respiration rather weak on the right side. Bowels being costive and skin feverish, a dose of castor oil was ordered, as also a mixture consisting of liq. ammon. acetat. ℥ij., morphiæ gr. ij., pot. acetat. ʒij., mist. camphoræ ℥vj.; one ounce every three hours. Milk diet.

From this date up to the 21st of the month, the temperature, pulse, and physical signs of the respiration were carefully noted. The range of the first was from 98° to 102°, of the pulse from 76 to 108, and of the respiration 32 to 40. Indications of bronchitis became more distinct, and on the 8th crepitation was heard in the right side of the chest posteriorly, near the wound in the side. By degrees these disappeared, and on the

10th salines were changed for quinine, given at first every four hours, and latterly three times a day, with ten drops of tinct. ferri muriat. in each dose.

Besides the above medicines, laxatives, counter-irritants, and fomentations were prescribed, as the condition of the bowels or chest required. The gutta-percha and chloroform application was changed several times, and latterly the wounds were dressed with carbolic oil. He was discharged cured on February 13th.

Case II.

B. S., a Rajpoot Durwan, aged 30, in the Mercantile Bank, Calcutta, was admitted on January 4th, 1869, with gunshot wounds of the left side of the chest and left arm. There were altogether four wounds—one at the middle and inner aspect of the left arm, a second about two and a half inches below it on the anterior aspect of the same arm, a third in the left mammary region, and a fourth in the back, a little below and internal to the inferior angle of the left scapula, about half an inch from the spine. There was slight bleeding from the wounds in the arm, but none from the other two. Percussion-note dull on the left side of the chest; emphysematous crackling heard all over the back, and sonorous rhonchus all over the front of the chest. Respiration puerile on the right side; very weak on the left. No hæmoptysis. Pulse 96; temperature 101°. Abdomen slightly tympanitic. Had been subject to intermittent fever for the last two months. Bowels cleared out with a dose of castor oil and tr. assafœtidæ, and the following mixture given: Liq. am. acet. ʒij., morphiæ gr. ij., pot. acet. ʒij., mist. camph. ℥vj.; an ounce every three hours. Lint and cold-water dressing to the wounds.

6th.—Has paralysis of the lower extremities, except the left leg, which he can move a little. Expectorates a frothy fluid tinged with blood; not tenacious. Wounds painful. Is restless. Temperature 103°; pulse 116; respiration 48.

7th.—No expectoration of blood; stools involuntary; urine drawn off by the catheter. Pulse 136; temperature 104°; respiration 28.

8th.—Wounds on the arm cleaning. Pulse 128, feeble; temperature 103·5°; respiration 28.

9th.—Breathing laborious; is restless and delirious; has diarrhœa; 24 oz. of bloody urine drawn off this morning, and 20 oz. in the evening; mustard plaster to the chest; gallic acid and diluted sulph. acid mixture every three hours; beef-tea, milk, and sago, port wine diet, and beef-tea and brandy enemata every four hours; pulse feeble, 104; temperature 101°; respiration 28; slight discharge from the wounds in the arm; paralysis the same; respiration in the upper part of the right chest, harsh; crepitation in the lower; respiration in the upper part of the left chest, harsh and attended with mucous râles; respiration at the back, harsh; marked bronchophony.

10th.—Cannot take nourishment. Lower part of the left chest resonant; respiration attended with large mucous râles and amphoric sounds. 26 oz. of bloody urine drawn off this morning and 24 oz. in the evening. Pulse 120, very feeble; respiration 32°. He died at midnight.

The body was removed by the police, and I had no opportunity of making a post-mortem examination; but I am indebted to Dr. Woodford for the following brief notes of the autopsy given in his evidence before the coroner, which show that the ball had passed through the left lung. The hæmaturia is not accounted for unless it were due to the catheter.

"I found a gunshot wound between the third and fourth ribs on the left side anteriorly, and a wound through the inner side of the left arm. Posteriorly near the left shoulder blade was a gunshot wound, and on the lower part of the body posteriorly was an abrasion of the skin; the left lung was pierced through with a bullet. The viscera otherwise appeared healthy, and the stomach was nearly empty."

Case III.

Joomuum, a Mahometan, aged 45, a boatman of one of the Custom House boats, was admitted December 22nd, 1869, with a pistol-shot wound situated about three-quarters of an inch below the sternal end of the left clavicle. The bullet passed out at the back, immediately below the spine of the left scapula, having traversed that bone. The wound in front was circular, and about a quarter of an inch in diameter, that in the back a little smaller. Not much bleeding from either wound. The patient says that whilst assisting to unload some carts, he gave a pistol, which he had about his person, to a baboo who was standing by, and that as the baboo was in the act of handling it, it suddenly went off, wounding him in the chest. He was at the time standing in front of, and facing the baboo.

On admission, the respiration was 24 and good in the left lung; no difficulty of speech; pulse 84; temperature 100°; coarse crepitation about the bullet-hole in front; vesicular respiration below that at the left back. On the following day a good deal of cough; no expectoration of blood; much pain in the left shoulder-blade. Coarse crepitation around a circle of about three inches radius of the wound in front; percussion-note good there; that in the back dull, but respiration tubular.

On the 25th he began to spit blood in small quantities; pain in the shoulder-blade increased; pulse 100; respiration 28; temperature 100°; bronchial breathing near the bullet-holes; tubular breathing below the wound in front; vocal resonance much impaired.

26*th*.—No spitting of blood; tongue clean and moist; pulse 96; temperature 101°; respiration 20; feels better.

28*th*.—Expectorating dark brown thick sputa. About three inches below the wounds on either aspect, back and front, there is harsh bronchial respiration; no mucous râles.

January 12th, 1870.—Respiration and percussion about the bullet-wound almost natural, as also vocal resonance; the cough has ceased; respiration 20; pulse 80.

The patient had an attack of diarrhœa for a few days, which yielded to ipecacuanha and Dover's powder. After this he went on improving steadily till the 28th, when he was discharged cured.

The wounds were dressed with lint and carbolic acid oil, and the diet was nourishing. Stimulants were not found necessary during the whole time he was under treatment.

Case IV.

A healthy-looking Englishman, aged 30, an engine-driver on the East India Railway, received a gunshot injury of the chest on March 18th, 1870. He was resting the muzzle of a double-barrelled gun loaded with No. 2 shot against the right side of his chest, the butt of the gun being supported by his foot. In some unexplained way one barrel was discharged in this position, and the contents entered his chest through the seventh intercostal space, fracturing the upper rib. The aperture was at a point intersected by a line drawn vertically from the right nipple. The accident occurred in a railway-carriage, and he had been under treatment for some days at Ramporehat. The wound is said to have bled freely at the time, but the hæmorrhage was soon arrested. He was admitted March 25th, just a week after the accident. The wound was then about an inch in diameter, its margins sloping and granulating towards the centre. There was aconsiderable portion of sloughing integument still unseparated. There was little or no movement of the right side of the thorax, which was dull on percussion, excepting at the apex. Air could only be heard to enter at the posterior part of the right lung. Had been expectorating blood for the previous two days only, and cough ever since the accident had been very troublesome. There was

some dyspnœa. The breath-sounds in the left lung were normal, and the heart-sounds were healthy. Pulse 124. Temperature 103° in the right axilla, and a degree lower in the left. Water-dressing was used, with carbolic glycerine over it.

There was no change of importance until April 2nd, when symptoms of pleurisy and pericarditis set in. The expectoration previously coloured with blood showed evident indications of being deeply tinged with bile. His countenance became more sallow, anxious, and depressed.

On April 5th the endocardium was involved. The inflammatory symptoms became more and more marked; the area of cardiac dulness increased; præcordial thrilling became more manifest; the friction-sound seemed louder, and the action of the heart was violent and very irregular (varying from 56 to 120 in a minute), the systolic bruit being more distinct. The pleuritic friction extended to the side of and above the heart, and the respiration became weak and bronchial on that side. The expectoration was more free and rusty coloured, at times with a faint but offensive bilious odour; low, muttering delirium with restlessness and subsultus tendinum supervened.

On April 11th a dark-looking, thin, offensive expectoration was freely established. The right side had gradually become more resonant, and the patient lingered on in an almost hopeless condition, with cold clammy perspiration and ever varying sputa. For about a week, he changed but little in the general symptoms, though the cardiac signs went on gradually fading, the right infra-mammary region becoming tympanitic with distinct amphoric breathing, and metallic tinkling beginning to be heard.

By the 17th the heart-sounds had become almost natural; and all abnormal sounds vanished by the 20th. The pleurisy also disappeared by the 23rd, and the respiration became normal in the left side, while amphoric sounds, with metallic tinkling, continued the same in the right side. It was from this time that he showed symptoms of improvement. The

perspiration lessened, and the expectoration gradually became converted into a bilious, yellow, thin, offensive liquid. He began to be quiet and rational, taking his food better, etc. In fact, he was then doing well to all appearance; the heart-sounds and the respiration on the left side continued free and clear, while the right side remained amphoric, with metallic tinklings. The expectoration became more and more profuse (℥viij. or more in the day), and the cough was more and more harassing, and often, remitting for a time, came on in fits, of which he had a severe one on the morning of May 3rd, and died about 11 o'clock a.m.

The temperature was always high, ranging between 100° and 103°. The greatest variation of the pulse was between 112 and 140, the mean variation being between 116 and 124; and that of the respiration between 22 and 30. The wound was always healthy, and though about the onset of the pleurisy and pericarditis (on the 20th) its discharge had an appearance of liver pus, yet no apparent communication could be traced with the cavity of the chest. It had gradually cicatrized by April 10th, when the patient was very low. It had nearly healed by the 28th, when he was apparently improving. The hepatic region was more or less tender throughout, but no enlargement of the liver could be detected. The urine, pretty free at first, became scanty from April 17th, when the pericarditis had ceased, and the pleurisy was abating. It was deficient in chlorides throughout. Thus, on March 29th there were none; March 31st, April 6th, and 11th, traces only could be found; April 16th, none; April 25th, traces more apparent. The bowels were generally regular; but latterly they became rather inactive, and an enema was occasionally required. The treatment generally consisted in supporting the strength, allaying pain and irritation by anodynes, and employing counter-irritants when inflammatory mischief rendered them necessary. The comp. tinct. of camphor, and occasionally morphia, were of the greatest benefit. Quinine and sulph. acid were also found useful in the profuse sweats, which were very frequent towards

the end of his illness, and which were aggravated by the intense heat of the weather. Counter-irritation was at first kept up steadily by mustard plasters and hot fomentations; constant turpentine stupes were applied at the height of the pericarditis, and continued from April 7th to 10th. Afterwards the præcordial region was daily painted with tinct. iod., and occasional sinapisms were applied when dyspnœa occurred. A mild nourishing diet was allowed him till the attack of pleuro-pericarditis on April 2nd, when port wine was given freely. Beer was also given.

Autopsy.—On opening the chest, the right lung was found to be collapsed and shrunk into an oblong mass by the side of the spine, attached by two bands of tissue stretching along the diaphragm to the wall of the thorax, the result of adhesions. The pleural cavity was half filled with a thin yellow fluid, like that he had expectorated during the latter days of his illness. A few shot were found loose in the cavity. The collapsed and carnified lung also contained some shot. The larger bronchial tubes could be traced down into the mass. An opening communicated with the liver through the diaphragm, and also one from the liver into the thorax. The tissues were all matted together and inseparable. The liver was wonderfully little diseased, excepting where it communicated with the lung and the thorax. It was pale and somewhat fatty, but not otherwise diseased. Several shot were found imbedded, indeed encysted, in its substance. The heart was adherent generally to the pericardium by recent adhesions. There were no clots in the cavities, and the valves were healthy. The left lung was healthy, but its anterior and lower parts were adherent by recent adhesions to the thoracic wall. The shot-wound had cicatrized, and it was difficult to find it on the inner surface. The eighth rib was broken about an inch from its costal cartilage. Part of this and of the rib above it were necrosed. A few shot were found here also, and several lay under the integument of the thorax in the vicinity. The sixth and seventh ribs were necrosed about two inches from the spine, and a

few shot were found imbedded here in the soft parts. It is remarkable that a charge of shot penetrating from so short a distance did not perforate the side like a bullet—they scattered in all directions, into the muscles of the thorax, the liver, lung, and thoracic cavity. It is also remarkable that no part of the clothing nor of the wadding should have been forced into the wound.

2.—*Gunshot Fracture of the Neck of the Femur.—Amputation at the Hip-Joint.*

On the 25th September, 1867, a consultation was held at the Officers' Hospital in Calcutta, on the case of Lieutenant H., who had been accidentally wounded on the 12th of the same month, by a rifle shot, which had penetrated the gluteal region, and fractured the head and neck of the femur. The patient had been a passenger on board a troopship, and met with the accident when out shooting at night, with a friend, in the island of Ceylon. The circumstances were briefly as follows:—

In pursuit of large game in the jungle by moonlight, they had taken different paths, and believed they were widely separated. About 2 or 3 a.m. the attention of one of the gentlemen was called by his guide to a herd of wild animals forty or fifty yards distant. He raised his rifle and fired, and to his horror found, on approaching the object, that he had wounded his companion, whom he believed to be several miles distant. The injured man, when struck, was dressed in a grey shooting suit, and was crawling on all-fours, probably to approach the game without being seen. The bullet from a Snider rifle struck him just over the left tuber ischii, and lodged. He lost a considerable quantity of blood whilst being carried to the nearest habitation, some miles distant, and there, when the medical officers arrived, the nature of the wound was examined. It was found that

the ball had grooved the tuber ischii, passed on towards the neck of the femur, and there lodged. There was no evidence of its having entered the pelvis, and the fracture of the neck of the femur was not then detected, doubtless owing to the fact that the capsular ligament had not been much injured by the passage of the bullet. He was taken on board the ship, as, owing to the heat and dampness of the climate, and for other reasons, it was deemed better that he should go on to Calcutta; and after a stormy voyage he arrived at Fort William on the 24th September. He had been tended with the greatest care and skill, but his sufferings had been heavy, requiring the use of frequent doses of opium. There had been profuse discharge, considerable irritative fever, occasional delirium, and consequent wasting and debility during the passage. Some small fragments of bone, and the basal cone of wood of the Snider bullet, had been removed from the wound.

I saw him first at 10.30 a.m. in consultation with several medical officers, and after placing him under the influence of chloroform, a thorough examination of the wound was made. His pulse was then 128; he was slightly delirious; and the discharge from the wound was fetid and profuse. The constitutional disturbance was well marked; and the rapid pulse, profuse perspiration, and quickened respiration were suggestive of the commencement of pyæmic mischief, though no rigors had, as yet, occurred. The respiration was said by the medical officers, who had seen him during the previous few days, to have been at times quick and catching. He had also clay-coloured diarrhœa. I observed, on exposing the limb, that the foot was everted, and the leg shortened about two inches, with a marked rounded prominence of the left hip about the trochanter. The skin was smooth and glazy, with the superficial veins well marked. On grasping the head of the bone, and making extension and rotation by the foot, crepitation was apparent; and on introducing the finger into the wound, now a large suppurating sinus, fragments of bone were detected, and the fractured neck of the femur, with part of its

head, detached and left in the acetabulum, became apparent. The ischium was found to have been grooved by the ball.

It is to be observed here, that the state of matters had entirely changed since the wound was inflicted. The capsular ligament had given way through the suppuration and sloughing that occurred in the track of the ball, thus allowing the shortening of the limb to take place—for there was none, it is reported, when the first examination was made—and the portions of dead and comminuted bone to move more freely on each other, thus rendering the crepitus apparent. The wound also had become much enlarged by the sloughing of the track of the ball, and allowed the finger to enter and examine freely.

The nature of the injury having been so far determined, a consultation was held as to the treatment, and it was decided that the only hope of saving life lay in an operation, which, considering the extent of injury, not only to the neck of the femur, but to the ischium, the cancellated texture of which was opened, and to the soft parts from sloughing and suppuration about the head and neck of the bone, and in the track of the ball, should be amputation at the hip-joint. As no pelvic injury seemed to have been inflicted, the urine being natural, and as no pyæmic visceral complication had yet occurred, considering the patient's youth and previous healthy constitution—he was only 20 years old—it was thought that this operation offered a chance of life, though it was admitted that it was at the best a poor one. His consent and that of his friends having been obtained, it was determined that it should be performed as soon as possible, and it was carried out at 3.30 p.m.

Entering the point of a long amputating knife, about two inches from the anterior superior spine of the ilium, in a line leading to the great trochanter, I transfixed the anterior part of the thigh, the point grazing the bone as it passed, and emerging about three inches from the anus. The artery was commanded by Professor Partridge, who, following the knife, as

the anterior flap was cut, seized and compressed the main trunk as soon as it was divided. The limb meanwhile being depressed by Dr. Home, C.B., no difficulty was found in passing the knife between the broken fragments of the neck of the bone, cutting out the posterior flap and detaching the limb—the proceeding occupying altogether between twenty and twenty-five seconds. There was considerable oozing from small arteries and veins. The femoral and gluteal arteries were secured, and then the portion of the head of the femur, still attached by the round ligament, was removed from the acetabulum. All bleeding points having been secured, the flaps were brought together with silver wire sutures. The patient became very low towards the latter part of the operation, the bleeding points being so numerous that many ligatures were required; but under the influence of stimulants, he rallied and was put to bed. His pulse rose, and reaction commenced; but although he was closely watched, hot bottles and sinapisms being applied to the limbs, and over the heart and stomach, and champagne and ammoniated stimulants given, he never thoroughly rallied. About an hour and a half after being put to bed, his breathing became much accelerated, and he sank and died quietly at 6.40 p.m., about three hours after the operation. The quantity of blood lost at the time was small, and he did not lose a drop after its completion. His constitutional powers were exhausted, and he never completely rallied from the shock.

I should note that, after removing the limb and the fragment of the head of the bone left in the acetabulum, my finger entered a large sloughing cavity above, internal to, and behind the neck of the bone. From this, the bullet, split into three longitudinal pieces, and some fragments of bone were removed. Before bringing the flaps together, the remains of the sloughing capsular ligament, and some shreds of sloughing muscle, were also dissected away. The external portion of the margin of the acetabulum was found to be roughened and partially stripped of periosteum.

The body was examined the following day at 11.30 a.m., when decomposition had not perceptibly commenced. The lungs were found to be partially collapsed. There were patches of lobular hypostatic congestion, but for the most part they were pale and exsanguine. In the lower lobes there were one or two small patches of commencing pyæmic mischief, but these had not advanced to disorganization. The pleuræ and pericardium were quite healthy.

The heart was natural in size and healthy in structure; valves, all competent. But the right ventricle was nearly filled with a firm, adherent, fibrinous ante-mortem clot, and besides it there was a post-mortem coloured coagulum. The fibrinous clots extended far into the pulmonary arteries. The right auricle also contained a small fibrinous clot. The left ventricle and its valves were quite healthy. The left auricle contained a small fibrinous clot. The exsanguine state of the lungs corresponded to the obstructed pulmonary circulation.

The liver healthy, pale and rather fatty; spleen and kidneys quite healthy; intestines, healthy. The peritoneum covering the bladder and the pelvis had a darkened appearance, probably from decomposition; no trace of any injury in the pelvis. But corresponding to the portion of the acetabulum, denuded of periosteum, there was a small collection of pus in the sub-fascial areolar tissue of the pelvic cavity. In this situation the soft parts, external to the peritoneum, were matted together, as if by inflammation. I removed the left os innominatum for more perfect examination, and found that the tuber ischii had been injured by the ball: it was grooved, and its cancellated tissue laid open. It was also broken across near its spine, and the ramus was fractured, the fracture running up to the top of the acetabulum, the outer portion of which was rough and denuded of periosteum. There was also a fissure in the acetabulum itself. These fractures were indeed all fissures, and involved no separation of the fragments.

Remarks.—This is the only instance in which I have seen the effects of the Snider bullet, and I should have expected,

knowing the great force and velocity with which that projectile travels, that it would have passed right through the limb, struck at a distance of only fifty yards, notwithstanding the obstacle it met with in the neck of the femur. The force of the ball, however, seems to have been spent in traversing the gluteal region, grooving the ischium, and breaking the head and neck of the femur into three pieces. The part of the neck actually traversed by the bullet presented a comminuted groove, and some small fragments knocked off lay in the wound or in the collection of pus, and sloughing tissue, from which the ball was removed after the amputation.

With reference to the operation, and why amputation was preferred to excision. The soft parts were much disorganized, the pelvic bones were injured, and the patient's constitution had been greatly tried already by suppuration and irritative fever, while there were evident indications of incipient toxæmia; and knowing the great tendency in this place to osteo-myelitis in divided bones, it was considered that if he could survive the shock of amputation, the subsequent chances of recovery were better than after excision, which would have left the suppurating cavity, and a divided long bone, as a probable source of future pyæmic poisoning, should it, as was very probable, become the seat of osteo-myelitis. He bore the operation very fairly, and his condition, when it was undertaken, although low, was not by any means such as to render success impossible. The loss of blood was not very great, nor was there any difficulty or delay in the amputation.

Reaction commenced, but as I believe the rapid supervention of the formation of fibrinous coagula in the right side of the heart, or rather aggravation of this when in an already incipient condition, prevented its perfect re-establishment, and he sank, as many other surgical patients do, not only from shock and exhaustion, but from the sudden interruption in the pulmonary circulation.

3.—*Case of self-inflicted Gunshot Wound of the Throat.—Recovery.*

A Hindoo carpenter, aged between 25 and 28, attempted to commit suicide at 5 p.m. on October 19th, 1870, by shooting himself in the throat with a pistol, carrying a bullet of about twenty to the pound. It appears that he placed it against or near the right side of his throat, at about the upper margin of the wing of the thyroid cartilage, over the thyro-hyoid space. The ball passed through and emerged on the left side, a little below the angle of the lower jaw. He fell, and there must have been considerable effusion of blood. After some hours he applied a portion of his dress to the wound, and then, having crossed the river in a boat, walked about four miles to the Hooghly Hospital, where he was admitted on October 19th, at about 7 p.m. He absconded on the 24th, and presented himself at the Medical College Hospital on October 26th, having, as he said, walked all the way. Soon after shooting himself he tried to drink, but the water came through the wounds on either side of his throat. These wounds, he says, were about the size of a fourpenny piece, the left being rather larger than the right. For a few days he had paroxysms of coughing, every attempt to swallow being frustrated, as fluids were rejected and came through the wounds in the neck. The whole throat was swelled, inflamed, and very painful, and soon the tissues about the pomum Adami sloughed and became fetid. It appears that gangrene began in the right side on October 26th.

When admitted into the Medical College Hospital he was much reduced, and miserably weak; the neck was swollen and infiltrated. There was a sloughing wound on the right side, and anterior surface of the pomum Adami, and a second on the left side, near the angle of the lower jaw, in a similar condition. These were separated by a bridge of integument about a quarter of an inch in width. The sloughs separated soon after

admission, laying bare great part of the right ala of the thyroid, and a smaller portion of the left. The os hyoides appears to have already separated, having been probably comminuted by the bullet. The carotid artery could be distinctly felt beating in the left wound. Through the large gaping wounds, now converted into one, an elongated, irregular opening in the pharynx and œsophagus, an inch in length, was perceptible, through which the vertebral column could be felt with a probe. Efforts to speak produced a faint husky sound. The vocal cords had apparently escaped when the thyroid cartilages were injured. When he recovered and left the hospital he still spoke with a husky but quite audible voice. On admission, any attempt to swallow was followed by rejection of the fluid through the wounds. The tube of the stomach-pump was introduced with some difficulty, and some beef-tea passed through it into the stomach. He seemed anxious to feed himself, and as he appeared to swallow a small portion he was allowed to take milk and beef-tea frequently. When all sloughing had ceased, and the clean granulating surfaces allowed the deeper parts to be quite distinctly seen, he managed to swallow more of the fluid, a considerable portion running down the open channel.

By November 2nd, with a view of expediting the healing of the wound by placing the parts at rest, all feeding by the mouth was discontinued. The head was bandaged forward to facilitate contraction, and nutrient enemata of beef-tea, wine, and milk were trusted to, being given at frequent intervals. He existed entirely on this mode of sustenance until November 7th (the sixth day), when the craving for food became intense. The wound during this rest had contracted considerably. Milk and beef-tea were again carefully introduced into the stomach through the tube, which now passed easily.

The enemata were also resumed until November 9th. About this time contraction of the healing œsophagus began to be apparent, and the tube was introduced daily, through which he was fed with milk morning and evening.

On November 11th arrowroot was added to the milk, the enemata of beef-tea and port wine being still continued. The wound in the neck was all this time granulating healthily and rapidly closing, and he was beginning to speak in an audible voice. This progress continued, and by the end of the month the wound was reduced to a fistulous opening.

On December 5th he began to feed himself with milk, arrow-root, and beef-tea, and only a few drops passed through the wounds. He then took solid food, and found he could swallow it easily. He rapidly improved in health, became fat and strong, and was able to give us an account of his accident and all that followed it. A tube was passed occasionally down the œsophagus, to obviate the contraction caused by cicatrization of the wound, and it appeared to do so satisfactorily.

It was not until May 23rd that he was discharged, as we had kept him in the hope that a small fistulous opening communicating with the larynx (the remains of the wound) would close. It had nearly done so when he was discharged. As he was in good health and impatient to return home, we let him go.

The wound, with the exception of the narrow fistulous opening above mentioned, had contracted to a linear though irregular cicatrix, and I believe it would have been impossible for any one to have imagined that it was due to a perforating gunshot wound; though, of course, when the nature of the wound and its subsequent progress are explained, it is intelligible. We verified the fact of its being a gunshot wound by inquiry from the police at the Hooghly Hospital, and from the native gunmaker of whom he had purchased the pistol. His own statements, too, though very wild and vague at first, were so clear and consistent afterwards, that there was no reason to doubt their truth. It is not difficult to imagine how important medico-legal questions might arise out of such cases, and it is therefore not uninteresting that the particulars of this should be placed on record.

FRACTURES.

Between May, 1859, and December, 1871, I find records of the following fractures, excluding those of the vault of the cranium, treated in my wards of the Medical College Hospital, Calcutta :—

Nasal bones	12
Zygoma and malar bones	4
Palate and superior maxillary bones	1
Lower jaw	10
Clavicle	36
Scapula	5
Humerus	67
Ulna and Radius	89
Fingers	21
Ribs	56
Spine	10
Pelvis	7
Femur	131
Patella	9
Tibia and fibula	159
Bones of the foot.	5
Total	622

These cannot be accepted as the actual sum total of all cases of fracture that have occurred during that period, some having, doubtless, owing to an imperfect system, escaped registration; yet they are sufficient to give an idea of the relative frequency, and the results of the various fractures among the natives and others in Bengal.

I have made simply a brief analysis of the fractures. It is unnecessary to enter into details of symptoms and treatment, further than as they affect general results. As a rule, I think it may be said that simple fractures are almost as easily repaired in Bengal as in Europe, and that, considering the depressing influence of a malarious climate, a poor and mainly farinaceous diet, a more or less general prevalence of anæmia and splenic cachexia, the results of treatment are satisfactory.*

In cases of compound or open fracture, the results are probably not so favourable; and here, I fear, the constitutional conditions I have mentioned, supplemented by hygienic and nosocomial defects, must be admitted to have caused a higher mortality from the secondary accidents of pyæmia, osteomyelitis, and shock after amputation, than is usual elsewhere in these cases.

I have nothing to say in reference to treatment, except that it was of the simplest kind, and managed with splints of the simplest form. In some cases, such as fracture of the lower end of the radius (Colles'), a pistol-shaped splint, cut for each particular case from boards kept for the purpose, was usually resorted to. The same for fractures of the forearm generally.

Fractures of the femur, for the most part, have been treated by simply placing the limb at rest on a long splint, to which it was secured either by a bandage or sheet, without any forcible extension, which I believe to be needless.

In fractures of leg, McIntyre's, Salter's, and Cline's splints were found to be most efficacious.

The chalk and gum or starched bandages have also been very freely used, and with good results. They were frequently applied within a few days after the first swelling or inflammatory symptoms had subsided.

I think there is every reason to believe, that since the introduction of the antiseptic treatment, as practised by Professor

* The subject of rapid union of fractures is discussed in "Clinical Surgery in India," p. 382.

Lister, the treatment of open comminuted fractures has been more successful, there being less suppuration and consequent tendency to exhaustion or septicæmia. In this respect, I believe the good effects of carbolic acid have been more apparent than in any other class of cases in which it has been used. But I should like to have still further experience, before expressing any very decided opinion on the subject of the antiseptic treatment of disease generally.

Fracture of the Nasal Bones.

Of twelve cases of fracture of the nasal bones, caused by blows on the face, ten occurred in European sailors and two in natives, all males. Ten of the cases were simple, and the depressed and fractured bone having been elevated, recovery took place rapidly. In two, the injury was more severe, and in addition to wounds of the face, the bones were so much depressed as to cause injury to the brain, proving fatal in one case on the day of admission soon after the injury; in the other, in six days, from inflammation.

The average duration of treatment was about eleven days. It consisted in elevation of the depressed bones and local applications to the contused parts. In the fatal cases, such treatment as the cerebral symptoms indicated were resorted to, in addition to the local measures.

FRACTURE OF THE NASAL BONES.

Fracture of the Nasal Bones.	Males.	Females.	Europeans.	Natives.	Recovered.	Died.	Cause of Death.	Remarks.
Simple	10	..	9	1	10	..		
Compound .	2	..	1	1	..	2	Inflammation and injury of the brain.	
Total....	12	..	10	2	10	2	Total cases, 12	

Fracture of the Zygoma and Malar Bone.

Only three cases of fracture of the zygomatic arch are recorded. They were all simple, and were caused by violent blows or falls. They all did well, and were under treatment for periods of eight to fourteen days. Fomentations, rest, and lotions, with elevation of the depressed and fractured bone as much as possible, was the only treatment needed. Two occurred in Englishmen, one in a native.

One other case is recorded of a severe wound in the face, caused by a blow, involving compound fracture of the right malar bone. The patient recovered without an unfavourable symptom, under the simplest treatment, and left the hospital in eleven days.

FRACTURE OF THE ZYGOMA AND MALAR BONE.

	Males.	Females.	Englishmen.	Natives.	Recovered.	Died.	Cause of Death.	Remarks.
Simple	3	..	2	1	3	..		All simple fractures of the zygoma.
Compound .	1	..	..	1	1	..		A compound fracture of the malar bone.
Total....	4	..	2	2	4	..	Total cases, 4	

Fractures of the Upper and Lower Jaw.

I have a record of one case of fracture of the superior maxillary and palate bones, and ten of the lower jaw. The former was caused in a native male by a violent blow on the face with a stick. There was profuse hæmorrhage from the nose and mouth, and the superior maxillary bones were broken obliquely through the alveolar and palatine processes, involving the palate bones. He recovered well, and was discharged in three weeks, union having taken place.

There were ten cases of fracture of the lower jaw, of which three occurred in European males, six in native males, and one in a native female. In five cases the fracture was compound, and in five simple. The injury was caused by falls or violent blows on the jaw. One case proved fatal about two hours after admission, the accident being complicated by injury to the brain.

The average duration of treatment in the simple fractures was twenty-six days; that of the compound fractures about thirty-two days. The treatment consisted in the application of such dressing as was needed in the compound fractures, the removal of any loose or exfoliated pieces of bone, and the application in all cases of a gutta-percha splint moulded to fit and support the fractured jaw, and retained in position by a four-tailed bandage.

FRACTURES OF THE MAXILLARY BONES.

	Males.	Female.	Europeans.	Natives.	Recovered.	Died.	Cause of Death.	Remarks.
Simple	4	1	3	2	5	..		One case of compound fracture of the upper jaw. Recovery.
Compound .	6	..	..	6	5	1	Injury to the brain.	
Total....	10	1	3	8	10	1	Total cases, 11	

Fractures of the Clavicle.

Thirty-five cases of fracture of the clavicle are recorded. Of these, sixteen occurred in native males, eleven in European males, and eight in native females. One was compound, which recovered. Four cases proved fatal; one of simple fracture, in a native male, who died soon after the accident from shock caused by a fall, from which there was injury of the head.

Two cases of fracture of both clavicles in women, caused by being run over by carriages; in these cases there was also intra-cranial mischief, which proved fatal soon after admission. The fourth case died of tetanus, which supervened in simple fracture, and proved fatal on the sixth day.

The ages ranged from 7 to 68 years; five between 7 and 18, twenty-four between 18 and 38, six between 38 and 68 years of age.

In seventeen instances the seat of the fracture was at the outer third, in fifteen at the middle, and in three at the inner third of the clavicle.

In seventeen cases it was on the right, in fourteen on the left side, in two on both sides; and in two cases the side is not recorded.

The treatment has generally been the axillary pad, a fixed scapula, and figure of 8 bandage, with a sling to support the arm. Bandages and apparatus specially constructed for this fracture have not been found to possess, as a general rule, any advantage over the figure of 8 bandage. In cases of restlessness and irritability of constitution, rest in the recumbent posture without any bandage at all has had favourable results.

FRACTURES OF THE CLAVICLE.

	Males.	Females.	Europeans.	Natives.	Recovered.	Died.	Cause of Death.	Remarks.
Simple	27	7	16	18	30	4	Two of injury to the brain, one of shock, one of tetanus.	Two cases of fracture of both clavicles accompanied by injury to the head proved fatal.
Compound .	..	1	..	1	1	..		
Total....	27	8	16	19	31	4	Total cases, 35	

Fractures of the Scapula.

I find a record of five cases of fracture of the scapula treated in my wards during the past eleven years. The first was the case of a European, aged 37, who fell on a wet and slippery floor, and struck the shoulder violently in the fall. The symptoms were those assigned to the rare accident—fracture of the neck of the scapula—crepitus, falling and flattening of the shoulder, the roundness of which was diminished by the prominence of the acromion, the deformity being removed on raising the elbow.

The parts were kept in apposition, the elbow being raised and secured *in sitû* with a cap over the shoulder. He did well, and was discharged in four weeks.

The second case was that of a Greek sailor, aged 25, who had fracture of the left acromion from direct violence. He did well. The bone was kept at rest, the arm being supported and bandaged to the thorax. He was discharged in twelve days. The union was probably ligamentous.

The third was a simple fracture of the spine of the right scapula, probably extending through the body of the bone, caused by direct violence. The scapula was kept at rest with a bandage, and the woman, an East Indian, aged 16, was discharged in thirty days.

The fourth case was that of a Hindoo coolie, aged 45, who had a fracture through the body of the right scapula. The bone was bandaged to the thorax, and being kept at rest, union took place, and he was discharged in thirty days.

The fifth case was that of a Mahomedan, aged 32, who was admitted with a comminuted fracture of the body of the right scapula, caused by the falling on him of a heavy weight. The bone was kept in position by a bandage round the thorax, and he was discharged cured in three months.

FRACTURES OF THE SCAPULA.

Fractures.	Males.	Female.	Total.	Recovered.	Died.	Remarks.
Neck.....	1	..	1	1	..	The ages were 16, 25, 37, 32, 45.
Spine	1	1	2	2	..	
Body	2	..	2	2	..	One case of fracture of the body of the bone was comminuted.
Total.....	4	1	5	5	..	

Fractures of the Humerus.

I have notes of sixty-seven cases of fracture of the humerus, treated in my wards during the past twelve years.

Of these, eight occurred in European males, four in East Indian males, thirty-five in native males, and seventeen in native females. Fourteen deaths occurred, of which the following is a short analysis :—

1. A Hindoo, aged 22, who had the right humerus simply fractured, and also fracture of the ribs with injury of the lung, from which he died soon after admission.

2. An English sailor underwent an operation for badly united fracture of the fore-arm. Osteo-myelitis and pyæmia set in. Amputation of the arm was performed. He died of pyæmia.

3. A Hindoo woman, aged 21, underwent amputation of the arm after a fracture of the fore-arm, which resulted in diffused suppuration, extending into the elbow-joint. She died of exhaustion and pyæmia on the fourteenth day.

4. An East Indian underwent amputation of the arm for a severe compound comminuted fracture, accompanied by extensive laceration of the soft parts. He died, apparently of shock, on the fourth day after the amputation.

5. A Mahomedan, aged 40, under treatment for simple fracture of the fore-arm, was attacked by dysentery, of which he died on the sixteenth day.

6. A Hindoo boy, aged 14, underwent amputation of the shoulder-joint for a bad compound fracture, with laceration of the soft parts. He died of exhaustion.

7. A Hindoo woman, aged 35, fractured her humerus in two places, in falling from a height of fifteen feet. There was also extensive laceration of the soft parts and hæmorrhage. Amputation at the shoulder-joint was performed, but she sank from exhaustion on the sixth day.

8. A Mahomedan, aged 15, when under treatment for simple fracture, died of epilepsy, to which he was subject.

9. An East Indian, aged 70, was knocked down by a carriage, and sustained fracture of the surgical neck of the left humerus. The carriage had passed over his abdomen and caused injury of the viscera. He was in a state of collapse on admission, and died shortly afterwards.

10. A Hindoo boy, aged 8, when under treatment for compound comminuted fracture of the humerus, was attacked by, and died of, tetanus.

11. A Mahomedan, aged 20, had the right humerus comminuted by a gunshot wound. Symptoms of osteo-myelitis setting in, amputation at the shoulder-joint was performed, but he died of pyæmia on the twenty-seventh day after the accident.

12. A Hindoo, aged 60, had simple fracture of the right humerus, a carriage wheel having passed over him. There was also internal injury, of which he died in a few hours.

13. A Mahomedan, aged 30, was admitted with a compound comminuted fracture of the left humerus at its upper third, secondary amputation becoming necessary, and he died from exhaustion.

14. A Hindoo boy, aged 7, was admitted with compound comminuted fracture of the left humerus just above the condyles, caused by a fall. Amputation was performed, but he sank from shock the same day.

In one case of simple fracture in a Hindoo, the patient was attacked in hospital by small-pox, and was removed to the small-pox hospital.

In a case of simple fracture in a Mahomedan, he was attacked in hospital by cholera, and was transferred to another ward, where I believe he died.

The fracture was at the anatomical neck in four cases.

" " at the surgical neck in nine cases.
" " at the upper third in eight cases.
" " at the middle third in twenty-one cases.
" " at the lower third in sixteen cases.
" " at the condyles in nine cases.

The fracture was simple in fifty-six cases, and it was multiple or comminuted in two cases.

It was compound in five cases, and compound comminuted in nine cases. In five cases primary amputation was performed with one recovery. In four cases secondary amputation was performed, all fatal.

The causes of death after the amputations were in three cases pyæmia, in three shock, and in three exhaustion.

As to treatment, the simple fractures of the shaft of the humerus were put up with ordinary side splints, or in some cases with the angular splint, to ensure perfect rest of the whole limb, which indeed is always the best plan. These were exchanged for the starch or gum and chalk bandage as soon as swelling or inflammatory symptoms permitted.

Fracture of the neck was treated by a pad in the axilla, and side or angular splints to support the arm and fore-arm, so as to keep all at rest, with in some cases a gutta-percha or leathern cap over the shoulder, or a leather or gutta-percha bent splint applied to the inner side of the arm and thorax.

Fractures about or through the condyles were placed on a rectangular splint, in order to preserve the most useful portion of the arm if anchylosis ensued, as is sometimes the case, owing to inflammatory changes in the joint. Passive motion was had recourse to as early as possible.

In all the cases here recorded bony union occurred.

In one case of compound fracture one and a half inches of the humerus were removed.

In another case of compound fracture four inches of the lower third of the humerus were removed. The divided ends were gradually brought into apposition, and the patient recovered with a useful although a shortened arm. In most of these cases the use of the starched or chalk and gum bandage was found to be very satisfactory both to the dresser and patient.

FRACTURES OF THE HUMERUS.

Fractures.	Recovered.	Died.	Total.	Cause of Death.	Remarks.
Neck	11	2	13	Injury of the lung. Pyæmia. Do. Shock.	Fifty-three cases were simple fracture.
Shaft	33	12	45	Dysentery. Exhaustion. Do. Epilepsy. Collapse. Tetanus.	Fourteen of the fractures were compound and comminuted.
Condyles	9	..	9	Pyæmia. Injury of the abdominal viscera. Exhaustion. Shock.	Amputation was performed in nine cases— 5 primary. 4 secondary.
Total	53	14	67		

Fractures of the Fore-arm.

During eleven years I find records of eighty-eight cases of fractured fore-arm. Of these, fifty-six occurred in native males, thirteen in native females, thirteen in European males, one in a European female, three in East Indian males, and two in East Indian females. There were thirteen deaths, which were due to pyæmia in three cases after amputation; to shock in four cases, in which the injury had been caused by great vio-

lence, involving the head in two cases, and amputation in one; to tetanus in five cases, in one of which amputation had been performed; and to chronic diarrhœa in one case.

There was fracture of both bones in twenty-three, of the radius alone in fifty-nine, and of the ulna alone in seven cases.

Of the fractures of the radius, twenty-two were that form known as Colles' fracture, one of which was double and compound, whilst two were at the neck of the bone.

Of the fractures of the ulna, one was at the olecranon.

Of the whole number, fourteen were compound, four of which led to amputation, all fatal; nine died, and five recovered. The deaths after compound fracture were due to pyæmia in two; tetanus in five; and shock in two

The treatment of these fractures has been conducted on the simplest principles—by splints which supported the whole fore-arm and hand, and so applied as to keep the interosseous space from being contracted, the starched bandage replacing them at an early period. In the cases of Colles' fractures, I have found the curved splint, with a small pad applied at the lower end of the palmar aspect, and a dorsal splint, followed by very favourable results, and these fractures were not, as a general rule, followed by any distortion of the limb. Fractures near the elbow joint were supported on a rectangular splint.

FRACTURES OF THE FORE-ARM.

Fractures.	Males.	Females.	European and East Indians.	Natives.	Recovered.	Died.	Cause of Death.	Remarks.
Simple	64	10	14	60	70	4	Pyæmia. Shock. Injury to the head. Chronic Diarrhœa.	Twenty-two were Colles' fractures. Two fractures of the neck of the radius.
Compound .	12	2	..	14	5	9	Two Shock. Five Tetanus. Two Pyæmia.	One of the olecranon.
Total	76	12	14	74	75	13	Total cases, 88	

Fractures of the Fingers.

I find notes of twenty-one cases of fracture of the fingers. Of these two were simple and nineteen compound. In nine cases, one or more fingers, in two the thumbs were removed. There was one death, and that was rather due to debility and exhaustion in a feeble person than to the accident.

The fractures occurred in native males fourteen, in East Indian males four, and in Europeans two. In a native female one case. The accidents were generally caused by machinery.

This enumeration does not include cases in which the carpal or metacarpal bones were fractured, the records of which have not been furnished.

FRACTURES OF THE PHALANGES.

Fractures.	Males.	Female.	Europeans.	Natives.	Recovered.	Died.	Cause of Death.	Remarks.
Simple	2	..	1	1	2	..	One died of debility.	They, except one case, all did well, under rest, water, and carbolic acid dressing.
Compound .	18	1	5	14	18	1		Eleven cases required amputation, but did well.
Total ..	20	1	6	15	20	1	Total cases, 21	

Fractures of the Ribs.

I have a record of fifty-six cases of fractured ribs treated during a period of eleven years. Of these there were—

European males	11
,, female	1
East Indian males	7
Chinese male	1
Native males	29
,, females	7
Total	56

There appears to have been only one case of compound fracture, and that occurred in a Mahomedan, aged 56, who, falling from a height on to a sharp log of wood, which penetrated the left side of the thorax, sustained a compound fracture of the sixth rib. There was injury of the lung, hæmoptysis, emphysema, and collapse of the lung. He sank two days after the injury. Nine other cases also terminated fatally.

2. A Hindoo woman, aged 45, who had fallen on a block of stone from a height, and had fractured the ninth and tenth ribs, injuring the lung. She died shortly after admission.

3. An East Indian boy, aged 2, had fracture of the fifth and sixth ribs of the left side, with hæmoptysis. He died from exhaustion a few hours after admission.

4. A Hindoo woman, aged 30, was run over by a carriage, the third and fourth ribs being broken on the left side. The violence had been very great; she was much exhausted, and died almost immediately after admission. There was considerable emphysema.

5. A Mahomedan, of middle age, was admitted in a state of insensibility, with several ribs broken, caused by a fall, it was believed. He died a few hours after admission.

6. A Mahomedan, aged 60, was knocked down by a carriage, and had the ninth and tenth ribs on the left side fractured. There was hæmoptysis, and he died of pneumonia in nine days.

7. A Mahomedan, aged 40, was run over by a carriage. Nearly all the ribs of the left side were fractured; he was insensible when admitted, and died of shock in a few hours.

8. A Hindoo, aged 50, was knocked down by a runaway horse; admitted in a state of shock: seventh rib broken, and extensive emphysema. He died in six days, never having rallied.

9. A Hindoo, aged 65, fell heavily on an iron rail, and fractured nearly all the left ribs. When admitted he was much depressed; there was hæmoptysis and extensive emphysema. He died a few hours after admission.

10. A Hindoo woman, aged 60, was knocked down by a carriage. The wheel passed over her chest, fracturing the right

ribs, from the second to the ninth. She never rallied, and died a few hours after admission.

11. An English clerk, aged 35, fractured the fifth and sixth ribs on the right side. There was much emphysema, but no hæmoptysis. The day after admission his respiration became very feeble and hurried, and he sank in a few hours.

In six cases the lung appears to have been injured, emphysema or hæmoptysis, or both, being present. These were in addition to the fatal cases, in all of which the lungs were probably injured.

In two instances the fracture of the ribs was said to have happened during violent fits of coughing. These patients were an Englishwoman, aged 44, who thus fractured her sixth rib, and an East Indiaman, aged 45, who fractured the eighth right rib.

I have nothing particular to say on the subject of treatment. It consisted, in the simple and uncomplicated cases, in the application of a bandage round the chest to give support, rest in bed, and the allaying of irritation and cough by the comp. tinct. of camphor, in ʒj. or ʒij. doses. I know of no better form of sedative in these accidents than this preparation of opium. In cases of more serious injury, involving emphysema or hæmoptysis, the result of wounded lung, and attended by prostration, as it was in some cases, it became necessary to support the patient whilst such measures were had recourse to as might control the hæmorrhage and relieve the oppression caused by the emphysema. In one case I found it desirable to abstract blood from the arm, to relieve congestion of the uninjured lung, and to give relief to the embarrassed heart; and although the operation was performed when the patient appeared depressed, and his pulse was feeble, the benefit was evident in the relief of the dyspnœa, the improvement in the pulse, the better arterialization of the blood, and his subsequent recovery. Indeed, I know of no case in which venesection is more decidedly indicated; and though one is naturally reluctant to deprive the patient of blood, yet to do so may be the choice of a lesser evil, and con-

tribute, not only to his present relief, but to the saving of his life. In such cases it may be necessary to give stimulants as the blood is withdrawn, the object of the blood-letting being merely the relief of congestion and an overloaded and labouring heart, not depletion for antiphlogistic purposes.

I subjoin short notes of five of the cases.

Case I.

Fracture of the ribs.—Emphysema.—Pneumo-thorax.—Collapse of the injured lung.

S. F., aged about 50 years, a Mahomedan coachman, was admitted on the 25th March, 1866, having fallen from a branch of a tree at about twenty feet from the ground. The left ribs, from the third to the eighth inclusive, were fractured, the line of fracture extending downwards from the nipple. There was great depression of the fractured ribs, and extensive emphysema of the thorax, neck, left arm, and abdomen. The left side of the chest was tympanitic on percussion; the pulse was weak, and the breathing very difficult, but there was no hæmoptysis. Diffusible stimulants were given frequently, and hot bottles applied to the limbs and trunk. He was bandaged, and supported on pillows in the sitting posture, not being able to lie down.

26*th*.—Pulse still very feeble, skin cold, lips livid, dyspnœa severe, with loud mucous râles. Venesection ad. ℥viii. from the right arm. The stimulants to be continued as before.

27*th*.—The pulse still feeble, but the breathing is easier; temperature 99°; large crepitation audible.

28*th*.—Rather better; pulse 128; respiration 36, and easier; temperature 101°.

29*th*.—Pulse 100; respiration 36; temperature 102°; expectoration purulent. The air now enters the lung freely.

30*th*.—Much better; less cough and expectoration; emphysema disappearing, and strength returning. A simple cough mixture ordered containing tr. camph. co.

2nd April.—Expectoration and cough much diminished; no pain; respiration clear on both sides. Continue medicine and diet. He gradually gained strength, and was discharged recovered on the 19th April.

Case II.

Fracture of the ribs.—Emphysema.—Pneumo-thorax.—Wound of the lung.

J. R., an English sailor, admitted 27th April, 1866. Fell, on board his ship, from a height of twenty feet, and fractured the fourth rib on the left side near its costal cartilage. There was much pain, dyspnœa and pneumo-thorax, with considerable emphysema of the left side of the chest. There was no blood in the sputa. He progressed favourably, had no fever and only slight cough, which was modified by the use of the tinct. camphor. co. A bandage was applied round the thorax, and he was kept at rest in bed, with a nutritive but unstimulating diet. The rib united, and the emphysema disappeared: the breathing on both sides became natural, and he was discharged recovered on the 17th May.

Case III.

Fractured ribs.—Emphysema.—Pneumo-thorax.—Wound of the lung.

B. K., aged 25 years, a Mahomedan servant, admitted on the 18th April, with fracture of the anterior portion of one or two ribs on the upper part of the right side, caused by falling downstairs. There was pain and dyspnœa, with emphysema of the right side of the thorax. No blood in the sputa. Percussion-sound about the seat of fracture was somewhat tympanitic, but respiration was audible in the affected lung; pulse feeble; slight cough. Bandage round the thorax, simple cough mixture, salines when feverish, and moderate diet.

28*th.*—Doing well; no cough; emphysema gone.

3*rd May.*—Ribs united; percussion-note clear on both sides. Respiration natural.

12*th.*—Discharged recovered.

Case IV.

Fracture of the ribs.—Injury of the lung.—Pneumo-thorax.—Emphysema.

M., aged 50 years, a Khalassíe, admitted on 23rd November, 1866, with fracture of the fourth, fifth, and sixth ribs, caused by compression between the buffers of two railway carriages. There was extensive emphysema of the right side of the chest, great dyspnœa and bloody expectoration, and pneumo-thorax on the right side.

25*th.*—Emphysema extended to the right side of the neck and face, as far as the eyelid. Respiratory murmurs faint; dyspnœa and bloody expectoration; tr. camph. co.; simple diet.

28*th.*—He is better; no fever; emphysema disappearing; breathing easy; cough less troublesome.

6*th December.*—No emphysema; slight cough; muco-purulent expectoration. Breathing nearly natural; bones united.

17*th.*—Discharged recovered.

Case V.

Fracture of the ribs.—Laceration of the lung.—Emphysema.—Death.

S., aged 50 years, a Hindoo servant, admitted on the 1st April, 1867, with fracture of several ribs on the right side, caused by a kick from a horse. The axillary region was depressed, and the integument of the thorax, neck and face distended by emphysema. Extremities cold; pulse feeble; respiration very painful and hurried; no hæmorrhage. Respiration on the uninjured side puerile and attended with mucous râles,

He is much depressed. Stimulants and warm fomentations; rest in the recumbent posture.

2nd.—Pulse 96, feeble; respiration 40; temperature 100°; blood in the sputa. Emphysema extending; noisy mucous râles; cough troublesome.

3rd.—Pulse 128; respiration 28; temperature 104°; emphysema still extending. Salines and stimulants.

4th.—Pulse 136; temperature 104°.

5th.—Dyspnœa worse and pulse feeble; much congestion of the left lung; dulness all over the right side; the lung partially, if not altogether, consolidated. Took eight ounces of blood from his arm; he felt easier as it was flowing, but the improvement was only temporary, for on the following day he was worse. Again the breathing became very rapid, and the pulse feeble. He died at midnight.

On post-mortem examination the second, fourth, and fifth ribs of the injured side were found to be broken about the middle, one end of the fourth rib penetrating the lung; the right lung was consolidated and adherent to the parietes; the pleura much thickened; the middle lobe was lacerated to the extent of two inches; blood was effused into the thorax, the lung itself being engorged; the left lung was congested at the base.

This was a very severe injury; the shock was great, and the patient was an infirm man.

ABSTRACT OF CASES OF FRACTURE OF THE RIBS.

Race.	Age.	Sex.	Ribs fractured.	Length of Stay in Hospital.	Result.	Complications.	Remarks.
Mahomedan .	48	M.	5th and 6th	8 weeks 6 days	Recovery		
Do.	50	M.	8th	5 weeks 3 days	Do.		
Do.	56	M.	6th (compound)	2 days	Death	Hæmoptysis	
Hindoo	46	F.	9th and 10th	2 days	Do.		
East Indian..	50	M.	9th and 10th	8 weeks	Recovery		
Do.	2	M.	5th and 6th	A few hours	Death	Hæmoptysis	
Hindoo ...	47	M.	6th, 8th, 10th, 11th	2 days			Removed by his friends
Do.	30	M.	6th	3 weeks	Recovery		
Do.	35	F.	3rd and 4th	6 weeks	Do.		
Do.	30	F.	3rd and 4th	A few hours	Death	Emphysema and great exhaustion	
Do.	32	M.	10th	3 weeks	Recovery		
Mahomedan .	60	M.	5th	5 weeks	Do.		
Do.	..	M.	— —	A few hours	Death	Insensibility	
East Indian..	45	M.	8th	4 weeks	Recovery		Left at own request
Mahomedan .	30	M.	8th and 9th	6 weeks	Unknown		
Do.	60	M.	9th and 10th	1 week	Death	Hæmoptysis and great exhaustion	
Do.	32	M.	10th	3 weeks	Recovery		
Hindoo	44	F.	6th	4 weeks	Do.		
Mahomedan .	50	M.	7th and 8th	3 weeks 3 days	Do.	Emphysema and great depression	
Hindoo	75	F.	5th	5 weeks	Do.		
Mahomedan .	60	M.	All the left ribs	A few hours	Death	Insensibility and shock	
Hindoo	60	M.	10th	1 day	Left at own request		
Do.	50	M.	3rd and 4th	5 weeks	Recovery		
Do.	25	M.	8th, 9th, 10th	19 days	Do.		Left at own request
East Indian .	46	M.	2nd and 3rd	12 days	Do.		
Mahomedan .	30	M.	4th to the 8th	3 weeks 4 days	Do.	Hæmoptysis and Emphysema	
Do.	25	M.	5th	4 weeks	Do.		
Hindoo	45	M.	2nd and 3rd	3 weeks	Do.		
Do.	50	M.	7th	6 days	Death	Emphysema	

ABSTRACT OF CASES OF FRACTURE OF THE RIBS—*continued.*

Race.	Age.	Sex.	Ribs fractured.	Length of stay in Hospital.	Result.	Complications.	Remarks.
Hindoo	65	M.	All the left ribs	1 day	Death	Emphysema and Hæmoptysis	
Do.	60	F.	2nd to the 9th	A few hours	Do.	Severe shock	
Mahomedan .	40	M.	5th and 6th	12 days	Recovery		
Do.	65	M.	8th	8 weeks	Do.		
Do.	40	M.	2nd and 3rd	4 weeks	Do.		
Do.	45	M.	6th and 7th	2 weeks 4 days	Do.		
Do.	35	M.	2nd, 3rd and 11th	6 weeks	Do.		
Hindoo	65	M.	4th and 5th	2 weeks 5 days	Do.		
East Indian .	25	M.	8th and 9th	1 week 3 days	Do.		
Do.	52	M.	6th and 11th	2 weeks 5 days	Do.		Left at own request
Hindoo	45	M.	9th	2 weeks 1 day	Do.		
Chinese	52	M.	6th and 7th	6 weeks	Do.		
Hindoo	40	F.	7th and 8th	3 weeks 2 days	Do.		
Mahomedan .	18	M.	8th	11 days	Do.		Left at own request
Hindoo	30	M.	3rd and 8th	Not stated	Do.		
				EUROPEANS.			
English	29	M.	10th	4 weeks 3 days	Recovery		
Portuguese ..	50	M.	6th	4 weeks 1 day	Do.		
English	43	M.	9th and 10th	7 weeks 1 day	Do.		
Irish	44	F.	6th	7 weeks	Do.		
Scotch	60	M.	4th	3 weeks	Do.		
English	48	M.	8th and 9th	5 weeks	Do.	Emphysema and Hæmoptysis	
Do.	30	M.	8th and 9th	8 weeks	Do.		
English	35	M.	5th and 6th	24 hours	Death	Emphysema	
Irish	52	M.	7th	3 weeks 4 days	Recovery		
English	52	M.	6th and 7th	3 weeks 1 day	Do.		
Do.	28	M.	9th	3 weeks 2 days	Do.		
Do.	49	F.	8th	2 weeks 4 days	Do.		

Fractures of the Spine.

I have a record of ten cases of fracture of the spine treated in my wards during the last ten years, all, with one exception, proving fatal.

1. A Hindoo coolie, aged 35, was injured by a block of wood falling on his back from a height. There was a depression in the dorsal region, and complete paralysis and anæsthesia of the lower extremities and lower part of the abdomen. No crepitus perceptible. He died fourteen hours after admission. The laminæ of the fourth vertebra were broken, and the fourth was dislocated from the third dorsal. The membranes were also injured and the cord was crushed.

2. A Hindoo, aged 45. In this case the eighth and ninth dorsal spinous processes were fractured by the falling of a weight on him. He was paralyzed in the lower extremities, and the bladder was distended. He survived eighteen days. The bladder was emptied frequently, and he was carefully watched. No post-mortem was allowed.

3. A Hindoo woman, aged 22, in falling from a second story, sustained injury to the spine. There was depression in the lower dorsal region between the tenth and eleventh vertebræ. She lived sixteen days. Post-mortem examination showed that there was fracture of the laminæ of the tenth dorsal vertebra, laceration of the ligaments, and crushing of the cord.

4. A Mahomedan, aged 40, was admitted paralyzed below the neck. Respiration hurried and diaphragmatic. The injury had been caused by a block of wood falling on his neck. He died on the second day. There was fracture and dislocation of the fourth cervical vertebra.

5. A Hindoo, aged 23, sustained a fracture of the fifth and sixth cervical vertebræ by direct violence. He was paralyzed in the trunk and lower extremities, the bladder being distended. He died shortly after admission.

6. A Mahomedan sustained an injury of the spine from a blow, and a depression was found low in the dorsal regions. He was much depressed, and was paralyzed in the lower extremities. He died on the following day. No post-mortem was allowed.

7. A Hindoo coolie, aged 30, was admitted with diaphragmatic breathing and complete paralysis below the neck. He had been injured by the falling of the end of a railway sleeper on his neck. This man survived from the 20th of March to the 7th of April, an unusually long time after injury so high up in the vertebral column. The body of the fifth cervical vertebra was found to be fractured.

8. A Hindoo coolie, aged 20, was admitted with paralysis and anæsthesia of the lower extremities, the consequence of fracture by violence of the first lumbar vertebra. The urine was drawn off frequently, and he was carefully tended. Diarrhœa set in, and he died in eleven days. No post-mortem was allowed.

9. A Hindoo woman, aged 30, sustained fracture of the first lumbar vertebra by the falling of a bag of rice on her back. She was completely paralyzed in the lower extremities and bladder. She was carefully tended, the urine being frequently withdrawn. She gradually improved in health, regaining partial power in the legs, but no control of either the bowels or bladder. She left the hospital on the 17th of July, having been admitted on the 11th of the preceding December.

10. A Hindoo woman, aged 26, fell from a second story and injured her spine; the trunk, and the lower and upper extremities were paralyzed, the breathing diaphragmatic, and the bladder distended. A depression was found between the fourth and fifth cervical vertebræ. She died a few hours after admission, and about three days after receipt of the injury. The laminæ of the fourth and fifth cervical vertebræ were fractured, and the body of the fifth was split vertically. The ligaments were also ruptured.

Of the above cases, seven were males and three females. The fractures occurred in the cervical region in four cases, in the dorsal in four, and in the lumbar in two cases.

In one case of injury to the cervical vertebræ life was prolonged for eighteen days; in the other three cases death occurred in from one to three days after the injury. In the dorsal fractures death occurred in one case in seventeen hours, and in the other three in twenty-four hours, sixteen days, and eighteen days. In the two lumbar fractures, one partially recovered and left the hospital in three months; the other died on the eleventh day, death being hastened by diarrhœa.

In the treatment of these cases great attention was given to the state of the bladder, which requires to be frequently relieved, often at intervals of a few hours. I have observed that during the first few days after the injury the quantity of urine secreted is unusually large, and therefore the bladder requires frequent relief. Later on, when the urine becomes ropy and ammoniacal, it may be desirable to wash out the bladder with a very weak solution of nitric acid, and to see that it is always thoroughly emptied. The patient should be kept in the most perfect repose of mind and body; all movement of the trunk should be prevented, in order to obviate any chance of increasing injury to the cord or its membranes by motion of the fractured bones. The tendency to bed sores must be borne in mind, and continued pressure on prominent parts carefully obviated; the most perfect cleanliness and dryness is essential, especially in a hot damp climate, where decomposition proceeds so rapidly; and the state of the bowels must be carefully watched. All depressing agencies must be avoided in the treatment, and restlessness and pain, which is often great above the paralyzed parts, may be alleviated by opiates; sleep may be induced by chloral. The diet should be nourishing, but unstimulating. The amount of stimulants must depend on the temperament and constitution of the sufferer.

At the best, I fear, in cases of fracture above the lumbar region, we can only hope to prolong life, and promote euthanasia; for even though the cord or membrane be uninjured at the time of the injury, the mischief is almost certain to spread to this, so that sooner or later it proves fatal. After

death the softened and altered state of the cord is shown, when a stream of water is gently poured on it—the diffluent softened part disappearing and leaving a chasm in the cord, which indicates the extent to which the mischief has spread.

FRACTURES OF THE SPINE.

Race.	Sex.	Age.	Point of Fracture.	Result.—Duration of Life from admission.	Remarks.
Hindoo	M	35	4th Dorsal vert.	Death in 17 hours.	
Do.	M	45	Dorsal region.	Death in 18 days.	No post-mortem.
Do.	F	22	10th Dorsal.	Death in 16 days.	
Mahomedan..	M	40	4th Cervical.	Death in 2 days.	
Hindoo	M	22	5th & 6th Cervical	Death on same day	
Mahomedan..	M	36	Dorsal region.	Death in 24 hours.	No post-mortem.
Do.	M	30	5th Cervical.	Death in 13 days.	
Hindoo	F	30	1st Lumbar.	Partial recovery.	This patient recovered sensation, but not motion of the lower extremities.
Do.	F	26	4th & 5th Cervical	Death in 3 days.	
Do.	M	20	1st Lumbar	Death in 10 days.	Diarrhœa set in.

Fractures of the Pelvis.

The following seven cases of fracture of the pelvis occurred between October, 1865, and August, 1871. Three proved fatal, the fracture being complicated with injury of the pelvic viscera.

The first fatal case was that of a Mahomedan boatman, aged 27, who was admitted with a comminuted fracture of the left ilium, he having been crushed between two boats in a collision. He was collapsed; stimulants were given, but he sank within an hour. No post-mortem examination.

A Mahomedan woman, aged 40, was admitted with a simple fracture of the right ilium. A large block of wood had fallen on her loins, and caused the injury. She was collapsed on admission. Stimulants were constantly given, and a bandage

was applied round the pelvis. She died from peritonitis and injury of the pelvic viscera a few days after admission. No post-mortem.

3. A Mahomedan carpenter, aged 35, was admitted with an extensive wound in the perineum, involving fracture of both rami in four places. The pelvis was also fractured, and its symphysis forcibly separated. The urethra was not injured. Gangrene of the thigh set in, and destroyed him on the seventh day.

The other cases were simple fractures of the ilium, caused by blows or the falling of weights. They did well. The treatment consisted of rest in the recumbent posture, the pelvis being supported by a bandage, and attention paid to the action of the bowels and to relief of the bladder. The average duration of treatment in these cases was forty-six days.

FRACTURES OF THE PELVIS.

Fractures of Pelvis.	Males.	Female.	European.	Natives.	Recovered.	Died.	Cause of Death.	Remarks.
Simple....	5	1	1	5	4	2	{ Collapse. { Peritonitis.	The injuries were all caused by great violence.
Compound.	1	..	..	1	..	1	Gangrene.	This was caused by crushing against a sharp log of wood.
Total.....	6	1	1	6	4	3	Total cases, 7	

Fractures of the Femur.

I have notes of 131 cases of fracture of the femur under treatment between June, 1859, and September, 1871.

The seat of fracture was at the neck of the femur in forty-six cases, of which there were—

Intra-capsular fractures	31
Extra-capsular fractures	12
Seat of fracture not named	3

At the trochanter major four cases.

In the shaft of the femur in seventy-one cases, of which there were—

Upper third	20
Mid third	31
Lower third	19
Condyles	1
Seat of fracture not named, but probably in the shaft	10

The subjects of these injuries were—

European males	12
Do. female	1
East Indian males	6
Do. females	3
Native males	81
Do. females	28

There were 127 cases of simple, and four cases of compound fracture.

Amputation became necessary in two cases, of which one was compound, the other comminuted.

Death occurred in seventeen cases.

The first was that of a Hindoo, aged 75, who sustained a simple fracture of the neck of the femur, with extensive contusion of the limb; he died of exhaustion.

2. A Hindoo boy, aged 15, had a compound fracture of the right femur in the middle, and simple fracture of the upper and lower ends of the bone. Amputation was followed by death from shock a few hours after the operation.

3. A Mahomedan, aged 64, died of tetanus, which supervened on a simple fracture of the shaft of the femur.

4. An East Indian woman, aged 50, admitted with intra-capsular fracture of the neck of the right femur. She died ten days after from exhaustion.

5. A Mahomedan boy, aged 12, died of erysipelas after simple fracture of the right femur, at its lower third.

6. A Hindoo man, aged 39, died of debility and diarrhœa, after an extra-capsular fracture of the right femur.

7. A Hindoo man had a compound fracture of the right trochanter major. He was admitted much exhausted, and died of pyæmia on the twenty-first day.

8. A Mahomedan, aged 31, died of pneumonia on the nineteenth day, after a compound fracture of the right femur.

9. A Mahomedan, aged 55, was admitted with fracture of the neck and longitudinal fracture of the condyles. He was much depressed on admission, and died shortly after of shock.

10. A Mahomedan, aged 30, admitted with comminuted fracture of the right femur. Amputation became necessary, and he died of pyæmia.

11. A Hindoo woman, aged 30, died of diarrhœa, which supervened after simple fracture of the right shaft of the femur.

12. A Hindoo male, aged 60, was admitted with extra-capsular fracture of the right femur. He died of exhaustion on the twenty-seventh day.

13. An Englishman, aged 50, was admitted with extra-capsular fracture, and died of chronic diarrhœa the same week.

14. A Mahomedan, aged 55, was admitted with extra-capsular fracture of the left femur. He died of exhaustion in the fifth week.

15. A Hindoo woman, aged 60, admitted with intra-capsular fracture. She died of diarrhœa in about thirteen weeks.

16. A Mahomedan, aged 50, admitted with simple fracture of the shaft of the femur. He died of diarrhœa a few days after admission.

17. A Hindoo woman, aged 28, admitted with extra-capsular

fracture of the right femur. She had received also some injuries of the head, of which she died on the second day after admission.

The deaths occurred therefore in

Native males	12
Do. females	3
East Indian female	1
European male	1
The fracture was at the neck in	9
Do. do. shaft	7
Do. do. trochanter	1

Death was caused by exhaustion in four cases, shock in two cases, pyæmia in two cases, tetanus in one case, erysipelas in one case, diarrhœa in five cases, pneumonia in one case, and injury of the head in one case.

Amputation was performed twice. In one case—a compound fracture—death resulted from shock.

In the second case, in consequence of diffused suppuration following a multiple fracture, the patient died of pyæmia.

I have recorded the ages in the fractures of the neck as given by the patients, but it is to be observed that natives of India of the lower classes are very inaccurate on this subject, and as frequently under, as over, state their age.

With them, as with Europeans, intra-capsular fractures of the neck occur generally at advanced ages, and from trivial causes such as falls, stumbling, or comparatively slight injuries. As in the European, too, repair is imperfect, and the accident, if not fatal from constitutional disturbance and debility, results in permanent and complete lameness.

The average age in the intra-capsular fractures calculated by the patients' own statement, was about 59, the greatest age being in the case of an Armenian aged 100, the lowest in that of a patient 5 years of age who fell from a great height ; but in this case I suspect the diagnosis may have been imperfectly recorded.

Taking the fractures generally, they occurred at all ages, from infancy to extreme old age.

I have generally found that fractures of the femur, wherever

situated, are satisfactorily treated by the application of a long outside splint, reaching from near the axilla to below the foot, without any foot-piece or mechanism for extension. The fractured shaft, after reduction, is supported on an inner and outer short splint, confined in position either by straps or a roller, the former extending from the groin, and the latter from above the trochanter to below the condyles. The long splint to which the foot is first attached by a roller is kept in position by a sheet passed round it and the limb, or by rollers. A perineal band is also used, but not so much for the purpose of extension—which I believe is seldom necessary if, the fracture being properly reduced, the limb is kept at rest—as for steadying the head of the splint and aiding the bandage, which is passed round the trunk, in keeping it close to the side.

As it frequently happens that aged or irritable persons, especially those who have fractured the neck of the bone, are altogether intolerant of the splint, I have often placed a double inclined plane in the bed. Confining at the same time the knees and ankles together with very gentle restraint, was the only treatment that could satisfactorily be adopted; for I believe nothing can be more objectionable than to continue the application of the splint in such aged and irritable persons, after the experience of a few hours of its use, and the failure of opiates to produce rest and allay irritation have shown the patients' intolerance, and that it is altogether contra-indicated. In such cases even the inclined plane may not be borne, when I know of no better alternative than the simple recumbent position, without any local application beyond some cotton and a flannel bandage to support the limb, and keep it at rest by bandaging it loosely to the uninjured limb. This intolerance, especially when it occurred from other causes than old age—such as the restlessness that follows the excitement of stimulants—I have known to pass away under treatment by nutrients and the judicious use of opium, after which the splint could not only be effectually applied but gave at the same time great relief. I have always been in the habit of particularly

warning my house-surgeons on this subject, as a night spent in this state of irritation from the intolerance of a long splint might have on an aged and irritable person the worst effects.

In most of the cases of intra-capsular fracture no union occurred, excepting in one or two younger persons, when the accident was caused by great violence, and the fracture probably extended beyond the intra-capsular limits. In a few ligamentous union may have occurred.

Fractures external to the capsule and through the trochanters were all repaired by bony union.

The fractures of the shaft all, with one exception, united by bone, and in very few cases with any shortening. In one case, apparently without any reason, bony union did not occur, though the man was moderately healthy, quiet, and patient. All the usual measures, such as pressure, friction of the ends of the bones against each other, needles, and the galvanic current, were resorted to without success. The ends of the bones were then exposed and excised; the wound healed, and he was doing well when this report was made, but *bony* union had not then occurred.

FRACTURES OF THE FEMUR.

Fractures.	Recovered.	Died.	Total.	Cause of Death.	Remarks.
Neck and Trochanter ..	40	10	50	Exhaustion, 4 cases. Shock, 2 cases. Pyæmia, 2 ,, Tetanus, 1 ,, Erysipelas, 1 ,,	There were four cases of compound fracture—one died after amputation, one died of pneumonia, and two recovered. One woman died of injury to the head, and sustained at the same time as the fracture. Ten cases where the seat of fracture is not named are included amongst those of the shaft.
Shaft	73	7	80	Diarrhœa, 5 ,, Pneumonia, 1 ,, Injury of the head, 1 ,,	One fracture was multiple and compound.
Condyles...	1	..	1		In one case, where union did not take place, the ends of the bones were excised. The patient was under treatment when this report was drawn out. Doing well, but no certainty as to the prospects of bony union.
Total	114	17	131		

Fractures of the Patella.

I find records of only nine cases of fracture of the patella; two in Europeans, and seven in Natives, all males. Six were of the simple transverse form, with more or less displacement upwards of the superior fragment. Two were of the comminuted variety, and one compound and comminuted, caused by the fall of a heavy bar of iron on the knee, and involving fatal shock, from which he died a few hours after admission. The treatment of these last consisted of a figure of 8 bandage, and of a circular roller above and below, connected by side pieces and adhesive plaster; the limb being extended on a straight splint, with the foot slightly raised, so as to take off tension from the extensor muscles of the thigh. Lotions were used to allay inflammatory mischief, or such other antiphlogistic measures as the inflammatory symptoms, when there were any, indicated the necessity for. The union was ligamentous. In only one case was there much permanent displacement. Malgaigne's hooks were tried on more than one occasion, but were not found to answer, as they caused pain and irritation.

In the simple cases, especially where there is not complete severance of the fibrous tissues about the bone, very little is needed beyond rest of the limb in the extended position, care being taken to prevent any sudden movement by which union might be disturbed or the ligamentous band stretched. In those cases of transverse fractures where the upper fragment is much displaced, or where there is a tendency to it, the bandage as I have described, or an apparatus of straps, is desirable. Inflammatory symptoms must be combated by local measures, such as the application of cold, or it may be hot fomentations; leeches, if the pain and tension are great, or opiates, with occasional aperients, care being taken that the limb is not disturbed when the latter act. It is necessary to protect the limb against sudden or immediate muscular action or violence for some time

after the union is firm, to obviate any chance of the ligamentous union being either torn or stretched. In the starred or comminuted fracture the same treatment is appropriate, but it may be expected that inflammation in the joint will be more severe.

Two of the nine cases proved fatal; one from shock, where the knee received violent injury from a heavy piece of iron comminuting the bone, and the other from pyæmia, which supervened on a comminuted fracture.

The average duration of treatment in these cases was fifty days, the longest period being ninety-five, the shortest eighteen days.

FRACTURES OF THE PATELLA.

Fractures.	Cured.	Died.	Total.	Cause of Death.	Remarks.
Simple.....	7	1	8	One died from pyæmia.	There were six transverse, one compound comminuted, which was fatal from shock, and one comminuted, which was fatal from pyæmia.
Compound ..	..	1	1	Shock.	One comminuted, which recovered.
	7	2	9		

Fractures of the Foot.

I find records of only seventeen of fractures of the foot, or its phalanges. Of these nine were compound, five were compound and comminuted, and three were simple. In two cases the great toe alone; in four, several or more than one toe; and in one case the foot itself required amputation. There were two deaths. One in the case of a Mahomedan coolie with splenic cachexia; gangrene of the leg supervened, causing death, most probably from the formation of fibrinous coagula in the right side of the heart.

The second death was due to pyæmia, which supervened on the twelfth day, in the case of an aged and debilitated East Indian male, after amputation of three toes for injury.

The fractures occurred in	European males	..	2
Do.	do. East Indian males	..	2
Do.	do. Native males	..	12
Do.	do. do. female	..	1

The accidents were caused by the direct violence of carriage wheels, the falling of weights, or other crushing injuries.

FRACTURES OF THE FOOT.

Fractures.	Males.	Females.	Europeans.	Natives.	Recoveries.	Deaths.	Cause of Death.	Remarks.
Simple.....	3	..	1	2	3	..		One case was a fracture of the astragalus, and did well.
Compound or Comp. comminuted	13	1	2	12	12	2	One from gangrene, one from pyæmia.	One amputation of the foot by Syme's method did well.
	16	1	3	14	15	2	Total cases 17	

Fractures of the Tibia and Fibula.

The following is a brief analysis of 159 fractures of the leg that have been under treatment between the 16th July, 1859, and 21st December, 1871. Of these, there occurred in European males, including one Armenian, 17; East Indian males, 5; Native males, 116; Native females, 21. It appears that the tibia alone was fractured in twenty-eight instances; the fibula alone in eleven; both bones in 111; in two cases both legs were broken, in one of which the fractures were simple; in two the fracture in the leg was compound, and in the other simple.

Fracture occurred in the upper third in fifteen cases, in the middle in forty-nine, and at the lower third in thirty-four cases. In the latter are included eleven cases in which the ankle was implicated; viz., four Pott's fractures; and seven in which both malleoli were fractured, four of the latter being compound.

In twenty-four cases the seat of fracture is not defined, the record being imperfect.

It appears, moreover, that there were 105 simple fractures, including those that were comminuted, and fifty-four compound, ten of which were also comminuted.

There were thirty-three deaths in all, and they were due to the following causes:—pyæmia and osteo-myelitis, 8; exhaustion, 5; shock, 5; tetanus, 6; gangrene, 3; asthma, 1; not mentioned, but probably pyæmia and shock, 5; total, 33.

Of the fifty-four compound fractures, twenty-eight proved fatal; the remaining five deaths resulted after simple fractures from causes detailed in the table.

Amputation was necessary in thirty-one cases, ten being primary and twenty-one secondary. Of these, twenty-three, viz., seven primary and sixteen secondary, proved fatal:—European males, 2: native males, 15; native females, 6.

The treatment was that usually adopted in such cases, the splint used being either McIntyre's, the ordinary side splint, or Salter's swinging splint.

In simple fractures, the use of starched or chalk and gum bandage was had recourse to as much as possible, and in many cases at an early period, with the best effect.

It appears to me that lately, in the treatment of compound fractures, the application of Professor Lister's antiseptic method has been attended with benefit; and the impression is very strongly impressed on my mind that by its aid pyæmia or secondary amputations were avoided in some cases, where otherwise one or the other, or both, would have been inevitable.

As it was, pyæmia and osteo-myelitis (and here I may remark that the latter in many of these cases involved the former) were

fatal in several instances, and secondary amputation became necessary in some cases.

I have in the first series of these observations* described the method by which I generally amputate the leg. It appears to me to have the advantage of making a good stump without the over-redundancy of muscle of the posterior flap, produced by transfixion.

FRACTURES OF THE LEG.

Fractures.	Males.	Females.	Europeans and East Indians.	Natives.	Recovered.	Died.	Cause of Death.	Remarks.
Simple....	93	12	17	88	100	5	Pyæmia, osteomyelitis, 8 Exhaustion, 5 Shock, 5 Tetanus, 6 Gangrene, 3 Asthma, 1 Not mentioned, probably pyæmia or shock, 5.	There were three cases of fracture of both legs, one simple, two compound.
Compound.	44	10	4	50	26	28		
	137	22	21	138	126	33		

* "Clinical Surgery in India," p. 403.

TABULAR STATEMENT OF DEATHS AFTER FRACTURE OF THE LEG.

Race.	Age.	Sex.	Fracture.	Limb.	Bones.	Site.	Amputation. Primary.	Amputation. Secondary.	Site.	Date of Death after. Admission.	Date of Death after. Amputation.	Cause of Death.	Remarks.
Hindoo	22	M	Simple	Right	Both	Lower third		Yes	Upper third		5th day	Pyæmia	Fracture became compound from ulceration and suppuration.
Mahomedan .	20	M	Comp. comtd.	Right	Tib. & Fib.	Mid. third							
			Simple	Left	Both		No	No		Same day		Shock	Never rallied from shock of injury.
Hindoo	40	M	Com-pound	Right	Tib. & Fib.	Lower third							
			Simple	Left	Do. do.		Yes				20th day	Tetanus	
Hindoo	55	F	Compound	Right	Do. do.	Mid. third	No	No		24th day		Exhaustion	Portions of the bone removed; excessive suppuration followed.
Mahomedan .	22	M	Compound	Left	Do. do.	Mid. third		Yes	Thigh		22nd day	Osteo-myelitis	15 days after amputation fever and shivering came on, and 2 days later the femur was found necrosed.
Mahomedan .	60	M	Compound	Left	Both	Above ankle	Yes		Upper third		19th day	Pyæmia	Soft parts and vessels seriously damaged.
Mahomedan .	32	M	Compound		Both	Mid. third		Yes	Upper third		6th day	Pyæmia	
Hindoo	50	M	Compound	Left	Tibia	Inch above ankle		Yes			2nd day	Exhaustion	An old feeble man.
Hindoo	40	F	Compound	Right	Both	Lower third	No	No		8th day		Gangrene	
Mahomedan .	54	M	Compound		Both	Lower third	Yes		Below knee		4th day	Shock	
Hindoo	35	F		Both		Mid. third		Yes	Below knee		2nd day	Shock(?)	Both legs in state of gangrene, and two contused wounds corresponding to seat of fracture. Both legs amputated.
Hindoo	22	M	Compound	Left	Both	Mid. third		Yes			3rd day	Pyæmia	
Hindoo	55	M	Compound		Both	Upper third	Yes				Same day	Shock	Much laceration of soft parts.

Hindoo	45	F	Compound	Right	Tibia	Lower		Yes	Below		4th day	Tetanus	Gangrene set in. Re-amputation.
Mahomedan .	25	M	Comp. comtd.	Right	Both	Mid. third	Yes		Upper third		Same day	Shock (?)	General injuries excessive, death from shock.
Mahomedan .	40	M	Comp. comtd.	Left	Both		No	No		Same day		Shock (?)	General injuries excessive, death from shock.
Mahomedan .	40	M	Compound	Right	Tibia	Mid. third		Yes	Below knee			Shock	Much exhausted when amputation was performed.
Mahomedan .	25	M	Compound	Right	Fibula			Yes	Thigh Lower third		4th day	Asthma	Extensive laceration of soft parts, followed by gangrene.
Mahomedan .	40	M	Compound	Left	Both	Mid. third		Yes	Upper third		3rd day	Exhaustion	
Mahomedan .	34	M	Compound	Right	Both			Yes	Below knee		11th day	Gangrene	
Hindoo	40	F	Comp. comtd.	Left	Both		No	No		2nd day		Exhaustion	
Dane	27	M	Compound	Right	Both	Lower third		Yes	Below knee		6th day	Pyæmia	
Mahomedan .	25	M	Comp. comtd.		Both	Mid. third	No	No		Same day		Exhaustion	Much depressed when admitted, never rallied.
Mahomedan .	50	M	Compound	Right	Both	Lower third	No	No		13th day		Tetanus	
Hindoo	40	M	Compound	Right	Exter. Mall.			Yes			6th day	*	
Mahomedan .	55	M	Compound	Right	Both			Yes	Upper third		3rd day	*	
Hindoo	60	F	Compound	Left	Both	Inch above ankle	Yes		Upper third		2 months 17 days	Pyæmia	
Mahomedan .	40	M	Simple	Left	Tibia	Lower third	No	No		21st day		Tetanus	
Hindoo	60	M	Simple	Right	Both	Mid. third		Yes	Upper third		4th day	Shock	
Englishman .	22	M	Comp. comtd.		Inter. Mall.		Yes		Upper third		25th day	Gangrene	
Hindoo	40	M	Compound	Left	Both	Lower third		Yes	Upper third		19th day	Pyæmia	
Mahomedan .	15	M	Compound	Left	Tibia	Mid. third	No	No		Month 27 days		Tetanus	
Hindoo	40	M	Simple	Left	Both	Lower third	No	No		23rd day		Tetanus	

DISLOCATIONS.

Dislocations of the Shoulder.

In ten cases of dislocation of the shoulder-joint I find that six occurred in Englishmen and four in Natives, all men. Their ages varied from 23 to 71 years. All appear to have been successfully treated. One case was of two months' duration, one of six weeks, one of four weeks, one of eight days; the remainder were recent. They all appear to have been caused by falls; six occurred in the right, and four in the left shoulder. Seven were sub-coracoid, two sub-glenoid, and one sub-clavicular.

Four were discharged within forty-eight hours after admission, the remainder were under treatment for periods varying from three to twenty-two days.

Dislocations of the Hip.

The following is an abstract of twelve cases of dislocation of the hip that have occurred in my wards of the Medical College Hospital. They were as follows:—six on the dorsum ilii, two into the sciatic notch, four into the foramen ovale. The ages were from 6 years to 80 years. Three of the patients were females. One only was European, a sailor, aged 39.

All did well, and most of them were admitted soon after the accident; one exception was a child of six, who came under treatment two months after its occurrence. In her case changes had occurred in the cotyloid cavity that precluded much improvement.

It is remarkable that the old woman of 80 should have escaped fracture of the neck of the femur in the accident that caused dislocation on the dorsum ilii.

Race.	Sex.	Age.	Limb.	Site of Dislocation.	Cause.	How reduced.	Result.	Days under Treatment.	Remarks.
English	M.	23	Left	Sub-coracoid	Fall on the head and hip	Heel in axilla	Cured	7 days	Recent.
Native	M.	29	Right	Sub-glenoid	Fall	Do.	Do.	4 ,,	Do.
Native	M.	25	Left	Sub-coracoid	Do.	Do.	Do.	3 ,,	Of 2 months' duration.
Native	M.	25	Right	Sub-clavicular	Do.	Manipulation	Do.	2 ,,	Recent.
English	M.	71	Left	Sub-coracoid	Do.	Heel in axilla	Do.	22 ,,	
English	M.	25	Left	Sub-coracoid	Do.	Manipulation	Do.	3 ,,	Discharged same day at his own request.
English	M.	30	Right	Sub-coracoid	Do.	Heel in axilla	Do.	1 ,,	Do.
Native	M.	30	Right	Sub-glenoid	Do.	Pulleys	Do.	1 ,,	Of 8 days' duration.
English	M.	32	Right	Sub-coracoid	Do.	Pulleys	Do.	1 ,,	Of 6 weeks' duration.
English	M.	52	Right	Sub-coracoid	Do.	Cruise's apparatus	Do.	10 ,,	Of 4 weeks' duration.

Race.	Sex.	Age.	Limb.	Site of Dislocation.	Cause.	How reduced.	Result.	Days under Treatment.	Remarks.
Native .	M.	6	Left	F. ovale	Violence	Manipulation	Recovered	3 days	Taken away by friends. Doing well.
Do.	M.	35	Right	D. ilii	Do.	Pulleys	Do.	24 ,,	
Do.	M.	50	Right	S. notch	Do.	Do.	Do.	33 ,,	
Do.	M.	55	Both	D. ilii	Do.	Do.	Do.	20 ,,	The particular form of violence by which this was caused is not recorded in the abstract.
Do.	F.	80	Left	D. ilii	Fall	Manipulation	Do.	26 ,,	
Do.	M.	28	Left	D. ilii	Fall	Pulleys	Do.	7 ,,	Removed by friends. Doing well.
Do.	M.	36	Left	D. ilii	Fall	Do.	Do.	36 ,,	
Do.	F.	50	Right	S. notch	—	Do.	Do.	54 ,,	
Do.	M.	45	Right	F. ovale	Bale of cotton fell on him	Do.	Do.	5 ,,	Removed. Doing well.
European .	M.	39	Left	F. ovale	Fall	Do.	Do.	68 ,,	This man was a Danish sailor. Fell on board ship.
Native .	M.	22	Right	Fract. of acetab. F. ovale	Fall	Manipulation	Do.	32 ,,	
Do.	F.	6	Left	D. ilii	Fall	Pulleys	Relieved	3 months	This was a dislocation of some three months' duration. Cotyloid cavity appeared to have become obliterated.

BITES OF ANIMALS.

1.—*Shark-bites in the Hooghly.*

Shark-bites, I regret to say, occur annually, and they will continue to do so until simple measures, such as might easily be taken, are resorted to for their prevention. The particular shark (*Carcharras Gangeticus*) is a fierce and bold creature; he dashes in among the crowds bathing at the ghât, and though he seldom—if ever, under these circumstances—succeeds in carrying off his prey, yet he inflicts a dangerous, often a mortal wound.

These accidents appear to have become more common of late years, since the practice of throwing bodies into the river has been discontinued, and those of the poorer classes have been entirely burned at the municipal charge. Near the great burning-ghâts, where the sharks no doubt used formerly to find their prey in abundance in the half, or only very partially, burned bodies then thrown into the river, but where they no longer find them as they are now burned, these accidents most frequently occur; and one or two bathing-ghâts near that spot have furnished more victims than the others. It is chiefly in the months of April and May, when the river contains much salt water, that the accidents occur, for being then unusually muddy from the freshes, the sharks are not seen as they glide in among the legs of the bathers; and it is only when the shrieks and sudden immersion of one of their fellow-bathers give the alarm, that they are aware that the enemy is in their midst. The noise,

the splashing, and shouting, as well as other aid given to the sufferer, save him from being carried off, but not from a severe—if, indeed, not a mortal—wound.

No precautions are taken to prevent this annual loss of several lives. The mere staking off a portion of the ghât, as is done in the Soonderbuns against alligators, would be sufficient; but simple as the expedient is, it has not yet been resorted to. The people go on bathing at the same places perfectly unconcerned. Indeed, shortly after a person has been bitten the ghât is again fully occupied with bathers. Every year during these two months cases occur, and they are generally brought to the Medical College Hospital.

Case 1.—H. E. S., aged 39, a Hindoo trader, living near Hatkolah Ghât, admitted on May 18th, 1870, with four irregular lacerated wounds of a triangular form on the right ham, two being opposite the other two. They were about three-quarters of an inch deep. He said that when up to his middle bathing at the ghât with a number of others, he was suddenly seized and as suddenly released. He made his way out of the water and found the four bleeding wounds. They were dressed simply, and the next morning he left the hospital for his home, and probably did well, as we heard no more of him. He had a fortunate escape, for it is seldom that a man escapes out of a shark's grip with such slight injury.

Case 2.—M., aged 40, a Hindoo confectioner, residing at Sobah Bazar, was admitted on May 11th with three wounds on the anterior aspect of the left thigh. They were situated about three inches above the knee; one was large, above two inches long, the others were near it and were somewhat smaller. They were lacerated, irregular wounds, as though the flesh had been torn by a sharp-pointed instrument. He was seized when bathing, as in the first case. The water being about three feet deep and muddy, he did not see the shark, and was only aware when pulled off his legs that the voracious creature was near him. In this, as in the former case, the shark did not retain its hold, as the man was immediately rescued by two friends. After

admission the wounds were dressed with carbolic oil. He had slight fever and the margins of the wounds sloughed; but they ultimately took on a healthy action, and on July 6th he was discharged quite recovered.

Case 3.—B., aged 40, an Ooryah coolie, residing at Koomertollay, Calcutta, was admitted on June 1st, with an extensive wound of his right foot and leg. About half an hour before admission, he was bathing with others at the ghât, standing mid-deep in the muddy Hooghly water, when he was suddenly seized and drawn down by a shark. He was caught and rescued by his friends, who pulled him out of the shark's jaws, and brought him, much exhausted by loss of blood and shock, to the hospital. The foot was nearly torn away at the ankle-joint, and the soft parts about the foot and leg extensively lacerated—those of the leg extending high up the limb. One tooth had made an isolated, deep-punctured wound in the calf of the leg. Immediate amputation was performed. He rallied under chloroform, and bore the operation, which was performed an inch below the tubercle of the tibia, well. There was very little blood lost, three ligatures only being required—a very uncommon occurrence in an amputation at Calcutta, where, owing to profuse bleeding from numerous small vessels, many ligatures are generally needed. Nothing remarkable occurred during the progress of the case, and he was discharged cured on September 21st, with a wooden leg.

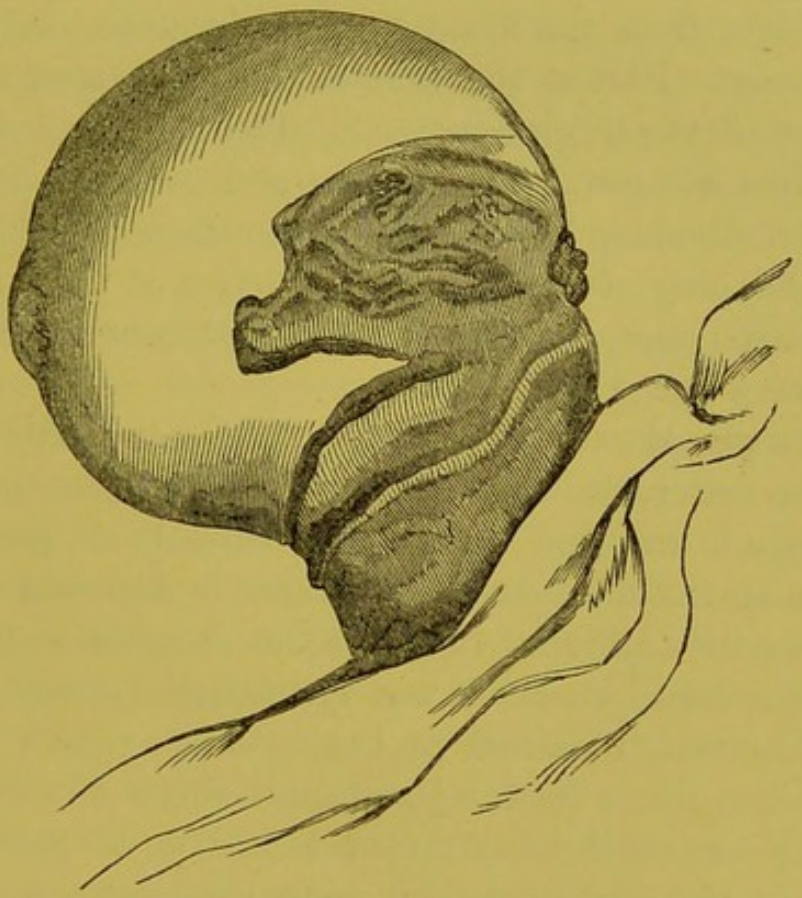
Case 4.—C., aged 40, a Hindoo shopkeeper of Ultadinghee, near Calcutta, was admitted on June 20th with a severe injury of the left arm, caused by a shark-bite. He was bathing, as usual, at one of the ghâts, and was stooping immersed in the water, when the creature seized him by the arm, extensively lacerating and stripping the soft parts from the limb. The bones were not actually exposed, nor were the joints opened, but the limb had been so much disorganized that gangrene had set in. It appears that the shark seized him in twice—first by the forearm, and then, again, immediately by the arm. The injury had been inflicted the day before admission. Owing to

the extensive injury and the consequent gangrene, his condition was very low. Immediate amputation was performed high up, within three inches of the head of the bone, by double flaps. In this case ten ligatures were required. He suffered subsequently from irritative fever, and the formation of abscesses in the stump and about the bone, but the bone itself remained sound. Ultimately, the wound cicatrized, and he was discharged on September 21st, with a good stump.

Case 5. *Shark bite; amputation at the hip-joint; death from shock.*—On May 13th, 1868, I was summoned hurriedly to the hospital to see a Hindoo, who had a short time previously been seized by a shark when bathing in a ghât. It appears that he was standing in deep water, when a shark seized him by the thigh, and carried off a great portion of the muscles and integument, exposing the head of the femur, and grooving the bone itself in several places. With the aid of his companions, who were bathing at the same ghât, he reached the bank, was carried home, and thence to the hospital, where he arrived about 10.30 a.m. From the enormous extent of the wound and the position of the teeth-marks in the soft parts and on the bone, it appears that the shark must have struck a second time before tearing away the mass of flesh with which he disappeared—in this respect differing from the alligator, which does not readily relinquish its hold, but tries to drag the prey under water. The shark was in all probability the *Carcharras Gangeticus*, a very voracious fish, and the individual must have been a very large one, from the size of the separate tooth-wounds, and the deep grooves in the femur, the neck of which was nearly cut through. It seems difficult to comprehend how the teeth could have been driven in so deeply as to injure the neck of the bone; but such was the case, as shown in the accompanying sketch of the head and neck of the femur.

I found the patient, who was a strong healthy-looking man of about 35 years of age, in a state of great prostration. The skin was covered with cold sweat. The pulse at the wrist was just perceptible. He was conscious, but suffering no pain.

The shock was so great that it had apparently relieved him of suffering. He was restless, and trying to toss about in bed. Warmth had been applied, and stimulants freely given, with



HEAD OF THE BONE GROOVED BY SHARK'S TEETH.

sinapisms over the region of the heart and solar plexus. Slight reaction was coming on. The injury had been inflicted about one hour before admission, during which time nothing had been done. Blood was dripping from the ragged surfaces of the enormous wound, but there was no arterial bleeding. He was said to have lost a great quantity of blood, and it is very probable that such was the case, for his eyelids, tongue, and lips were quite blanched.

The upper part of the left thigh and the gluteal region were frightfully mangled; the head of the femur was exposed, and the shark's teeth had cut away part of the cartilage of the head of the bone, and grooved its neck so deeply as to expose

the cancellated texture. The shaft of the femur lower down in the inferior third was also exposed, and the dense cortical tissue deeply grooved by the shark's teeth. The muscles and integument hung in shreds; the greater portion of the posterior part of the thigh, from the ilium to near the knee-joint, had been carried away. Part of the muscles and integument at the anterior aspect of the thigh remained. The femoral and obturator arteries had escaped. The gluteal and ischiatic arteries must have been divided, but there was no hæmorrhage beyond a general dripping of blood from the surface of the wound, which presented the appearance of one that had been inflicted by the passage of a round shot or shell.

He was placed on the operating table, and after stimulants and other restorative measures had taken effect, and a slight improvement in the pulse had ensued, I proceeded to amputate at the hip-joint. The anterior flap was made from the portion of uninjured tissue at the anterior and inner surface of the thigh, in which was the femoral artery. The posterior flap was obtained in the gluteal region from such tissue as was there least injured, and when brought together the stump was not by any means a bad one. Several ragged wounds in the gluteal region were united by sutures. The femoral and obturator arteries were ligatured. No others showed any tendency to bleed. The flaps, having been brought together with wires, were dressed with carbolic acid.

He bore the operation very well, being brought slightly under the influence of chloroform by Mr. Gaffney, the Resident Surgeon, and it was remarked by all present that his pulse seemed rather to improve than fail during the operation. He lost very little blood, the femoral artery being commanded by Professor Colles, whilst the limb was managed by Mr. Waller. He was removed into the operation ward and closely watched. There was no bleeding, and stimulants were constantly given, but he soon began to sink, and quietly expired about three-quarters of an hour after the operation.

The body was examined the following morning. All the

viscera were healthy. The heart was empty and flabby; the lungs were slightly congested hypostatically; the body and viscera generally bloodless. In addition to the wounds I have described, the shark had inflicted a deeply lacerated wound at the inner part of the gluteal region of the opposite side, and another deep wound in the perineum, and had carried away the entire scrotum without injuring the testes, which were left hanging exposed, as though a surgical operation had laid them bare. The thumb of the left hand had also been torn off at the metacarpo-phalangeal joint.

Beyond the interest attaching to the terrible injury thus inflicted, which was followed immediately by the prostration caused by shock and hæmorrhage, it is very noteworthy how well, under the influence of chloroform carefully given in small quantities, he bore the operation. He did not appear to suffer the least increase of depression; on the contrary, he rather improved, and I believe that although he survived the operation only about three-quarters of an hour, he would have died sooner if the amputation had not been performed. It put a stop to all oozing of blood, and it removed an immense lacerated mass of tissue, whose presence could only tend to aggravate nervous depression. The case confirms what I have often before observed, that it is not necessary to wait long in serious injuries with collapse where immediate amputation is required. It furnishes also an additional proof of the value of chloroform in these cases.

Case 6.—Deno, a muscular, healthy Oorya Coolie, aged 30, was admitted on March 26, 1871, two days after having been severely bitten by a shark whilst bathing in the Mutlah. He had been rescued by his companions, but not before the savage creature had seized him three different times, inflicting most serious injury, tearing away a large portion of the left thigh, and causing great effusion of blood. There was an enormous wound extending from about the middle of the left gluteal region to within three or four inches of the ham. It measured twenty inches in length, seven in breadth at the lower end, twelve inches in the gluteal region, and nine inches at its

upper extremity. The depth was great, extending nearly to the bone, which could be felt only covered by a few muscular fibres. The flexors and great part of the glutæus maximus were torn away; the sciatic nerve was divided, and several inches of it removed. The anterior portion of the limb had escaped, and the femoral vessels and nerve were uninjured. He was depressed and feeble from shock, loss of blood, and pain; but his pulse—112—was better than might have been expected. He was restless and feverish. He appeared to have been a healthy and vigorous man before the accident. Notwithstanding the injury, he was able to move the limb slightly; he could approximate the knees and flex the limb, showing that some portions of the flexors were undivided. Sensibility seemed to be preserved in the integument of the leg and foot. In addition to the wound above described there were others—one on the right gluteal region, six inches in length by four in breadth, the integument to this extent having been torn away and the subjacent tissues deeply lacerated; another on the right elbow, where had been taken away a narrow strip of integument about two inches in length. There were also several deep punctures on the back, corresponding to the size of the shark's triangular teeth. These wounds were all superficially sloughing when he was admitted.

In consultation with my colleagues it was determined to attempt to preserve the limb. The loss of so much muscle, the division of the sciatic nerve, and the great extent of the wound, were suggestive of immediate amputation at the hip-joint; but as the joint itself was uninjured, and his condition as favourable as could be expected under such circumstances—considering the shock and loss of blood (which is said by his companions to have been very great)—it was determined to attempt to save him without amputation at the hip, itself a most dangerous alternative. His bowels being confined, a dose of oil was ordered, and acetate of ammonia with nitric and chloric ether prescribed with reference to his feverish condition. Opium was freely administered, to allay pain and give rest. The limb was

supported on a splint, and the wound dressed with poultices and carbolic oil dressing. Subsequently decoct. cinchonæ with quinine and chloric ether were given. He was slightly delirious on April 2. The pulse increased to 120. Temperature varied from 97·5° in the morning to 101° and 103° in the evening. But the wounds had cleaned and presented a healthy granulating surface by April 3, and were covered with well-formed pus. He was very restless at night, and could not sleep, complaining of burning in the wounds. Hydrate of chloral was given, but with little benefit. An abscess formed on the left shoulder about April 9, which soon degenerated into a sloughing sore, from which a slough of subcutaneous cellular tissue separated. The wrist and forearm became œdematous. From the 10th he again began to improve, and slept better. The discharge moderate; the wound looking pale and pink, with imperfect granulations, but evidently contracting. His pulse fell from 120 to 110, and the temperature from 103° to 101° and 100°. A slight burrowing of matter, with sloughing of subcutaneous cellular tissue, occurred; this being laid open on the 18th, the wound soon began to granulate, and he continued to improve. On the 25th the surface of the wound had contracted three inches in length and one inch in breadth on the thigh, and two inches in the loins. On May 3 he had slight diarrhœa, which was checked by astringents. He now began to look more pallid and puffy about the face and limbs, but the urine contained neither albumen nor sugar. The wounds, though inactive, continued to contract. Potassio-tartrate of iron and infusion of calumba were prescribed, with two grains of opium every fourth hour to allay irritability and promote capillary action. The puffiness diminished for a few days, but it again returned, and the pulse became weaker and more rapid, and he again began to complain of a burning sensation in the wound; sleep was imperfect, and fever and cough supervened on May 16, which continuing for fifty-six hours, left him very weak. He never rallied from this condition, and gradually sank on May 21.

On post-mortem examination the left lung was found to be congested throughout, the lower lobe being in a state of grey hepatization, with pus freely exuding from its cut surface. The right pleural cavity contained a quantity of sero-purulent fluid. The pericardium contained about four ounces of serum, and there was a small fibrinous clot in the right ventricle. The liver and kidneys were fatty, and the latter congested. The whole muscular system was pale and flabby. The wound was cicatrizing throughout; that on the back had healed. On dissection it was found that about seven inches of the great sciatic nerve had been torn away. The muscles on the back of the thigh were also torn away. The semi-tendinosus and membranosus, the long head of the biceps, and the gracilis had suffered; their divided ends were found agglutinated together with the lower end of the sciatic about three or four inches above the ham. The surface of the sore was formed by the short head of the biceps, vastus externus, and outer surface of the trochanter major; the edge of the sartorius with the adductors formed the inner side. In the gluteal region it was formed by the surface of the external rotator muscles of the thigh, the pectinæus and quadratus femoris below, the deep fibres of the glutæus maximus above. The gracilis was torn across at about an inch from its origin, and the upper end of the divided great sciatic nerve was on a level with the edge of the lower margin of the quadratus femoris, upon which it lay thickened and adherent. The end of the nerve was bulbous, and tied down by the cicatricial tissue that matted all together. The general condition of the patient, and the reparative action in the wound, at one time seemed to promise a favourable termination of the case, but pyæmic mischief, resulting in suppurative pneumonia of the left lung, supervening in the seventh week, proved rapidly fatal.

2.—*Case of Wolf Bite.*

Wolf Bite of the Forearm, followed by Necrosis, Hæmorrhage, Ligature of the Brachial Artery, and subsequently Excision of the Elbow-joint.

A Hindoo was admitted, on September 9, 1868, with necrosis of the central portion of the shaft of the right radius, the consequence of a bite from a wolf inflicted about seventeen months ago. The arm was distorted from shortening of the radius, the styloid process of the ulna being prominent, and the hand twisted towards the radial side. The elbow-joint was perfectly anchylosed in the extended position of the forearm.

On examination of two sinuses leading to the dead bone, I ascertained that there was a sequestrum detached, and requiring removal.

On September 13, I removed the sequestrum, and to do so it was necessary to enlarge the sinus. In making this incision an artery of some size was wounded, and the hæmorrhage was profuse, but it was arrested by graduated compress and bandages. Hæmorrhage recurred several times, and exhausted him very seriously. It was impossible to find the bleeding point, though every effort was made to do so.

On the 16th, as hæmorrhage had again recurred, I applied a ligature to the brachial artery, at the junction of the lower with its middle third. This arrested the hæmorrhage, and it did not return. The wound rapidly healed, the ligature having come away, and on October 17, the wound and the sinuses having all closed, I performed excision of the elbow-joint by the H-shaped incision. On exposing the bones, I found the joint firmly united by bony anchylosis. The olecranon was first sawn off, and next the bony adhesions between the humerus and ulna were divided. The ends of both bones were sawn off, but the head of the radius was preserved. The wound was closed, after the application of several ligatures, with

wire sutures, dressed with the carbolic oil dressing, and the limb was placed at rest on a pillow in the extended position, on a straight splint applied along the anterior surface of the arm. The wound healed rapidly, and with very little suppuration. Passive motion was begun as soon as the transverse incision had fairly united, and was carefully practised daily. His general health improved, and he soon recovered from the loss of blood.

He is now (November 28) doing well. He begins to move the arm, and it is probable that, notwithstanding the loss of bone, the distorted condition of the wrist-joint, and the excision of the elbow-joint, he will have an arm that will be of some use to him.

The case is interesting from the sequence of operations on the same limb—the bite, then the removal of the sequestrum; next the attempts to arrest hæmorrhage, the ligature of the brachial artery, and finally the excision of the joint.

3.—*Case of Jackal Bite.*

On the 19th of May, 1870, I was asked to see the infant son of a native gentleman, who had been taken by a jackal from his mother's side when sleeping in a room on the second story of an inner quadrangle of a house situated in a crowded part of Calcutta. I found a male infant of thirty-four days old with a deeply punctured wound on the inner aspect of the left thigh, at about the juncture of its middle and upper thirds.

The limb was swollen and infiltrated, and the femur broken. The wound penetrated to the bone, but the probe did not touch the fractured portions. There was shortening and flexion of the limb. There were several other minor wounds and sundry scratches on the child's side, caused by pressure against the railing through which the jackal had tried to drag him, and where it had dropped him. The child was restless and feverish; the limb was much swollen, infiltrated, and indurated, being also

shortened with the foot everted. There was a sanious discharge from the deep wound which had been inflicted by the jackal's tooth, and some portion of adipose tissue protruded.

The wound was dressed with carbolic glycerine, and the thigh placed to rest on a long splint. The child was feverish and restless for a day or two, and having caught cold, its breathing became considerably embarrassed; but it did well. The wound healed, and the bone united rapidly, and in three weeks the child had perfectly recovered. It was nursed by its mother, and it also had cow's milk during the time it was under treatment.

A few days later, a child about six months old was seized by a jackal, and carried for a short distance through the court-yard of the house next door, but was dropped on some one running to its aid. In this case the child was lying on the raised platform of the ground floor, and was wrapped in a sheet. The jackal had seized it by the dress, and beyond a few scratches it was unhurt. It shows how bold these generally shy and cunning animals can be at times, and is a warning to native mothers and nurses to look well after their charges, even in the innermost recesses of their city houses.

DISEASES OF THE JAWS.

The following summary of twenty-four cases of disease of the jaws, illustrates most of the diseases and morbid growths of a non-malignant nature, to which these bones are liable. I have not included carcinoma, but have confined my remarks to those which are amenable to surgical treatment. There is nothing more remarkable in the pathology of the maxillary bones than their great powers of recovery and repair after injury or disease, and the freedom with which great portions or the entire bone may, in cases of disease, be removed by surgical operations, which are frequently of the most formidable character, and attended with considerable danger to life at the time from shock or hæmorrhage. The ample supply of blood furnished to the bones and periosteum, gives them their great recuperative power, and accounts for the rapid regeneration of substance, especially as regards the lower jaw, when large portions of it are lost from injury or necrosis—provided the periosteum be in part or altogether preserved, as fortunately is, not unfrequently, the case. In addition to ten cases of necrosis, there are three of cystic disease, four of myeloid or fibro-plastic growth, two of enchondroma (which is a comparatively rare form of disease in these bones), three of fibrous growth, and one of firm fibrous polypus, taking its origin in the antrum.

It will be observed that some of the cases of necrosis are attributed to mercurial salivation, a most fertile source of disease in this country. The mode of exhibition of the drug

is frequently by fumigation, and cases of excessive ptyalism are numerous, which end either in necrosis or atresia of the mouth from the firm cicatricial adhesions that result from the excessive ulceration which is set up—a condition which, though not absolutely incurable, is well nigh so. Malarious blood-poisoning is a not unfrequent cause of necrosis of the jaw-bones in this country. A tumid abdomen, enlarged spleen, blanched mucous membranes and conjunctivæ with œdematous lips, are the chief symptoms of the cachectic condition, in which death and disintegration of the tissues are prone to occur, as are frequently seen in cancrum oris, necrosis of the jaws, noma, and sloughing of the scrotum.

The cases of necrosis all terminated favourably, notwithstanding the great loss of substance in some, showing the great power of repair possessed by the bone and its periosteum. The other morbid growths also did well with two exceptions, one a case of fibro-plastic tumour of the upper jaw, its removal being followed by fever and pyæmic mischief, and death occurring rapidly from the formation of coagula in the right side of the heart; and the other, the case of a man who had completely recovered from removal of great part of the lower jaw, when he was attacked by and died of a low form of pneumonia. The usual method of operating was by making the smallest possible incisions through which the diseased parts could be removed, with the view of disfiguring the face as little as possible. In cases of the lower jaw, the prolabium was not divided. In the upper jaw, removal was generally effected without cutting the cheek; the separation of the ala nasi and the upper lip from their attachments affording room for the removal of even large growths. In some cases it was necessary to divide the cheek from the commissure of the lips to the zygoma, but only in those cases wherein the entire bone had to be removed.

Case 1. *Necrosis of the Right Upper Jaw.*—D. N., a Hindoo, aged 20, admitted 15th August, 1859, with necrosis of the right upper jaw, the result of mercurial salivation. Several large pieces of necrosed bone were removed on the

15th, and another portion on the 18th. He was discharged, cured, on the 22nd, the wound having cicatrized rapidly.

Case 2. *Fibrous Tumour of the Right Lower Jaw.*—B. H., a Hindoo farmer, aged 35, admitted 24th February, 1860, with a simple osteo-sarcomatous, that is, fibrous tumour at the right side of the lower jaw. The whole of this half of the jaw was removed on the 25th by an incision carried from over the articulation to the symphisis. A tooth was extracted, and the bone divided at the symphisis with a saw. The flaps were carefully dissected, and the bone disarticulated. The prolabium was not divided. He was discharged, cured, on the 13th March.

Case 3. *Myeloid, or Fibro-plastic Tumour of the Right Upper Jaw.*—P., a Hindoo female, aged 32, admitted 7th May, 1860, with a myeloid growth at the inner side of the right upper jaw, of two months' duration. The tumour, with the portion of the jaw in immediate connection with it, was removed by cutting through the upper lip and detaching the ala nasi. The superior maxillary was divided transversely below the floor of the orbit, and the tumour, with the alveolus and part of the jaw, removed on the 10th. The lip was brought together with silver wire sutures, and she was discharged cured, 18th May.

Case 4. *Cystic Tumour of the Left Upper Jaw.*—G. S., a Mahomedan, aged 28, admitted 17th September, 1860, with a cystic dilatation of the left antrum, of five years' standing. The antrum was dilated to about the size of an orange. At first the cyst was emptied of the limpid fluid contents by a trocar and canula, but was afterwards removed, on the 13th October, by detaching the left lateral cartilage of the nose, and cutting out the anterior wall of antrum. He was discharged, cured, 14th November.

Case 5. *Necrosis of the Left Lower Jaw.*—B., a Hindoo shop-keeper, aged 36, admitted 7th December, 1860, with necrosis of the left side of his lower jaw, resulting from a gum-boil. Two small pieces of dead bone, one about an inch long,

and another rather smaller, were extracted on the 8th. He was discharged, cured, on the 28th.

Case 6. *Necrosis of the Lower Jaw.*—R., a Mahomedan boy, aged 13, admitted 17th December, 1860, with necrosis of the lower jaw, and fever of about a fortnight's duration. He had fever daily, and was cachectic, but he gradually improved with tonics and nutrients. A large piece of dead bone, involving the alveolus and incisors, was removed on the 18th of January, and he was discharged, cured, the 28th.

Case 7. *Necrosis of the Right Lower Jaw.*—H. M., a Hindoo boy, aged 6, admitted 19th January, 1863, with necrosis of the right half of the lower jaw, as a sequel of inoculated small-pox occurring ten months previously. A sinus about the angle of the jaw kept up a constant discharge. The right half of the lower jaw, up to the condyle, had perished, and was removed on the 20th. The periosteum had already deposited a new bony arch, corresponding to the part removed, and he was discharged, cured, on the 26th.

Case 8. *Cystic Tumour of the Right Upper Jaw.*—R. S. R., a Hindoo beggar, aged 25, admitted 19th January, 1863, with an encysted tumour of the right antrum. It was about the size of an orange. A portion of the anterior wall of the antrum was removed on the 23rd, and he was discharged, cured, on the 14th February.

Case 9. *Cartilaginous Tumour of the Right Upper Jaw.*—K. M., a Hindoo, aged 20, admitted 9th November, 1863, with a fibro-cartilaginous tumour of the upper jaw. The tumour was of the size of an orange, and of only eight months' growth. It was painful, and rapidly increasing. The superior maxilla was removed, leaving the orbital plate, on the 9th. The wall of the antrum was thickened and softened. He was discharged, cured, on the 27th.

Case 10. *Myeloid or Fibro-plastic Tumour of the Right Upper Jaw.*—B., a Mahomedan farmer, aged 32, admitted 14th December, 1863, with a tumour on the right side of the lower jaw. It was dense, and extended from the angle of the jaw to

the symphisis. It was of eight years' standing. The tumour had been irritated by external applications, and an ulcerated opening had formed over it near the cheek. Half the lower jaw was removed on the 18th, from the second bicuspid of the left side to near the condyle of the right. The day after the operation, the tongue was secured from retroversion by a ligature passed through it and fastened externally. The tumour consisted of myeloid cells. He remained in the hospital for some time on account of abscesses in the part. The operation wound healed rapidly and well. He was discharged, cured, on the 24th February.

Case 11. *Fibrous Polypus of the Left Upper Jaw.*—A., a Hindoo trader, aged 20, admitted 12th December, 1864, with polypus in the right antrum protruding into the mouth. He had been suffering from nasal polypus from his infancy; one was removed eight years ago and he remained well for three years. The present polypus found its way through the palate, and had been gradually increasing for the last five years. The tumour was removed by evulsion, and was of the size of an ordinary egg and of fibrous structure. There was comparatively little hæmorrhage. He left the hospital on the same day, and we know no more of him.

Case 12. *Fibro-plastic or Myeloid Tumour of the Right Upper Jaw.*—U., a Mahomedan farmer, aged 32, admitted 17th January, 1866, with fibro-plastic tumour of the right upper jaw. The disease began with a swelling of the right cheek a year and-a-half ago, followed by ulceration of the palate within six months, for which he took mercury, the ulcers still remaining as sinuses leading to the antrum. The whole face above the mouth was much swollen, but the swelling chiefly affected the right side and closed the left eye. The nose was flattened, the ala nasi stretched over the tumour, the teeth projecting and loose, some having fallen out, and the palate bulged into the cavity of the mouth with a sinus discharging puriform matter. The tumour which was dense, hard and unyielding, was removed on the 20th, with the whole of the upper max-

illary bone, by an incision from the angle of the mouth to the zygoma, a portion of the orbital plate being left. He had fever in the afternoon with a pulse of 120, temperature 104°. There was not much bleeding either during the operation or after, yet both the pulse and temperature gradually rose very high, the former to 160 beats, and the latter to 108°. He died with hurried respirations on the morning of the 22nd.

Post-mortem Examination.—The whole of the left lung was consolidated and beginning to break down. There were no fibrinous coagula in the heart. The spleen was enlarged and engorged; the other viscera healthy. The wound in the face had united.

Case 13. *Fibrous Tumour of the Left Upper Jaw.*—J. N. S., a Hindoo, aged 25 years, admitted 20th July, 1866, with a fibrous tumour of the left superior maxillary bone. The disease began six months ago, between two of the left molar teeth, and has gradually invaded the palate, extending to the other side; several teeth had fallen out, some were displaced, the rest irregular, and the cheek bulging. But there was no protrusion of the eye-ball. The tumour was about the size of an orange, involving the whole of the left upper jaw. The entire left, and a portion of the right maxillary bone, were removed on the 13th August by an incision through the lip, detaching the cartilage of the left ala nasi, and another from the angle of the lip up to the zygoma. The wound healed up rapidly, partly by the first intention: and he was discharged, cured, on the 30th October.

Case 14. *Necrosis of the Lower Jaw.*—R., a Hindoo mookhtear, aged 35, admitted January 27, 1868, for necrosis of the lower jaw, from which he has been suffering for the previous two and a-half years. Had syphilis ten years ago; and secondary eruptions five years before, for which he took mercury. A large portion of the jaw was exposed inside the cavity of the mouth near the coronoid process. There were two sinuses opening outwards. The necrosed portion, involving nearly half the body of the bone, was removed on the 28th, and he

was discharged, cured, on the 18th April. The periosteum remaining, a considerable amount of new bone was reproduced, and a new though imperfect substitute was moulded on the sequestrum.

Case 15. *Necrosis of the Lower Jaw.*—M. J., aged 17, a Hindoo weaver, admitted on the 10th February, 1868, for necrosis of the lower jaw, from which he has been suffering for the last four or five years, and said to have been due to a previous attack of fever. Some pieces of dead bone were removed about a year ago, and the whole of the necrosed portion, involving nearly half of the body of the bone, was now removed. The cavity rapidly contracted, and good support was afforded by the new bone or cartilaginous structure formed from the periosteum; he was discharged, cured, on the 19th.

Case 16. *Necrosis of the Lower Jaw.*—M. K., a Mahomedan tailor, aged 30, admitted 16th September, 1868, with necrosis, which began four months ago, in an abscess on the left side of the lower jaw, which led to a sinus that had not healed. The jaw was swollen and painful. Two molars were extracted, and a large sequestrum removed on the 17th. The wound rapidly closed, and he was discharged, cured, on the 19th October.

Case 17. *Cystic Tumour of the Left Upper Jaw.*—M. S., a Hindoo Coolie, aged 32, admitted 27th of September, 1868, with a cystic tumour of the left antrum, of five months' duration. It was of the size of a small orange, and came on gradually. The cheek was distended, and on pressing the tumour under it the crackling of the attenuated bone could be felt. The roof of the mouth was not affected. A portion of the anterior wall of the antrum was removed, and two ounces of viscid honey-looking fluid, containing abundance of cholesterine, was taken out on the 27th. The cavity was sponged with strong tincture of iodine. He only remained three days, but was doing remarkably well. There is little doubt but that he speedily recovered.

Case 18. *Fibro-Cartilaginous Tumour of the Right Upper Jaw.*—F., a Hindoo farmer, aged 28, admitted 1st March, 1869, with a fibro-cartilaginous tumour of the right upper jaw. It was about the size of a walnut, growing from the right side of the upper maxilla under the upper lip, having commenced a year ago as a swelling at the root of the lateral incisor. The right nostril was slightly encroached on, the roof of the mouth not being affected. On the 12th the tumour was removed, with a portion of the maxillary bone, corresponding to the five anterior teeth, by an incision made in the median line reflecting the flap, and detaching the nostril, the floor of the orbit being preserved. Bleeding was stopped by actual cautery. He left the hospital 2nd April, doing well.

Case 19. *Necrosis of the Lower Jaw.*—M. K., a Mahomedan cook, aged 30, admitted 2nd August, 1869, with necrosis of a portion of the lower jaw, caused by a fall on the chin three months ago. There was a sinus within and another external to the mouth, leading to the dead bone. It was about two inches long and half an inch broad. Removed on the 3rd, and the patient was discharged, cured, on the 15th. The wound healed rapidly.

Case 20. *Fibrous Tumour of the Right Upper Jaw.*—O. C. B., a Hindoo peasant, aged 25, admitted on the 1st of November, 1869, with a fibrous growth of the right upper maxilla. It began as a swelling in the gum a year previously, for which two molar teeth were extracted. A sinus shortly after formed in the cheek, about a quarter of an inch below the eye. This occurred about eight months before admission. The sinus remained open on admission. The entire maxillary bone was diseased, and was removed with the malar bone, on the 3rd, by an incision extending from the commissure of the lips to the right zygoma. The orbital and palatine connections were divided with bone forceps, and the malar with Hey's saw. The tumour was then grasped, and removed by the lion-forceps. The eye-ball was supported and kept out of the way with a spatula. Hæmorrhage was rather free for a time, and the

actual cautery was found serviceable in controlling the vessels in the bone. There was some bleeding subsequently, for which the wound had to be re-opened. Within ten days, the wound and the sinus had completely healed; the eye-ball could be distinctly felt and moved through the cavity of the mouth during the period of healing of the wound. He was discharged, cured, on the 2nd of January, a dense fibro-cartilaginous cicatrix having taken the place of the maxillary bone, and the cavity contracted to very narrow dimensions. The union of the wound was so perfect that the scar was comparatively little seen. The most apparent result of the operation was the alteration in his speech, and a slight falling in of the cheek, otherwise the deformity was slight. The tumour proved on examination to be a simple fibrous growth, without any cellular structure. It sprang originally from the cavity of the antrum, the walls of which were thin and converted into a shell.

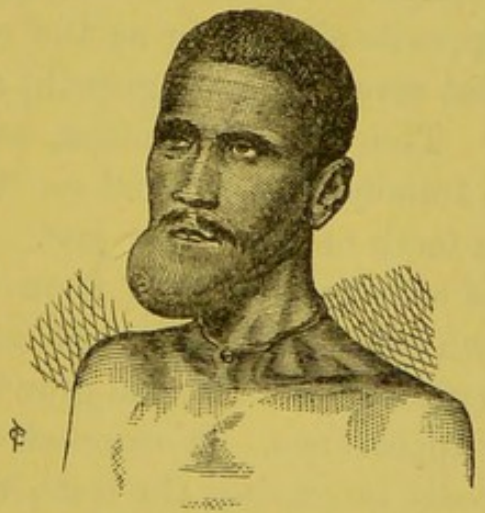
Case 20.

Case 21. *Necrosis of the Lower Jaw.* — T. G., a Hindoo, aged 23, admitted 8th January, 1870, for necrosis of the right side of the lower jaw, with cartilaginous bands of adhesions between the lower and the upper jaws of that side, as a result of cancrum oris, which he had three or four months before. The mouth could not be opened more than a quarter or a sixth of an inch at the utmost. The dead piece of bone at the angle of the jaw, about three inches long, and half

an inch broad, with a few teeth, and the tight cartilaginous band, were extracted from within the mouth on the 13th, by cutting on the tight band. The mouth was kept open by a cork, and he was discharged on the 17th March.

Case 22. *Necrosis of the Lower Jaw.*—N. L. P., a Hindoo trader, aged 45, admitted 21st March, 1870, for necrosis of the lower jaw, from which he had been suffering for the last two months. No history of malarious fever or syphilis, but he was very anæmic and cachectic. Almost the whole of the right half of the jaw from below the condyle to near the symphysis was removed through the mouth on the 22nd. He was discharged on the 11th April. An arch of fibro-cartilaginous structure replaced the bone, which would probably become bony before long, as no doubt the periosteum in part remained.

Case 23. *Osseous Tumour of the Lower Jaw.*—M., Hindoo weaver, aged 50, admitted 5th June, 1870, with a tumour on the right side of his lower jaw, of about six years' growth. It was of the size of an orange, situated just outside the right



angle of the mouth, and most prominent about the lower margin of the jaw. Said to have commenced as a swelling of the gum about the canine tooth, which had been lanced. The outer swelling of the jaw was also opened at the same time. A few teeth fell out. The inner wound healed, but the outer remained open as a sinus through which softened laminæ of bone could be felt with a probe. The tumour, with

the whole of the jaw-bone included between its right angle and the left molars, was removed through an incision carried over the tumour and extending from the left side of the chin to the right angle of the jaw, sawing through the bone at the insertion of the right masseter on one side, and between the molars and pre-molars on the other. The lip was not divided. There was remarkably little bleeding during the operation or after it. But the patient was very weak, and though the wound healed well and soon, and a rigid band formed, stretching between either side of the jaw, he gradually sank under pneumonic fever and diarrhœa, and died on the 22nd July.

Post-mortem Examination.—Most of the viscera were found anæmic and shrivelled; the upper lobe of the right lung was adherent to the parietes, and its proper structure quite rotten and disintegrated, forming a large irregular cavity, bounded in front by only a thin membrane, the remains of the pleura.

Case 24. *Fibro-plastic Tumour of the Upper Jaw.*—N., a Hindoo peasant, aged 28, admitted on the 22nd February, 1871, with a fibro-plastic tumour of the right upper jaw, encroaching on the opposite side as far as the canine tooth. The tumour was of about seven months' growth, and was about the size of an orange. The incisors, canines, and pre-molars had fallen out, and the tumour was grooved on its lower aspect by the pressure of the teeth of the lower jaw. It was increasing rapidly, and caused considerable pain from its pressure. The palate bulged downwards, and the nose and incisors of the opposite side were pressed aside by the growth, which presented a smooth vascular appearance. It commenced as an epulis in the cheek, and, rapidly increasing, the teeth were forced out, and its then present condition attained. The patient was suffering from bronchitis on admission; the operation was therefore deferred for some time until he was relieved. On the 28th March the diseased parts were removed under the influence of chloroform. In this case the upper lip was divided, and the ala nasi detached, and through the opening thus formed the right superior maxillary bone and a portion of the left one, extending as

far as the canine teeth, were removed. A portion of the hard palate and the orbital plate of the right side were left. There was very little hæmorrhage. The wound in the lip was stitched with horse-hair sutures. It healed rapidly, and cicatrization proceeded favourably in the cavity. He did well, and left the hospital of his own accord on the 24th April. The tumour proved to be fibro-plastic. In addition to the spindle-shaped fibre cells, there were numerous nucleated cells.

ABSTRACT OF TWENTY-FOUR CASES OF DISEASES OF THE JAW.

Disease.	Right Upper.	Left Upper.	Right Lower.	Left Lower.	Central.	Total.	Deaths.	Recoveries.	Remarks.
Cystic . . .	1	2	..	..	..	3	..	3	
Fibro-plastic or Myeloid . .	3	..	1	..	..	4	1	3	One Case of right upper jaw, died of pyæmia and fibrinous coagula in the right side of the heart, on the third day after operation.
Enchondromatous . . .	2	..	..	..	..	2	..	2	
Fibrous . . .	1	1	1	..	..	3	..	3	
Osseous . . .	..	..	1	..	..	1	..	1	This man recovered perfectly, but died afterwards from pneumonia.
Polypus . . .	..	1	..	..	..	1	..	1	
Necrosis . .	1	1	2	1	5	10	..	10	
Total . .	8	5	5	1	5	24	1	23	

TRACHEOTOMY.

The following detailed history of eleven cases of Tracheotomy illustrates many points of importance that are likely to occur in connection with this operation. An analysis of each case, with such remarks as are of clinical significance, will be therefore useful as well as interesting. The tabular statement shows the relative proportion of the sexes, race, and age, the disease which rendered the operation necessary, and the number of fatal and successful cases—the latter, I regret to say, bearing a small proportion to the former. Most of these cases were of the severest character, for which the operation could hardly hold out more than a faint hope of relief; but such cases are as instructive as those that have resulted favourably, and therefore I have recorded them in detail.

In the first and second cases, which occurred in children of three years of age, success was frustrated by the blocking up of the tube with inspissated mucus; whatever the result might have otherwise been, the conclusion is inevitable that, to this untoward accident, failure was immediately attributable. In the third and eighth, life was saved, and health restored, but the patients were obliged to wear the tube permanently, as structural changes in the larynx had occurred which rendered respiration through the natural channel impossible. In the fourth, life was saved for a time, but death occurred subsequently from cancer. In the fifth and sixth, temporary relief was afforded in one, but death resulted ultimately in both from pyæmia, with probably the formation of coagula in the right side of the heart. In the

seventh case, death was caused by aneurism of the innominate artery, and the pressure exerted by it on the trachea, the rings of which were necrosed. The ninth was the most satisfactory of all, for it terminated rapidly in perfect recovery. In the tenth, life was restored, when the child was in the greatest extremity of danger; but it sank subsequently from exhaustion, and extension of mischief from the wound. The eleventh terminated fatally from broncho-pneumonia, and the formation of clots in the trachea.

Sex.	Age.	Race.	Cause.	Result.	Remarks.
	Years.				
F.	3	Hindoo.	Custard Apple seed.	Death.	From obstruction of the tube.
M.	3	Eurasian.	Ulceration and Œdema.	Ditto.	Ditto.
M.	20	Hindoo.	Ditto.	Recovery.	Obliged to wear the tube.
M.	57	Portuguese.	Cancer of Larynx.	Death.	Died of cancer.
M.	2½	English.	Diphtheria.	Ditto.	Died of toxæmia.
F.	4	Eurasian.	Ditto.	Ditto.	Ditto.
M.	60	French.	Aneurism of the Innominata.	Ditto.	Died of aneurism.
M.	23	Hindoo.	Ulceration.	Recovery.	Obliged to wear the tube.
F.	30	Eurasian.	Ditto.	Ditto.	Rapidly recovered.
M.	3	Hindoo.	Ditto.	Death.	Exhaustion.
M.	45	English.	Ditto.	Ditto.	Pneumonia and formation of clots in the trachea and bronchial tubes.

Thus, out of the eleven cases, three only permanently recovered, whilst life was prolonged and suffering greatly relieved in others. In the case of aneurism only, and in one of diphtheria, no relief was afforded.

Some points of importance in connection with this operation, are illustrated in these cases, and especially the difficulties that are likely to occur, in stout adults and in children. As a general

rule, tracheotomy, either above or below the isthmus of the thyroid gland, in an adult of ordinary size and moderate muscular development, is by no means a difficult operation, though more so than would be supposed from experience only on the dead; but in the case of either a stout and short-necked adult, or of a young child, the difficulties are at times very great. Indeed I know no occasion in which the presence of mind and self-reliance of the surgeon are more taxed. The subsequent dangers and difficulties after the first great one is surmounted, are not unimportant, such as the difficulty of retaining the tube *in sitû;* ulceration and irritation of the integument and air-passages; inflammatory changes, or the formation of mucus or blood coagula in the trachea; the danger of the tube or of the windpipe itself becoming obstructed; and in the case of children, that of inanition, when from paralysis or loss of co-ordinating power in the muscles of deglutition, the food passes down the windpipe, instead of the œsophagus, and is thus regurgitated through the wound, or passed down into the bronchial tubes.

With reference to the operation in diphtheria or diphtheritic croup, I believe that, if performed early, it may be of benefit, and may save or prolong life. But it must be remembered that the operation itself is a formidable one; and, in children, is attended with subsequent dangers, and therefore should not be resorted to, until it appears evident that life is in imminent peril. The exact time at which it should be performed, is a difficult and anxious question, and one on which no general rules can be laid down. In the two cases of diphtheria here recorded, there was no room for doubt, for the children were at the point of death when the operation was performed; in one case life was prolonged, and great relief conferred for several hours; in the other, the disease had progressed so far, and the child was so much exhausted, that it was too late to be of any service. Much difference of opinion has existed, and does exist, on this question; but it is not my intention to discuss it at present. I will merely say, that I believe tracheotomy may be of great benefit

if performed early enough, before the blood has been thoroughly poisoned, and before the deposition of fibrous coagula has taken place in the heart.

With reference to the case in which aneurism existed, I may say that this disease had been suspected by his medical attendants, but no physical sign had made it certain. I cannot doubt the propriety of the operation in similar cases, were the cause even clearly perceptible, for although there could not be permanent, there certainly might be temporary, relief. In this case, no doubt, fits of dyspnœa had frequently occurred previously, from the gradually increasing pressure on the trachea and bronchial tubes; it was, however, the laryngismus that caused death. Very slight relief was obtained from the operation; but the season of the year, the intense and damp heat of July, the failing condition of the patient's heart, and the congested state of his lungs, were sufficient to prevent restoration of the respiration, even for a time, and the result was consequently unsuccessful. I believe that if it had been done earlier, temporary relief might have been conferred, and even that would have been of importance, not only to the sufferer, but to his friends.

All these cases present some points of interest for consideration, and therefore I propose to make a few remarks on each.

Case I.

A Brahmin girl, aged 3 years, was admitted, on the morning of the 15th August, 1862, with great difficulty of breathing. It appears that five days ago when eating a custard apple, one of the seeds slipped into the wind-pipe, and gave rise to the symptoms from which she was suffering. She was in great distress, breathing hurriedly and harshly, very little air entering the lungs; the efforts at inspiration were violent and distressing, the ribs expanding, and the intercostal spaces and ensiform cartilage being drawn inwards. The pulse was feeble,

the countenance livid, and all the signs of impending suffocation were present.

I held her up by the feet, patting her smartly on the back, in the hope of displacing the seed, but with no good result. Chloroform was then administered, but the breathing became so much worse, that it was discontinued. It was evident that, if the air-tube were not soon opened, the child would be suffocated. The father would not at first give his consent to any operation, but just as she appeared to be dying, he did so. I immediately opened the trachea, the air rushed in and out with freedom, and the child was quickly restored to consciousness. Great difficulty was experienced in getting a tube to fit the trachea, and I extemporized one by cutting off a piece of a large catheter, until a small tracheotomy tube could be procured. She soon became quite quiet and easy, and slept.

Shortly after, the child suddenly snatched at the tube and displaced it, the difficulty of breathing again returned, and she became insensible, livid, and, to all appearances, dead. The wound was dilated, and artificial respiration practised. In about five minutes she began to regain consciousness; and in half an hour, she was again breathing easily and quietly through the tube. She was placed in a secluded part of the ward and closely watched. The bed was surrounded with curtains, and a stream of vapour conducted therein.

I saw her again at 3 p.m., when she was doing well, breathing easily, and quiet. The tube had required frequent cleansing. The catheter tube was now removed, and a larger tracheotomy tube introduced, and I left her at 3.30 p.m., breathing easily. She had taken some milk, and the bowels had acted. No attempt had been as yet made to search for the seed, as the least irritation brought on such struggling that life was endangered by it.

10 p.m.—Found the child again in great distresss, almost asphyxiated. The officer on duty, seeing her very restless, and not appreciating the true cause, gave her a dose of laudanum. I placed her on a table, removed the tube, inflated the lungs,

and she partially revived. The wound having contracted, I enlarged it with a scalpel, and re-introduced the tube, but the child sank shortly after. On examining the tube, I found it had become blocked up at the distal end by inspissated mucus, so hard, that it was difficult to push it out. Thus, notwithstanding all the care and precaution taken to save the child, it sank, slowly asphyxiated. After death I passed a probe through the rima glottidis, and also examined it with the finger, which passed readily into the larynx. The seed had disappeared, whether ejected in one of the fits of coughing after the operation, or having passed into the mouth and been swallowed. The friends would not allow any post-mortem examination to be held.

Remarks.—In this case the obstruction to the respiration was due to the entry of a custard apple seed into the larynx, and it was not until all other means of relieving the patient had failed, that the trachea was opened. This was followed by great relief, which, there is reason to believe, might have been permanent, had the tube not become obstructed by the inspissated mucus that had collected in the distal end of the tube, which unfortunately was a single one.

This case shows the necessity of having a double tube, with a view of keeping the outer one free from any deposit. It appears to be impossible to keep a single tube free without frequently removing it from the wound, and this in a timid and irritable child would be, for obvious reasons, most objectionable. It is very important after tracheotomy that the condition of the tube should be closely attended to, and frequent examinations should be made by removing the inner one to see that no deposit is taking place. Mucus may be slowly collecting and diminishing the calibre of the tube, while the diminished supply of air is gradually inducing asphyxia. The symptoms of this are somewhat insidious, and the obstruction endangers life if not recognised early.

Case II.

At 10.30 p.m. on the 13th March, 1863, I was requested to see an East Indian child aged 3 years who had just been admitted, with symptoms of laryngismus that had come on within the last twelve hours, supervening on an attack of tonsillitis, with which there was no sign of any diphtheritic exudation.

The boy had been ailing previously with congestion of the liver. He was in great distress when I saw him, breathing with great difficulty, the ensiform cartilage being drawn in towards the spine at each effort at inspiration. His face and lips were becoming quite livid; no air could be heard to enter the chest; the pulse was feeble, and a comatose condition with convulsions was rapidly coming on. It was evident that no time was to be lost. I opened the trachea with some difficulty, owing to the imperfect light afforded by candles, the great venous congestion of the neck, and the struggles of the patient. The venous hæmorrhage was profuse. The tube having been introduced, and respiration established, the bleeding ceased, and the air entered and left his lungs freely. His lips regained their colour, the distress passed away, and he fell asleep. The pulse began to rise, it having become imperceptible when the operation was performed.

14*th*, 7.30 a.m.—I found the child sinking, and it died whilst I was present, with all the appearances of asphyxia. The tube at its lower end was obstructed by viscid mucus, which had become quite hard, although the dressers in attendance say they cleaned it out frequently during the night. They also state that the child had difficulty of breathing, with expectoration of blood and mucus through the tube, and that there was a return of hæmorrhage from the wound. This, no doubt, occurred when the tube having gradually become obstructed, the respiration was again embarrassed. The child was, in fact, slowly asphyxiated by its gradual closure by inspissated mucus.

Remarks.—This child, when in a low state of health from

hepatic disorder, was attacked with inflammation, and probably ulceration of an erysipelatous character, which, spreading to the glottis, and probably being accompanied by œdema, rapidly induced the dangerous condition into which he had passed when tracheotomy was performed. During the operation, a difficulty arose, one which is likely enough to occur at night, from the imperfect light given by the candles, which were used on the occasion.

A point of importance to be noted is the engorged condition and consequent hæmorrhage from the veins of the neck. This being due to asphyxia rapidly ceased when respiration was re-established. Taking every precaution to prevent the flow of blood into the trachea through the wound, as little time as possible was lost in introducing the tube, for delay would have been serious, and the patient's life placed in great peril. The operation restored life, and gave great relief; respiration was quickly re-established, and the hæmorrhage ceased.

Unfortunately no double tube small enough could be found at the time, and a single one was used; and from its not being thoroughly cleansed out during the night, the accumulation of viscid mucus closed the lower end, and thus gradually arrested the supply of air. What the result might have been, had the tube been kept clear, it is impossible to say; but the case shows the great necessity of using a double tube, the inner one exceeding the outer in length, so that no collection of inspissated mucus can take place. In this case, the mucus had dried and hardened not only in the end of the single tube, but also around and beyond its extremity, so that, even supposing the bent probe, with its end wrapped in lint, had passed down the entire length of the tube, it could not have kept it clear. This is a point of great practical importance in reference to the operation, and should be borne in mind, especially in the case of children, where the opening is small. It is obvious that if there be a double tube, the inner one of which protrudes considerably, no collection, such as occurred in either of these cases could take place, if the inner tube were frequently removed and cleansed. The

occlusion of the tube in this case could not be regarded as the result of neglect or carelessness, but rather of accident, for it was frequently cleaned out. Unfortunately not having been removed from the wound, its end became the seat of the deposit, which gradually obstructed the entrance of air.

No post-mortem examination was permitted.

Case III.

Ram Chunder, a Hindoo Ooryah, aged 20 years, residing at Juggernath Ghât, was admitted on the 8th May, 1863. Had a cough about a month since, attended with much expectoration; and about twenty days ago had fever which lasted for some days, during which time he attended one of the dispensaries as out-patient. For the last week, his voice had been hoarse, and his respiration difficult. He says he has never had syphilis. About three years ago, he suffered from ulceration of the nose, lower and upper lips and chin, the puckered cicatrices of these ulcerations remaining, giving him a pinched and distorted expression of countenance. He has had ulcerated fauces. He is of weak constitution and feeble muscular development, and has a cough.

I found him in a state of great urgency. The dyspnœa was intense at each inspiratory effort, the sternum being tucked in towards the spine. He had had two or three paroxysms of great severity. Whilst being placed in position for tracheotomy, which was urgently indicated, another paroxysm of dyspœna came on, and he was all but suffocated. The operation was at once performed. Having divided the integument and fascia, and separated the muscles, I seized the trachea with a tenaculum, and having drawn it forwards, and steadied it, I ran the scalpel quickly through three of its rings, and introduced the tube. He expelled a quantity of bloody mucus through this, and after a few forcible inspirations, was rapidly relieved and rescued from impending suffocation. There was considerable venous hæmor-

rhage during the operation, but it ceased as soon as respiration was fully established through the tube.

May 9th.—Doing well and breathing easily; ordered potas. iodid. Diet, soup, milk, and wine. The inner tube is frequently removed to be cleansed, as it has a tendency to become blocked up with inspissated mucus. The bowels have acted.

10*th.*—Doing well. The skin round the wound is inflamed; nitrate of silver solution applied.

11*th.*—Breathing easily through the tube; pulse quick and feeble. He looks so wretchedly cachectic and anæmic, that I fear the result. The throat and fauces exhibit superficial ulceration and old cicatrices, and the posterior part of the throat has a blanched appearance. Sponged the surface with solution of nitrate of silver; ordered cod-liver oil, and plenty of soup and wine.

15*th.*—He is better, and seems rather stronger. Has taken his food well. He cannot bear the least obstruction of the mouth of the tube, and there is still a profuse muco-purulent discharge from it.

17*th.*—Sponged the throat again with the solution of nitrate of silver. He is depressed and does not eat; but he breathes easily through the tube, and the larynx is evidently improving, as he can breathe for a minute or so, when the tube is closed. Continue the iodide of potash, and diet with wine as usual.

20*th.*—Has improved in general health, but is unable to dispense with the tube. He is to take tinct. ferri muriatis, gtt. x. thrice daily.

25*th.*—Removed the tube; he breathes pretty well without it when the aperture is closed by the finger, but he cannot dispense with it long.

June 4th.—He is doing well, but still he cannot do without the tube.

13*th.*—He is strong and well, but still wears the tube.

20*th.*—Caught cold, coughing again; ordered some simple cough medicine.

23*rd.*—Cough much better, general health good: but he is

quite unable to do without the tube, though he has repeatedly tried.

July 19th.—I took out the tube this morning, but in a short time his breathing became seriously embarrassed, and it was re-introduced.

25th.—He has been very well since last report. Is able to take out and replace the tube, and can speak in a hoarse voice when he closes it with his finger. He left the hospital shortly after this.

Remarks.—It is probable that in this case, although denied by the patient, the origin of the mischief was due to constitutional syphilis. The ulceration in the lips, nose, and chin, the appearance of the cicatrices, the cachectic condition, and the chronic ulceration in the throat, are all suggestive, if not confirmative, of it. The attack of dyspnœa from laryngeal mischief which rendered the operation necessary, was not the first from which he had suffered, but none had been so severe as to endanger his life. There was nothing remarkable in the operation; the trachea was easily opened below the thyroid gland; the tube was readily introduced and retained, and the breathing was rapidly relieved.

Iodide of potash, with a view to the probably syphilitic origin of the ulceration, was administered, and the fauces and rima glottidis were sponged with a solution of nitrate of silver. Cod-liver oil and a nutritious diet were also given. He steadily improved under this treatment, and his general health became much better; respiration was carried on easily through the tube, but he was unable, after many trials, to dispense with it, as each time it was removed, he fell into great difficulty, and it had to be replaced. On one occasion he nearly lost his life, the tube having been taken out to be cleansed. During its short absence, the wound contracted so much, that the attendant was unable to replace it. Dr. Chevers fortunately happened to be near, and arrived in time to re-introduce it, and thus resuscitated the patient, who had become all but asphyxiated. He subsequently was so accustomed to the tube, that he was able to take it out

and replace it himself. He could speak in a hoarse voice when the orifice was closed with the finger. The form of the rima glottidis and of the interior of the larnyx must have become so changed by ulceration that, when cicatrization had taken place, although a certain quantity of air could escape, none could enter. The consequence is, that the tube will be necessary for the rest of his life.

Case IV.

T. P., aged 57, Portuguese, a thin, delicate-looking man, was admitted on the 3rd February, 1864, with symptoms of laryngeal disease. He admits having suffered from primary syphilis thirty-nine years ago, but it was not followed by any secondary symptoms. His general health has been tolerably good until about six months ago, when he was attacked with swelling of the cervical glands and sore throat. Difficulty of breathing came on suddenly on the night of the 2nd February.

The patient is emaciated and is breathing with difficulty. There is some enlargement and thickening about the thyroid gland, and along the course of the trachea. The voice is husky, and he has difficulty and pain in swallowing. At the left angle of the jaw, there are one or two enlarged cervical glands. He was ordered hot fomentations, an emetic of antimony, carbonate of ammonia, and steam to the larynx.

4th.—He did not improve much after the first slight relief given by treatment, and good diet with wine. At 3 p.m. I found him very restless and depressed, with cold extremities, very feeble pulse, dusky countenance, and feeble and embarrassed respiration. He appeared to be sinking from exhaustion and slow asphyxia. I performed tracheotomy immediately. The trachea was prominent and thinly covered by emaciated tissues. Several large veins lay in the way, but I avoided them by drawing them aside, and the hæmorrhage was very slight. The operation gave great relief, although not very suddenly; but by the next morning he was much better, and asked for food.

11*th*.—He has been improving daily, and is much stronger. Is taking potas. iod. gr. iii. ter in die; nutritious diet and wine. Tinct. iodine is applied over the throat, and the rima glottidis is sponged with a strong solution of nitrate of silver. There is some mucous expectoration through the tube, but he is much better in every way.

For some days after this he improved slightly, the thickening about the larynx, thyroid, and trachea seemed to diminish, and he had less pain and difficulty in swallowing. The large tube was exchanged for a smaller one, and attempts were made to dispense with this altogether, but it was found to be impossible.

March 10*th*.—He is getting weaker, pulse more feeble, difficulty and pain in deglutition increasing. Is able to take very little nourishment. I examined with the laryngoscope, but could only ascertain that the epiglottis was swollen. There is much thickening and induration about the larynx and trachea. I suspect it is carcinomatous.

16*th*.—He died of asthenia last night, at 8 p.m.

Post-mortem.—Extensive carcinomatous deposits in the œsophagus and larynx; both passages being almost entirely obstructed by it, its growth having been very rapid lately. The thoracic viscera healthy. The liver contained several small abscesses, with carcinomatous deposits.

Remarks.—This patient was a prematurely old and feeble man, whose constitution seemed to be broken down by constitutional disease, which was attributed partly to syphilis, though carcinoma was suspected. The chief point of interest before the operation was performed, was the slow and insidious form in which asphyxia set in. The depression and gradual exhaustion had more the appearance of sinking from debility than from an imperfect supply of air, and I was informed at 3 p.m. on leaving the lecture-room that he was sinking from asthenia.

He, however, improved after tracheotomy, which was performed immediately. He died forty-two days after the operation, not from any respiratory difficulty, but rather from inanition due

to rapid extension of the cancerous mischief, which had invaded the larynx, œsophagus, and surrounding tissues.

Case V.

On the 25th February, 1864, I was asked to see an English boy, aged 2½ years, who was suffering from difficulty of breathing. I found a strong, healthy-looking child almost asphyxiated; his face and lips were livid; his skin cold; pulse feeble and rapid; respiration painfully difficult, and the sternum drawn in towards the spine at each effort to inspire. He had been put in a warm bath, which did not relieve him. The account I received was, that he had been ailing for two days, with sore-throat and aphonia, and much difficulty of breathing at night. The fauces had been sponged that morning with a solution of nitrate of silver, twenty grains to the ounce. He had been relieved by this application, and fell asleep in the afternoon. He awoke suddenly, suffocating, and some remedies had been administered, as well as the warm bath, in which I found him. This suffocative state had been going on for some time when I was summoned. With the consent of two other medical men, I proposed tracheotomy, as it seemed to offer the only hope of saving life. The operation was accordingly performed by candle light (it was 6.30 p.m.) without any delay, chloroform being carefully administered. It was somewhat difficult in a fat child, with an imperfect light, but the tube was introduced, and he rapidly began to recover, and was soon breathing with comparative ease.

26*th*.—The breathing again became rapid. The tube was removed, and carefully examined to see that it was quite within the trachea, and was then exchanged for one rather larger to give a freer ingress of air.

The breathing did not improve, but remained short and hurried, though air entered and escaped freely by the tube. The lungs did not expand; the countenance again became dusky; pulse rapid, and feeble. The skin was cold and damp. The

chest-sounds were feeble, and obscured by the tracheal sounds, but it was evident that there was capillary bronchitis, and probably partial atalectasis. He sank quietly, and died at about 8.30 p.m., rather more than twenty-six hours after the operation. The physician who attended him assured me that there had been no diphtheritic exudation, though in the morning the fauces were red and congested, and there was a small ulcer of the tonsil. He had not regarded it at first as a case of either croup or diphtheria. It is remarkable that the other two children in the house were both complaining of slight sore-throat, and that one of them, aged $1\frac{1}{2}$ year, got worse and died with similar symptoms on the 2nd of the following month.

I did not see the other children, nor had I any opportunity of making a post-mortem examination of the one upon whom I operated.

Remarks.—This was a case of diphtheria, or diphtheritic croup, and before I saw it, the disease had advanced so far that life was in extreme danger; and as tracheotomy afforded the only hope of saving life even for a time, it was at once performed. Great relief was afforded for several hours, but the respiration again became difficult, and it was evident that the child was sinking from extension of mischief to the lungs.

The dangerous condition in which I found him seems to have supervened rapidly, for there had been nothing at the last visit of the physician who was attending the case, to cause immediate anxiety. It is possible that tracheotomy, if performed earlier, might determine a favourable issue in such cases; but it needs the greatest confidence in its efficacy, to incur the danger of so serious an operation. In this case I believe it acted merely as a palliative, and that death was caused by extension of the original inflammatory mischief to the contents of the chest. It is, however, sufficient that it saved the child from the present horrors of strangulation, to encourage one to repeat it in similar cases even should the result be no better than in this one.

Case VI.

On the 26th of April, 1864, I was summoned by a medical man to see an East Indian girl, aged 4 years, who was in great danger from laryngeal disease. I found her cold and depressed, with face and lips livid, pulse very rapid and feeble; dyspnœa very urgent. The ensiform cartilage at every inspiration was drawn in towards the spine. She had been suffering from cough and sore-throat for some days. The physician in attendance had been consulted that day too late to benefit her by medicine. Emetics had been given, and a blister applied. As the child was evidently at the point of death, I at once, as the only hope of saving life, performed tracheotomy. Several large veins had to be drawn aside. When the trachea was opened, a quantity of puriform fluid escaped, and on inserting the tube, it was filled with it. There were a few more attempts made to breathe through the tube, but the child rapidly sank. On opening the mouth, no exudation could be seen on the fauces, but there was a profuse quantity of it in a puriform condition in the trachea, due to croup of a diphtheritic character. It is probable that, even had tracheotomy been performed earlier, the result would still have been fatal.

Remarks.—Whatever the good effects of tracheotomy might have been if performed sufficiently early, in this case it was done too late to offer any hope of recovery. The trachea was filled with the aplastic exudation which welled out through the tube directly it entered. A few efforts were made at inspiration, but with no favourable result, the child sinking from exhaustion, the result of blood-poisoning, and probably, from what is common in such diseases, the formation of fibrinous coagula in the right side of the heart. In opening the trachea, the prospect of relief was very small, but it was not right to withhold any chance of saving life; and as the operation in such a case could only have a good effect, it was done as a last resource.

Case VII.

The subject of this operation was a stout elderly European gentleman, with a very short and thick neck. He had been labouring for about seven days under some difficulty of breathing. I saw him on 7th June, 1865, in consultation with two medical men, who had been treating him. His breathing was then stridulous and oppressed, the countenance anxious, but not livid. The pulse 120 and weak. The respiratory murmur faintly audible, much obscured by the tracheal sounds. The cardiac sounds were faint and muffled, but there was neither *bruit* nor other abnormal sound distinguishable.

He lay always on the right side, as turning to the left caused intolerable difficulty of breathing. Various antispasmodics had been given without effect, and it appeared that the dyspnœa might only be relieved by opening the trachea. At this juncture I saw the patient, and it was determined to wait till 4 p.m. (this was about noon) unless any increase in the urgency of the symptoms should render earlier interference necessary. Meanwhile, a cathartic enema was administered, and hot stupes were applied to the chest and throat. The enema operated freely.

At about 4 p.m. he became worse, his breathing was more stridulous and difficult, the countenance and lips began to appear livid, and his pulse was weaker and more frequent. He was evidently beginning to sink from the circulation of non-aërated blood, and there was no time to be lost in opening the trachea. He was accordingly placed on his back on a table, with the throat exposed by allowing the head to hang back over a pillow. The aspect of the neck was most unpromising, it being very short, and loaded with fat. The chin appeared to commence almost at the sternum. The usual incision was made in the median line, and the trachea reached with a little dissection, though it lay very deep—the whole length of the forefinger from the surface. The hæmorrhage was not severe, and there was only one gush of venous blood of any importance. A hook was fixed into the trachea; two or three rings were divided, and a

tube introduced, which almost buried itself in the wound, and as it was very difficult to keep it *in sitû* without the external orifice becoming lost in the fat, consequently a little blood passed into the trachea and bronchial tubes. Air entered and found exit easily, but respiration was not satisfactorily re-established until the tube had been wiped out with a feather. It improved somewhat after this, but the stridulous sounds still continued. Chloroform was administered by Dr. Beatson; and at the commencement of the operation, the patient came easily under its influence, which was gently maintained until the tube was introduced. It produced neither convulsion nor untoward symptom of any kind. Consciousness, however, was not completely restored. The breathing became easier, but feebler; the weakness increased, the surface of the body was cold, and the pulse weak, irregular, and intermittent. Artificial respiration was practised, stimulants were given, warm coverings, hot bottles and sinapisms were applied, and an enema of brandy was thrown into the rectum, but life gradually ebbed, and he died within two hours after the operation.

Post-mortem examination was made thirteen hours after death. The larynx, trachea, lungs, and heart were removed together, and dissection revealed, what had been suspected, the presence of an aneurismal swelling of the arteria innominata about the size of a small hen's egg. This was well lined with firm fibrinous coagula, and formed a hard mass pressing against the right side of the trachea, and irritating the recurrent laryngeal nerve. The rings of the trachea, against which it pressed, were partially necrosed, but the lining membrane of the tube was intact. The epiglottis and upper part of the larynx presented no morbid appearance. The lining membrane of the trachea was healthy, and the tubes, being slit open, contained only a very small quantity of fluid blood. The lungs were slightly congested and somewhat collapsed. The heart was loaded with fat. Its muscular walls were thin, soft, and in a state of partial fatty degeneration. The cavities contained only a very little blood. The valves were all healthy, with the

exception of those of the aorta, which were slightly thickened. There was also a small aneurismal pouch bulging from the outer side of the ascending aorta.

Remarks.—I saw this patient only at the last, and when he was in great urgency of breathing. There was no positive evidence of the presence of aneurism, but the laryngeal difficulty was most urgent. The operation offered a hope of relief, but a sudden increase in the urgency of the symptoms so much exhausted him (the weather being at the time very unfavourable, the heat and damp excessive) that he sank before respiration could be thoroughly re-established.

The post-mortem examination showed that irritation of the recurrent laryngeal nerve, as well as compression of the trachea, had caused the fatal attack. No doubt the heat had much to do with the development of the unfavourable symptoms that preceded his death.

The congested state of the lungs and exhausted state of the nerve-centres, due to great heat, had doubtless much influence in causing the additional irritation which brought on the fatal laryngismus. The pressure of the tumour on the trachea itself had been slow and progressive, enough to cause much inconvenience, and was rendered fatal when the additional difficulty arose from irritation of the recurrent laryngeal nerve.

I think that there cannot be a doubt of the propriety of the operation in such a case. Even had the indication of thoracic aneurism been more positive, it would not only have been justifiable, but imperatively necessary, for, as the result proved, the laryngeal difficulties may be due to spasm of the glottis from pressure on, or irritation of, the laryngeal nerves, the actual compression of the trachea itself having comparatively little to do with the increased dyspnœa.

Case VIII.

I was asked, on June 7th, 1867, to see a case of laryngeal disease in a man, named Hurry Narain, a Hindoo sweetmeat-

maker, aged 23 years, who had been under treatment for ulceration or abscess about the larynx. He had expectorated a quantity of purulent matter. He had been treated by sponging the larynx with nitrate of silver, and by Dover's powder internally. Had had much pain and aphonia for the last twenty days with purulent expectoration. The fauces, soft palate, and epiglottis are thickened and vascular. There is considerable difficulty of breathing, which has increased since last night. The disease has probably a syphilitic origin, but the history is not very clear. When I saw him, he was in great stress and urgency of breathing, the ensiform cartilage being tucked in towards the spine at each effort at inspiration, and very little air entering through the contracted opening, and that with a noisy, stridulous sound. His pulse was becoming feeble, skin cold, face and lips dusky; in fact he was being slowly asphyxiated, and was beginning to sink. I proposed immediate tracheotomy, and arrangements were at once made for that operation.

I observed, on examining the neck, that there was a preternatural fulness about the throat, especially near the thyroid cartilage. I had no difficulty in opening the trachea, or in introducing the tube. He took just enough chloroform to deaden the pain of the operation. There was much venous hæmorrhage, but it ceased as soon as the respiration was established through the tube, which took place after a few gasping efforts, and the forcible expulsion of some frothy blood and mucus. He was soon much relieved; and when I left him, he was breathing tranquilly through the tube.

June 8th.—He is much better this morning, but was low yesterday, requiring to be kept up with frequent stimuli and enemata of brandy and beef-tea. He has great difficulty in swallowing. His pulse is much better, and he is free from pain except on pressure over the larynx. I ordered tr. iodine to be applied externally, and a poultice. The rima glottidis to be sponged with a solution of nitrate of silver, and a liberal diet, with wine to be given. The frothy and purulent discharge ejected from the larynx is less copious to-day.

9*th*.—He is better: pulse slower and firmer. He breathes easily through the tube, and his blood appears to be thoroughly aërated. A quantity of muco-purulent matter still comes from the larynx, and is secreted so fast that laryngoscopic examination is very difficult. Ordered the rima glottidis to be sponged with a solution of nitrate of silver, and that he should take tr. ferri sesquichlorid.: ten drops every third hour. He has less pain and difficulty in swallowing to-day.

12*th*.—He is slowly improving: swallows with less pain, and is stronger. There is still some muco-purulent discharge from the mouth, but much less is ejected through the tube. Less pain on pressure over the larynx. The solution of nitrate of silver is applied every day.

13*th*.—He is improving, having less pain and less discharge from the larynx. Takes his food well, and is stronger. Took out the tube to try if he could breathe through the natural passage, but finding that he could not do so, it was replaced immediately.

17*th*.—He improves daily; swallows well: no pain on pressure over the larynx; purulent discharge has ceased. But he is quite unable to breathe without the tube. He is now taking cod-liver oil in addition to the other remedies.

18*th*.—Tried him without the tube again to-day, but was obliged to replace it. He breathes through the wound, but not at all through the larynx, and as the wound quickly begins to contract, the tube has to be re-introduced almost immediately. On closing the wound with the finger, when the tube is out, dyspnœa rapidly comes on. The nitrate of silver solution is applied daily; and, as I should have before mentioned, inhalation of steam combined with the vapour of iodine is employed.

27*th*.—He is not so well: has an attack of erysipelas in the neck, especially about the tube. Let him be well purged, and the part painted with a solution of nitrate of silver. Continue the tr. ferri.

July 2nd.—He is much better, but still quite unable to dispense with the tube for any length of time; he can speak a

little, with a very hoarse voice, when the tube is removed and the aperture closed.

September 16th.—Still in the hospital; he is in excellent health, but cannot breathe without the tube; a certain amount of air can escape from the laryngeal opening, but none, apparently can enter. He can speak in a hoarse voice when he closes the aperture, but every attempt to breathe through the natural passage is followed in a minute or two by all the symptoms of impending asphyxia. There is still a profuse secretion of frothy mucus from the laryngeal opening, which makes examination very difficult. The vocal cords cannot be seen; but the congested and swollen appearance of the parts above them shows that important structural changes have taken place. He remained in the hospital until the 22nd of November, his health being then perfectly good, but he was just as unable as ever to breathe without the tube. He was discharged at his own request.

Some weeks after I saw him in the street looking very well, still wearing the tube. He takes it out and cleans it himself, and seems perfectly contented. By closing the mouth of the tube with his finger, he can make his voice audible.

Remarks.—In this case the power of breathing by the natural channel was never restored. The laryngoscope sufficiently indicated the changes that had occurred in the larynx to prevent inspiration, a sort of valvular condition of the rima glotiddis having resulted from the inflammatory action. There was nothing remarkable in the case beyond this; the operation presented no difficulties, and it conferred immediate relief.

Case IX.

An East Indian, named Mary Anne R—, aged 30 years, was admitted into my ward on the 5th of October, 1867, with great difficulty of breathing caused by an ulcerated state of the palate, fauces, and probably of the larynx. It appears that she had been under treatment in the hospital about two months ago for the same disease, which is of syphilitic origin, and had left the

hospital much improved. The symptoms had recently recurred, and she was in great urgency when admitted. The respiration was very difficult, the lungs imperfectly filling with air, and the ensiform cartilage being drawn in at each inspiration. The great distress was mitigated occasionally, but recurred in paroxysms. On examining the fauces and upper part of the larynx with the laryngoscope, as well as the urgency of the symptoms would admit of, extensive ulceration was detected, and as life was in imminent danger, it was decided that tracheotomy should be performed without delay. I accordingly opened the trachea below the isthmus of the thyroid gland. It lay very deep, and was very small, being much overlapped by the thyroid. There was not much bleeding, but some difficulty occurred in making the opening and introducing the tube. This having been effected, she was soon much relieved; and after expectorating a quantity of frothy blood and mucus, she began to breathe easily.

6*th*.—She is better, has passed a tranquil night, and is breathing easily through the tube. Pulse weak, about 96. Ordered nourishing diet and wine.

7*th*.—She breathes easily and seems much better. The neck is rather inflamed about the entrance of the tube. It was dressed with carbolic acid and oil.

10*th*.—She is doing well, breathes easily. A solution of nitrate of silver, xxx. grs. to ʒj. applied to the ulcer in the throat and larynx. Potas. iodid. 5 grain doses, and cod-liver oil ordered. Edges of the wound dressed with carbolic acid.

12*th*.—Doing well, except that there is some ulceration about the tube, and the lower part of the wound in the neck, which has opened out again. The tube is now taken out, and when the opening in the trachea is closed, the air enters much more freely by the natural channel. Laryngoscopic examination shows much improvement. She continued to improve daily, and was discharged cured on the 25th November. The wound in the throat, which was dressed with carbolic acid, had healed, and respiration was going on freely by the natural channel.

Remarks.—The result of the operation in this case was very

satisfactory, for not only was life preserved, but in all probability the ulcerated condition of the larynx, which was of a chronic character and of syphilitic origin, was allowed to heal. The perfect state of rest in which the muscles of the larynx were placed by the admission of air through the tube, no doubt mainly conduced to this favourable result. The remedies used had also a beneficial effect, and the carbolic acid applied as a dressing to the wound, was useful in inducing healthy action and cicatrization. She left the hospital perfectly cured in a month and twenty days after the operation. This case illustrates well the great advantage of tracheotomy in ulceration of the larynx, by conferring perfect rest on the ulcerated parts.

Case X.

On the 23rd December, 1867, I was asked to see a little boy, aged 3 years (the son of a native gentleman), who was suffering from urgent symptoms of dyspnœa owing to laryngeal mischief. It appeared from the account given by his friends, that the boy had been ailing for a few days with cold and cough, and that during the night he became suddenly worse, with great difficulty of breathing.

I found him very low, with gasping respiration, the air entering the lungs very imperfectly, the chest not expanding, and the ensiform cartilage being drawn in towards the spine at each effort at inspiration. His pulse was thread-like and very rapid, the lips livid, and consciousness almost gone. He was tossing about in bed in extreme restlessness, and in fact he seemed at the point of death. Counter-irritants had been applied. An emetic, and after it, stimulants had been administered. I examined the fauces, and found the tonsils ulcerated, but there was no diphtheritic exudation.

Some delay occurred before the parent's consent could be obtained to an operation; and when at last it was given the child appeared to be dying. I opened the trachea below the isthmus of the thyroid gland; there was no hæmorrhage. The tube was

introduced immediately; and in fifteen minutes the little fellow had so far recovered, that he had become perfectly conscious, and then fell asleep, breathing easily, with the natural colour of his lips and face restored. The air entered freely through the tube, and caused an almost normal vesicular murmur. Stimulants, milk, and broth were freely given, and readily taken by the child. I left him shortly after to be closely watched by his own medical attendant.

6 p.m.—He is doing well, breathing easily, and has taken food. No fever; his pulse improved. In the afternoon was feverish, but is now better.

29*th*.—Has been going on favourably, breathing easily, and taking his nourishment with avidity. The breathing is easy, with occasional exceptions. On one occasion he was nearly choked by mucus having become inspissated below the tube, just where it terminated in the trachea, but it was fortunately coughed up, and the respiration went on again. He is now free from fever, but is weaker, and the wound about the tube is ulcerating considerably. It has been washed with a solution of caustic, and the fauces and upper part of the larynx sponged with the same solution. To-day he does not take his food so freely, and part of the milk is regurgitated through the tube when he swallows. This must be due to paralysis of the epiglottis and muscles of the pharynx, or it may be that an opening has ulcerated into the œsopagus from behind the tube. I took out the tube this morning, but found that he was quite unable to breathe by the larynx. On looking into the wound, the course of the trachea upwards cannot be seen, either from contraction or from the effusion of lymph. I should remark that the larynx is sponged with the caustic solution, and that he takes iron and quinine, with a nutritious diet and port wine. The bowels are easily kept open by the enema.

30*th*.—He is doing well. The tube was taken out this morning and some milk given, but much of it ran out of the wound. The tube had to be replaced very quickly. The wound is large, but it looks healthy.

After this he gradually began to decline, and it was found impossible to dispense with the tube, as without it he was unable to breathe. Latterly the milk or broth came almost entirely out of the wound. He had occasional attacks of fever, and symptoms of congestion of the lungs with capillary bronchitis set in. He sank at last on the 13th of January, just three weeks after the operation. I was unable to obtain a post-mortem examination, but there is no doubt that his death was caused by inanition, and obstruction in the bronchial tubes.

I looked carefully into the wound, and there was no sign of any ulcerated opening into the œsophagus from the trachea. As the child made an effort to swallow, when the tube was out, the milk could be seen trickling down into the wound, evidently proving that it had entered by the larynx, the loss of co-ordinating power in the pharyngeal and laryngeal muscles being the cause of this.

Remarks.—This case, which at one time seemed to hold out hopes of success, illustrates some of the difficulties and dangers that may arise after the operation in children, and which are, to some extent, referable to the operation itself. The ulceration of the wound; the loss of co-ordinating power in the muscles of deglutition by which the food found its way into the air tube, as well as into the œsophagus; the capillary bronchitis, due partly to the extension of original mischief to the lungs, and partly to the entrance of portions of food into the bronchial tubes; and the exhaustion from inanition, owing to the food not passing into the stomach, are all points of interest, as accidents that are liable to occur after tracheotomy, and are independent of the original disease, which rendered the operation necessary and endangered life.

It was a matter of regret that enemata of nutrient fluids were not given, but nothing could overcome the prejudices of caste, which were opposed to the proceeding. For the same reason no post-mortem examination could be obtained, and thus the opportunity of examining the state of the larynx, of the trachea and lungs, was lost, much to our disappointment; as in each of these

organs changes of importance and interest had no doubt occurred.

Case XI.

On the morning of the 14th January, 1868, I opened the trachea in a case of chronic ulceration of the larynx of some weeks' duration. The patient, a sea captain, aged about 46, a stout, muscular, and otherwise healthy-looking man, appeared to have caught cold, which was followed by loss of voice, difficulty of breathing, expectoration of muco-purulent matter tinged with blood, and pain in the throat, on pressure over the larynx. He had been under treatment for some time by means of counter-irritation, inhalation of medicated vapours, and a solution of nitrate of silver applied to the glottis with a sponge. He had also taken morphia and sulphuric ether, with temporary benefit. I had seen him twice or thrice in consultation with his own medical adviser, and on the last occasion the breathing was so much embarrassed, that we thought it better that he should be removed to the hospital, as he was in momentary peril of suffocation. At this time, he was breathing with great difficulty, sitting up in bed, each effort at inspiration being attended with a stridulous, croupy sound. His voice was almost entirely gone, and his countenance was expressive of great suffering, but as yet the face and lips were of a good colour, and his pulse was good. The paroxysms of dyspnœa were spasmodic, and at times the urgency was very great; he complained also of great muscular pain in the thorax from the constant efforts at forcible inspiration. The air entered the lungs slowly and with difficulty, and its entrance through the ulcerated and contracted glottis was attended by a stridulous, whistling sound. There were, as yet, no symptoms of bronchitis or pneumonia. The sputa were discoloured, but this was probably from the laryngeal discharge.

He was removed to the hospital on the 13th of January. He passed a restless night, and on the morning of the 14th, after consultation with my colleagues, it was decided that, as he

was in no way improved, tracheotomy should be performed, with the view of placing the ulcerated larynx at rest, and of obviating the impending danger of asphyxia, which was gradually increasing, and might, at any moment, be suddenly aggravated.

He was brought slowly under the influence of chloroform. Being a very stout and muscular man, with rather a short neck, the trachea lay very deep. Owing to its depth and to his great restlessness, even under chloroform, I had some difficulty in opening it; and during the operation he was in great urgency of breathing. One or two vessels bled very profusely, owing to the turgid state of the neck. With some difficulty I got the tube into the trachea, but after some spasmodic efforts at inspiration, he began to revive after ejecting a quantity of blood and mucus, and forcing out the tube itself more than once. From the great depth, it was very difficult to introduce this, and still more so to retain it. We succeeded, however, in securing it in its place, and in a few minutes he was breathing easily through it, and expressed himself as much relieved. He was put in a secluded part of the ward, screened off by blankets, and a kettle of boiling water was placed near him, to keep the air moist. He was closely watched, the inner tube being occasionally removed and cleansed to make sure that the opening continued patent. He was much better in the afternoon, and had lost altogether the look of agony that expressed his sufferings before the operation. He took a little nourishment, beef-tea, milk, and sago in the course of the day.

15*th*.—He is doing well, breathing easily, and is relieved from pain: pulse good. Ordered inhalation of steam and vapour of iodine, and tincture of iodine to be applied over the larynx. I should note that one or two attempts had been made at examination with the laryngoscope before the operation, but not very successfully, owing to the dyspnœa, and consequent intolerance of the instrument—enough, however, being done to ascertain that there was much inflammation and ulceration of the larynx.

16*th*.—He appears to be doing well. The tube requires con-

stant watching and attendance, for it is liable to be forced out when a collection of mucus brings on violent expiratory efforts, and the inner tube quickly becomes clogged. The depth of the wound is remarkable, the longest tracheotomy tube only just reaching the trachea. He has no fever; pulse fair; bowels have acted. The expectoration through the tube is profuse, but it is neither so bloody, nor so viscid as it was. The back of the throat and the rima glottidis were sponged with a solution of argent. nit. xxx. grs. to ʒj. this morning, and he has inhalations and fomentations frequently.

18*th*.—He is not doing so well, I fear. The mischief has extended downwards, and the trachea is inflamed. He cannot bear the tube. The trachea lies so deep, that no ordinary tracheotomy tube reaches it properly, and the end has more than once slipped out of the windpipe and remained in the wound, air escaping and entering by its side, and causing great irritation. Profuse secretion of muco-purulent matter passes from the tube. The laryngeal mischief is apparently somewhat better. Evening.—He is weak and exhausted. He could not bear the first tube, nor a longer one made on purpose, and the wound has had to be kept dilated with blunt hooks. There are symptoms of mischief both bronchial and pneumonic coming on. He has beef-tea and a moderate amount of port wine given frequently. The wound is kept open with probes or a silver spring. The breathing is becoming more hurried, and the countenance dusky, with lividity of the lips. He is getting only an imperfect supply of air, and congestive or inflammatory mischief is taking place in the bronchial tubes or lungs. There is some dulness, with bronchial *râles*, but the sounds are a good deal obscured by the noisy tracheal breathing. His pulse is small and feeble, and the skin moist, but hot. Ordered frequent stimulants with ether and ammonia.

He had been better at times, but with no permanent improvement, and he sank at last, on the 22nd, from slow asphyxia, the result of an imperfect supply of air, and of the pathological changes in the chest. During the last two days of his life, he

had been able to bear the tube, and the difficulty of breathing seemed much diminished. The pulse continued at 120, and was very feeble. He took nourishment very well during the last few days; and the day before he died he was still able to express his wishes in writing on a slate.

The post-mortem examination took place about eight hours after death. The lungs were congested, and in all stages of inflammation. The trachea was much inflamed. The wound for two days before death had a black and sloughing appearance. The opening in the trachea lay just below the cricoid cartilage, and one or two of the rings were necrosed. There was a long firm blood-clot extending down the trachea and branching off into the smaller subdivisions of the bronchial tubes, so that it was drawn out in the form of the branch of a tree. The larynx was found to be extensively ulcerated, and the cartilages and part of the hyoid bone were dead and exfoliating. The left vocal cord was entirely destroyed by ulceration, and the laryngeal sac was deeply excavated by an ulcer. The other tissues were sound. The heart was normal, and the abdominal viscera were healthy.

I measured the depth of the wound in the neck shortly before death, and found it exactly two inches from the outer edge to the tracheal opening.

Remarks.—This is a very interesting case, both in a surgical and pathological point of view. The difficulty of the operation was great, owing to the depth of the trachea in a stout muscular man, with a short neck. None of the ordinary tubes were long enough, and the greatest difficulty was experienced in keeping the opening patent. This, however, was accomplished, and for a time the patient experienced great relief. On the fifth day unfavourable symptoms began to appear, and the respiration became more difficult, with symptoms of bronchopneumonia gradually increasing. He finally sank on the ninth day after the operation. The post-mortem examination revealed extensive pneumonia and bronchitis. The wound was in a sloughing state, and a long firm blood-clot occupied the air-

tubes below the tracheal wound, extending into the finer bronchial ramifications. The rings of the trachea were also partially necrosed, where they had been divided. The original disease in the larynx was found, as recorded in the notes of the autopsy, to have been very extensive.

ON PARACENTESIS OF THE KNEE-JOINT IN THE TREATMENT OF SYNOVITIS.

Wounds communicating with the cavity of the knee-joint have always been considered extremely dangerous, as they are so frequently followed by destructive inflammatory changes which result in excision, amputation, or death. The access of air to the opened synovial membrane is regarded as the great source of danger, as it is almost certain to set up irritation, followed by inflammation. The passing into the suppurative stage, rapidly induces disorganization of the tissues that enter into the formation of the joint, and gives rise to constitutional disturbance—the precursor of surgical fever, which, if amputation be not performed, either wears out the patient by hectic and exhaustion, or destroys life more rapidly by the toxæmic changes due to osteo-myelitis or other sources of pyæmia.

Notwithstanding the danger of opening the knee-joint, it has long been resorted to as a surgical operation for the removal of foreign bodies, such as loose cartilages from its cavity; but the opening is made in a valvular form, and with every precaution to exclude the air. It has, moreover, been found necessary to prepare the patient for this operation by rest and confinement to the bed or couch, for it has been observed that when the operations were performed without taking these precautions, dangerous and even fatal inflammation has followed. Some surgeons, to avoid actually exposing the cavity of the joint to the chance of the entrance of air have effected the removal of the cartilage by a double operation. The first fixing it by a sub-cutaneous incision to the parietes of the joint,

and the second being performed after the first wound has healed, removing it altogether. In the so-called hydrops articuli of the knee, a form of chronic synovitis, the joint has been tapped, and a solution of one part of tincture of iodine and four parts of water injected, with similar results to those with which the same method of treatment has been practised in hydrocele—the excitement of a moderate and modified form of inflammation, and the consequent absorption of the fluid.

The chief source of danger, however, appears to be the access of air, or perhaps, according to more recent views, not so much of the air itself as of the organic germs that pervade it; and if this can be avoided, the risk of destructive inflammatory change is much diminished. If such be the case, the use of carbolic acid, on the antiseptic principle, seems likely to be of service, and may render a wound of the knee-joint a less formidable accident than it has hitherto been considered.

That the method of treating effusions into the joints by paracentesis and the injection of iodine is a good one we can understand from the analogy of hydrocele, and it is fortunate that this particular agent, iodine, seems to have comparatively little tendency, even when exciting severe inflammation, to cause suppuration. But still we cannot but feel that it is attended with great risk in the case of an important organ like the knee-joint, and as yet I have not ventured to test its merits. My experience, however, enables me to speak with confidence of simple paracentesis of the joint in the treatment of inflammation; and as I believe this is capable of affording great and rapid relief from pain, as well as of expediting recovery, I have no hesitation in recommending it. But it must be borne in mind that the operation is to be performed with the greatest care, and that every precaution must be taken to exclude the air. I append notes of some cases in which I have found it to be of benefit, and in which I believe not only that relief was conferred, but recovery expedited.

That the knee-joint may be opened and perfect recovery take place has been amply proved in many cases, although such

accidents, even when caused by sharp, cutting instruments, do in many cases give rise to flagrant inflammation, rapidly terminating in destruction of the joint and often of the patient. A wound of the cavity of the knee-joint must ever be regarded as an accident of the most serious character, and the prognosis a doubtful one. It is satisfactory to know that, as in the cases here recorded, recovery may occur, and the joint retain its functions. Therefore, with whatever anxiety we regard a wound of the knee-joint, we know that it is our duty in the first instance to try, by careful management, rest, and the exclusion of air, to procure union of the wound, and obviate destructive inflammation of the articular cavity. It is not less important to keep a watchful eye on the patient's condition, that we may recognise and deal with the earliest symptoms of those inflammatory changes which, beginning insidiously, are apt to extend, and end in destruction of the joint.

Case I.

S., a Hindoo female, aged 32 years, was admitted on the 24th May, 1868, with sub-acute idiopathic synovitis of the left knee, of one month's duration. Had had gonorrhœa about three years prior to admission. At the time of admission there was general fulness and swelling of the joint, with a good deal of pain, most troublesome at night. Fluctuation at the upper and outer part of the joint was distinct. The patella was quite loose, and the motion of the joint impaired; it was in a semi-flexed position. The limb was put up in a MacIntyre's splint. The bowels were opened by a dose of castor oil, quinine and iodide of potassium in five-grain doses were administered thrice daily, and a blister was applied above the upper and outer part of the joint. On the 28th the knee was tapped at its upper and outer side with a small trocar and canula, and three ounces of oil-coloured fluid let out, and the puncture sealed by gutta-percha. A day or two after the knee began to inflame,

attended by febrile disturbance. On the morning of the 31st, the knee being swollen and painful, the gutta-percha was removed, and the joint was again tapped in the same place, and six ounces of thin puriform fluid were withdrawn. The canula was kept in for a time, and the discharge allowed to drain away freely. After this opening had been made, the joint gradually improved, the discharge having diminished, and the swelling subsiding, so that the wound had healed by the 22nd of January. In the course of the treatment, the patient had a large abscess at the upper and outer part of the left thigh, and a severe attack of diarrhœa; the former was opened, and the latter was checked by astringent mixture. From the day of tapping, that is, from the 28th May, up to 1st July, 1868, daily records of the temperature and pulse were kept, the range of the former varying from 99° to 100° in the morning, to 102° in the evening, and that of the latter from 84 to 116. Internally quinine and iodide of potassium were given; subsequently astringents when she had diarrhœa, and lastly ferruginous tonics. As regards external applications, cold lotions were employed during the existence of inflammatory symptoms after tapping, and subsequently, when matter formed in the thigh, carbolic acid injection and dressing. The patient was discharged on the 15th October, much improved in health, but with the knee partially anchylosed, and some thickening about the joint.

Case II.

T. H., aged 28 years, policeman, admitted on the 24th July, 1868, for scrotal elephantiasis and double hydrocele, of five years' duration. This was removed on the 29th, and he did well after the operation, the wound cicatrizing healthily until the 16th September, when he began to complain of pain in the left knee. On the following day both knee-joints were affected, and on the 18th, collections of fluid had formed in them. Purgatives were given, tincture of iodine

was applied to the joints, and iodide of potassium was administered; and under this treatment, the left knee recovered. The right, however, remained distended with fluid, and was painful. The tincture of iodine and iodide were again resorted to. On the 30th, the swelling still remaining, and there being no fever, the right knee-joint was tapped with a small trocar and canula, and nearly four ounces of yellowish and somewhat viscid fluid were drawn off. The puncture was made valvular, and the opening having been carefully protected against the ingress of air, was closed by lint, soaked in a solution of gutta-percha in chloroform. The removal of this fluid gave great relief, and no unpleasant consequences followed. On the 4th October, it is reported that "both knees are nearly well," neither fever nor inflammatory mischief having followed. There was no re-secretion of the fluid, and the swelling did not recur. He continued to take the iodide of potassium, and for some days the knee was kept at rest. Some stiffness and weakness of the joint that remained were gradually removed by friction with camphor liniment. He was discharged cured on the 5th January, 1869. The knee had perfectly recovered in November, but he was detained until the complete cicatrization of the operation-wound had taken place.

Case III.

K. D. S., a Bengalee, aged 32 years, was admitted on the 31st January, 1868, for pain, swelling, and impaired power of motion in the right knee, of four months' duration. For the last four years he had been subject to similar attacks, for which he had undergone a variety of treatment. There was no history of syphilis. The joint was found to be distended with fluid, and was contracted. The limb was extended under chloroform, and placed on a splint, and the extension gradually maintained. Iodide of potassium was given, and blisters were applied in the vicinity of the joint. Strapping of the knee was subsequently

tried. He made a slight improvement under this method of treatment, but soon fell back again. On the 2nd May, no real progress having taken place, I tapped the knee-joint, and withdrew eight ounces of fluid of a thin, sanguinolent appearance with flakes of lymph floating in it. The opening was made valvular, and immediately closed against the access of air by lint soaked in gutta-percha and chloroform. The knee was then placed at rest on a splint, and the iodide of potassium continued. The swelling and pain were much relieved by the operation, and on the 14th he could bear his weight on the limb, which had so long been completely crippled and contracted.

Some swelling still remaining, either from re-accumulation of fluid, or some of the old not having been removed, I again, on the 26th, drew off about eight ounces more fluid just like the first. The wound was closed, and the same precautions observed as before. He was again relieved, neither pain nor inflammation following. The knee was subsequently strapped. On the 7th June he was able to walk, and bend the knee in doing so. On the 27th the strapping was removed, and camphorated oil rubbed in. On the 15th July he was discharged, able to walk and much improved in all respects. The joint was still stiff, with some thickening of the surrounding tissues.

Case IV.

K. C. M., an opium eater, aged 30 years, was admitted on the 9th April, 1869, with chronic synovitis of the right knee. The iodide of potassium with his usual quantity of opium was prescribed. On the 10th the knee was tapped, and about four ounces of viscid puriform fluid were drawn off. The wound was closed in the usual way, and the knee placed at rest on a splint. He was much relieved by the operation, and the improvement was permanent. On the 13th the joint was strapped. On the 17th he was reported as much better. On the 25th the pain

had almost entirely gone, the joint being rather stiff, but much diminished in size. He walked without much difficulty.

Case V.

A., a Mahomedan girl, aged 26, admitted with synovitis of the left knee, and also in a slighter degree of the left ankle-joint. This came on about two months ago, after an attack of fever, for which she had been treated with blisters before admission. The knee was much distended with fluid. There was little or no constitutional disturbance. On the 21st March, 1869, the day after admission, the joint was tapped on the outer side, and about eleven ounces of straw-coloured fluid drawn off. The wound was closed in the usual way, the limb placed at rest on a splint, and lead lotion applied. There was no fever in the evening, but pain came on for a short time. On the 1st April the pain and swelling had subsided. On the 4th the knee was strapped, and she has since been gradually recovering, having been somewhat thrown back by an attack of diarrhœa. She can walk fairly with the aid of a stick, and the swelling and pain in the knee are almost gone.

Case VI.

D. R., aged 24, a Bengalee peasant, was admitted on the 30th January, 1870, with the right knee-joint distended with fluid, the result of chronic synovitis, which he traces to an attack of gonorrhœal rheumatism three and a half years ago. He appears to have had an abscess at the inner side of the thigh, just above the knee-joint, for there was an open sinus which burrowed under the integument. The limb was flexed and painful, and so weak that he was unable to walk. On the 31st May the fluid was drawn off through a delicate canula, the joint having been punctured on the inner aspect. About six ounces of straw-

coloured fluid were evacuated, with immediate relief, and the puncture was hermetically sealed with gutta-percha dissolved in chloroform. Before introducing the trocar and canula the integument was drawn aside, to make the opening valvular.

Not the least constitutional disturbance followed. He had no inconvenience beyond slight pain for a day or two. There was no return of the swelling, and the fluid was not again secreted. After the puncture had healed, simple strapping was applied, and potas. iodid. given internally. He has gradually improved since, the thickening of the tissues is subsiding, he walks with ease, and can flex and extend the part without pain. There can be no doubt of the benefit in this case. He came into the hospital on the 30th January, and was under treatment for four months without receiving any material benefit until the 31st May, when the joint was tapped. He is now, 30th July, quite well. The swelling and hydrops articuli have disappeared, and the weakened limb is rapidly regaining strength with exercise.

Case VII.

G. C., a Hindoo male, aged 25 years, was admitted 11th December, 1868, with a cystic tumour, of six weeks' standing, about the size of an ordinary long plum, situated over the anterior part of the left knee, at the inner side of the patella. He was put under chloroform, and the tumour, with its thick gelatinous contents, was removed; the wound was stitched up and made air-tight by chloro-percha, the limb being placed on a splint. Immediately after the operation, the patient began to complain of pain in the part, and had fever. Soon afterwards, the whole joint inflamed (perhaps it may have been opened by a small puncture during the operation). A collection of fluid was formed at its outer and upper part. The knee was tapped by a small trocar and canula, on the 14th, and an ounce of oil-coloured fluid let out—the puncture being immediately sealed by chloro-percha. The patient did very well.

He had slight fever for the first few days after the tapping, the temperature rising to 103° and the pulse counting 124. The knee swelled again. The bowels were kept open, diaphoretics were given, and the patient was put under the influence of opium. The part was kept wet with cold lotion. All these symptoms subsided, and the swelling lessened. The knee was ultimately strapped, which lessened the swelling materially, and the patient was put on tonics. Discharged 1st February, 1869, quite cured, except slight thickening about the joint. Bends and extends the limb fairly; walks pretty well.

These cases prove that the knee-joint may be punctured without severe inflammation being a necessary result, and that if a moderate degree of synovitis should occur, it may be subdued by ordinary remedies and perfect rest. A certain amount of inflammation, indeed, seems to have the beneficial effect of so far modifying the condition of the synovial membrane as to prevent a re-secretion of the fluid. It is with this object, as in hydrocele, that tincture of iodine has been recommended, and even used by some surgeons; but I confess I should feel no little anxiety in thus interfering with so delicate and important a cavity as that of the knee-joint. I should note that, in the closing of the puncture made into the joint in these cases, gutta-percha dissolved in chloroform was used by saturating the lint applied over the spot, thus forming a protection through which no air could penetrate. The wound, if it did not immediately close, was subsequently dressed with carbolic acid in the usual way.

In chronic effusions this practice may be resorted to with impunity; but even in acute synovitis it may also be employed, and with the greatest relief, although probably with more risk.

HERNIA.

1.—*Radical Cure of Inguinal Hernia.*

Since my last report on this subject I have recorded forty-nine cases of operation for the radical cure of hernia, abstracts of which are appended. I have no reason, after further observation and experience, to doubt the efficacy of this operation; and although I have not had many opportunities of noting its results after a period of years, yet in a few I have been glad to find that success continued permanent. In some, where it failed, it evidently did so from want of the simplest care or the observance of the most ordinary precautions on the part of the patient in protecting a part which must, at the best, be regarded as weaker than natural. At present I know of two cases operated on years ago, which I have reason to believe, remain free from the protrusion.

The simplicity of the operation,* if properly performed, and the comparatively small amount of suffering it entails, are matters of importance, and it certainly, also, is comparatively free from danger. In no case have I known it prove directly fatal, as from peritonitis. Two deaths are recorded among these cases—one from erysipelas, the other from tetanus. These were just as liable to have followed any other surgical operation, and cannot be regarded as peculiarly the consequence of this.

I would remark that the object of the operation is not merely to bring the margins of the inguinal canal into apposition, but to close or occlude the internal abdominal ring, thus restraining

* *Vide* p. 44.

the contents of the abdomen altogether within that cavity. This is effected by the inflammatory products and tissue-changes induced by the presence of a plug pressed tightly, by the tension of the ligatures, against the apex of the canal and the internal ring. Unless this is effected, the hernia will again protrude—if not immediately, as soon as absorption of the new products has taken place, should they not, in cicatrizing, have closed the opening; but even if perfect closure should not occur, the opening may be so much limited as to greatly diminish the tendency to hernia, giving at all events considerable relief, and rendering the protrusion more controllable. I had an excellent opportunity of seeing that the internal opening may be thus completely closed, in the case of a young French sailor (detailed further on) who had been operated on, and who was killed some time after by a fall from a house. The preparation is now in the Medical College Museum, and it well illustrates the complete closure of the internal ring.

Of the forty-nine cases here recorded, thirty were Americans, Eurasians, or Europeans; nineteen Natives. The following results were obtained:—Europeans: doubtful, 1; relieved, 2; failed, 4 (one being direct inguinal hernia, one being femoral hernia); died of tetanus, 1—total, 8. In one operated on in 1866 the hernia came down again in 1869. In the Natives fifteen were successful, three unsuccessful; one died of erysipelas. It is to be noted that in four cases the operation for strangulated hernia had to be performed before that for the radical cure. One case of femoral hernia which proved unsuccessful, and one of direct hernia which was doubtful, might both fairly be excluded, for I do not think the operation well adapted for these forms of hernia. In one case of direct hernia in an American, the operation failed. In some cases the operation having failed, was repeated, and with success.

Case 1.—M., an English sailor, aged 35, was admitted on April 12th, 1865, with left oblique inguinal hernia. Operated on for radical cure on April 17th. The plug was removed on the 19th, and he was discharged cured on June 11th.

Case 2.—B. F., an English seaman, aged 45, was admitted on March 27th, 1865, with left direct inguinal hernia. He was operated on for radical cure on May 10th. The plug was removed on the 14th, and he was discharged cured on June 16th. The hernia was large, and the rings were probably dragged together—not anatomically direct hernia. The permanency of the cure in this case is very doubtful.

Case 3.—D. L., aged 35, a Maltese, admitted on May 16th, 1865, with right oblique inguino-scrotal hernia. He was operated on for the radical cure on the 22nd. The plug was removed on the 26th, and he was discharged cured on July 24th.

Case 4.—B., a Hindoo, aged 50, was admitted on July 12th, 1865, with right oblique inguino-scrotal hernia. Came in with symptoms of strangulation, which were relieved by ice and the taxis. He was afterwards operated on for radical cure on the 18th. The plug was removed on the 21st, and he was discharged cured on August 28th.

Case 5.—N., a Mahomedan kholassee, aged 32, was admitted on September 15th, 1865, with right oblique inguino-scrotal hernia of five years' standing. Operated on for radical cure on the 20th. The plug was removed on the 23rd, and he was discharged cured on October 18th.

Case 6.—S. C., a Hindoo coolie, aged 40, was admitted on October 11th, 1865, with right oblique inguino-scrotal hernia of three months' standing. Operated on for the radical cure on the 16th. The plug was removed on the 20th. The operation proved unsuccessful, and he was discharged on November 6th.

Case 7.—E. B., an English sailor, aged 33, was admitted on October 30th, 1865, with left oblique inguino-scrotal hernia. Came in with symptoms of strangulation, which were relieved by ice and the taxis, and then operated on for the radical cure on November 16th. The plug was removed on the 20th, and he was discharged only partially cured (the hernia protruded, but was much more controllable than before the operation) on January 27th, 1866.

Case 8.—J. B., a French sailor, aged 20, was admitted on December 28th, 1865, with right oblique inguino-scrotal hernia. Operated on for radical cure on January 1st. The plug was removed four days after the operation, and he was discharged cured on the 21st. Four months after he came in with dislocation of the right femur and injury of the head, from which he died. On post-mortem examination the internal ring was found to be entirely occluded, but the invagination had descended.

Case 9.—G., Hindoo water-bearer, aged 36, was admitted on January 5th, 1866, with right oblique inguino-scrotal hernia. Operated on for radical cure on the 6th. The plug was removed on January 9th, and he was discharged on March 16th ; but the operation proved unsuccessful.

Case 10.—D., a Mahomedan, aged 40, was admitted on January 8th, 1866, with right oblique inguino-scrotal hernia. Operated on for radical cure on the 14th. The plug was removed on January 18th, and he was discharged cured on February 14th.

Case 11.—N. M., a Mahomedan, was operated on for strangulated right oblique inguinal hernia of several months' standing on April 20th, 1866. The constriction was found at the external ring. The sac was not opened. A month later, when the wound was completely healed, the operation for radical cure was performed (May 10th). The plug was removed on the 14th, and he was discharged cured on July 25th.

Case 12.—B. M., a Hindoo sircar, aged 28, was on June 17th, 1865, operated on for right oblique inguino-scrotal hernia of four years' duration. The sac was not opened; the constriction was found at the external ring. After the wound had healed, he was operated on for radical cure on July 2nd. The plug was removed on the 6th, and he was discharged cured on July 29th.

Case 13.—C. R., an East Indian, aged 23, was admitted on July 17th, 1866, with left oblique inguino-scrotal hernia. Operated on for radical cure on the 22nd. The plug was

removed on the 26th, and he was discharged cured on the 14th of August.

Case 14.—J. D., an English engineer, aged 32, was admitted on August 8th, 1866, with left oblique inguino-scrotal hernia. He had been twice before operated on in 1859 (having previously undergone the operation for strangulated hernia in the same year) by Wütz er's method, the second of these operations proving successful. He was discharged cured, and wore a truss for six months. The hernia did not recur for four years, when it was brought down by an injury caused by his being thrown against the pommel of a saddle, in Australia. He progressed favourably after the third operation. On the 6th of August, 1866, he was tested, and appeared to be cured. A severe attack of dysentery supervened, and owing to the straining and weakness caused by this disease, the rupture recurred. On the 12th January, 1867, he was operated on for the fourth time. The plug was removed on the 15th January. The invagination came down, but the canal seemed to be closed by a mass of exudation. He was discharged cured, after being severely tested on the 15th February.

Case 15.—R. C., a Hindoo servant, aged 30, was admitted on February 27th, 1867, with left oblique inguino-scrotal hernia. Operated on for radical cure on March 5th. The plug was removed on the 8th, and he died from erysipelas on the 28th. The operation had not succeeded for the inner ring was not closed. The inner and outer rings had in this case been dragged so close to each other, that in introducing the needle during the operation, it had passed beyond the inner ring and perforated the peritoneum. There was not, however, a trace of peritonitis. A coil of intestine which lay near the ring had contracted adhesions to the peritoneal surface. I suspected, during the operation, that the peritoneum was punctured, as a quantity of serum escaped when the needle traversed the abdominal wall.

Case 16.—M. G., an English sailor, aged 41, was admitted on March 4th, 1867, with right oblique inguinal hernia. Ope-

ration for radical cure on the 15th, and the plug removed on the 19th. The operation proved unsuccessful, and he was discharged April 14th.

Case 17.—H. C., an English sailor, was admitted on May 14th, 1867, with left oblique inguino-scrotal hernia. Operated on for radical cure on the 15th. The plug was removed on the 19th, and he was discharged cured April 22nd.

Case 18.—G. K., a Hindoo weaver, aged 41, was admitted on June 2nd, 1867, with right oblique inguino-scrotal hernia. He was operated on before for radical cure December 29th, 1866, without success. He underwent a second operation on June 15th. The plug was removed on the 19th, and he was discharged cured July 14th.

Case 19.—W. S., an English sailor, aged 32, was admitted on January 16th, 1867, with right oblique inguinal hernia. He was operated on for radical cure on the 21st. The plug was removed on the 25th, and he was discharged cured July 4th. In 1869 the hernia returned after great physical exertion. During the intervening time he had led an active life as a railway *employé*.

Case 20.—M. A., a Mahomedan steward, aged 22, was admitted on September 1st, 1867, for right oblique inguinal hernia, and was operated on for radical cure on the 3rd. The plug was removed on the 7th, and he was discharged cured October 24th.

Case 21.—D. C., an Englishman, aged 32, was admitted on September 2nd, 1867, for right oblique inguino-scrotal hernia, and was operated on for radical cure November 23rd. The plug was removed on the 26th, and he was discharged cured February 7th, 1868.

Case 22.—W. W., a Scotch sailor, aged 52, was admitted on January 24th, 1868, with right oblique inguinal hernia. He was operated on for radical cure on the 27th. The plug was removed on the 31st, and he was discharged cured the 23rd of March.

Case 23.—T. P., an American, aged 22, was admitted on

January 22nd, 1868, for left direct inguinal hernia, and was operated on for radical cure on February 18th. The plug was removed on the 22nd, and he was discharged April 16th, the operation having proved unsuccessful.

Case 24.—J. W., an English sailor, aged 48, was admitted on February 14th, 1868, with left oblique inguinal hernia. He was operated on for radical cure on the 25th. The plug was removed on the 29th, and he was discharged cured April 6th.

Case 25.—J. C., an English fireman, aged 32, was admitted on February 14th, 1868, with right oblique inguino-scrotal hernia. He was operated on for radical cure on March 18th. The plug was removed on the 23rd, and he was discharged cured May 23rd.

Case 26.—H. M., an English sailor, aged 20, was admitted March 18th, with right oblique inguino-scrotal hernia. He was operated on for radical cure on May 13th. The plug was removed on the 16th, and he was discharged cured June 22nd. He had been operated on once before in another hospital.

Case 27.—J. P. N., an Irish clerk, aged 40, was admitted on April 18th, 1868, with right femoral hernia. He was operated on for radical cure on May 21st, and the plug was removed on the 26th. The operation proved unsuccessful, and he was discharged July 18th.

Case 28.—H. W., an English cook, aged 28, was admitted on May 29th, 1868, with left inguino-scrotal hernia, and was operated on for radical cure on the 30th. The plug was removed on June 4th, and he was discharged cured August 23rd.

Case 29.—J. M., a Scotch seaman, aged 39, was admitted on May 29th, 1868, with left oblique inguino-scrotal hernia. He was operated on for radical cure on May 30th. The plug was removed on June 4th, and he was discharged cured July 2nd.

Case 30.—W. D., a Scotch carpenter, was admitted on June

24th, 1868, with right oblique inguinal hernia. He was operated on for radical cure on July 14th. The plug was removed on the 18th, and he was discharged relieved August 3rd.

Case 31.—N. K., a Hindoo priest, aged 34, was admitted on July 29th, 1868, with left oblique inguino-scrotal hernia. He was operated on for radical cure the same day. The plug was removed on August 2nd, and he was discharged September 14th.

Case 32.—A., a Mahomedan moonshee, was admitted on July 19th, 1868, with left oblique inguino-scrotal hernia. He was operated on for radical cure on August 25th. The plug was removed on the 29th, and he was discharged cured November 29th. He had been operated on for strangulated hernia immediately after admission. The sac was not opened. The stricture was found at the external ring.

Case 33.—C. S., a Dutchman, aged 43, was admitted on August 29th, 1868, with left oblique inguinal hernia. He was operated on for radical cure on October 2nd. The plug was removed on the 6th; he died of traumatic tetanus on the 12th.

Case 34.—J. B., a Scotch clerk, aged 33, was admitted on January 2nd, 1869, with right oblique inguinal-scrotal hernia. He was operated on for radical cure on March 22nd. The plug was removed on the 26th, and he was discharged cured April 29th.

Case 35.—D., a Hindoo farmer, aged 17, was admitted on March 20th, 1869, with left oblique inguinal hernia. He was operated on for radical cure on the 22nd, and the plug was removed on the 26th. He was discharged cured April 29th.

Case 36.—J. F., an English cook, was admitted on August 15th, 1869, with right oblique inguino-scrotal hernia. He had been operated on by Wütz er's method, which failed. He was operated on for radical cure on the 19th. The plug was removed on the ninth day, and he was discharged cured September 2nd.

Case 37.—E. J. G., an English seaman, aged 40, was

admitted on August 25th, 1869, with right oblique inguino-scrotal hernia. He said he had been operated on before. The operation for radical cure was performed for the third time on this day. The plug was removed on the 29th, and he was discharged cured November 16th.

Case 38.—S., a Hindoo, aged 45, was admitted on September 20th, 1869, with right oblique inguino-scrotal hernia. He was operated on for radical cure on the 24th. The plug was removed on the 29th, and he was discharged cured October 26th.

Case 39.—E. C., an English sailor, was admitted on September 29th, 1869, with left oblique inguino-scrotal hernia. He was operated on for radical cure on October 4th. The plug was removed on the 8th, and he was discharged cured on the 27th.

Case 40.—J. C., an English sailor, aged 25, was admitted on December 10th, 1869, with right oblique inguinal hernia. He was operated on for radical cure on the 16th, and the plug was removed on the 20th. He was discharged cured March 15th.

Case 41.—J. D., an English sailor, aged 32, was admitted on December 18th, 1869, with right oblique inguinal hernia. He was operated on for radical cure on January 15th. The plug was removed on the 20th, and he was discharged cured February 22nd.

Case 42.—K., a Hindoo shopkeeper, aged 24, was admitted on January 21st, 1870, with left oblique inguino-scrotal hernia. He was operated on for radical cure on February 3rd. The plug was removed on the 8th, and he was discharged cured March 15th.

Case 43.—W. S., an East Indian clerk, aged 28, was admitted February 15th, 1870, with right oblique inguinal hernia. He was operated on for radical cure the same day, and the plug was removed on the 18th. He was discharged cured March 20th.

Case 44.—J. T., an Englishman, aged 27, was admitted on

February 16th, 1870, with right oblique inguinal hernia. He had been operated on with the plug once before. Wood's operation was performed on the 17th. The wires were removed on the 24th, and he was discharged cured April 29th.

Case 45.—C. K., an American guard, aged 30, was admitted on November 11th, 1870, with right oblique inguino-scrotal hernia, and was operated on for radical cure on the 15th. The plug was removed on the 19th, and he was discharged cured December 18th.

Case 46.—N., a Hindoo farmer, aged 20, was admitted on October 14th, 1870, with left oblique inguino-scrotal hernia. He was operated on for strangulated hernia on the 15th. The sac was not opened, and the constriction was found at the external ring. After the wound had healed he was operated on for radical cure on November 15th. The plug was removed on the 19th, and he was discharged cured December 14th.

Case 47.—S. N., a Hindoo, aged 40, was admitted on January 12th, 1871, with right oblique inguino-scrotal hernia. He was operated on for radical cure on the 21st. The plug was removed on the 24th, and he was discharged cured February 22nd.

Case 48.—E. B., a Welsh sailor, aged 27, was admitted on July 15th, 1871, with right oblique inguinal hernia. He was operated on for radical cure the same day. The plug was removed on the 20th, and he was discharged cured August 12th.

Case 49.—H. M. A., a Moullah, was admitted on August 9th, 1871, with right oblique inguino-scrotal hernia. He was operated on for radical cure on the 18th. The plug was removed on the 22nd. He was discharged cured in September.

I should remark that the cases returned as "cured," were well tested before being discharged from the hospital, and so recorded. Of the ultimate results I am unable to say much, as so few patients return to tell us how they have been after the operation. I have recently, however, seen a patient, employed on the railway, an Englishman, upon whom I operated four years ago, who continues perfectly well.

The case of Mr. C., which has been omitted in the foregoing record, furnishes an instance of the most rapid recovery attending the operation that I have known. He was 43 years of age, muscular although slight, and in good health. He was operated upon for a small reducible hernia of the right side on the 17th of February. The plug was removed on the 21st, and on the 3rd of March he was, to all appearance, cured; fifteen days only having elapsed since the operation.

The two following cases have occurred since the above record was drawn up :—

1. W. C., aged 24, a Hindoo carpenter, was admitted on the 5th January, 1872, with right oblique inguino-scrotal hernia, of two years' duration. He came in with symptoms of strangulation, but the hernia was reduced by taxis under chloroform. On the next day the operation for radical cure was performed. The plugs were removed on the 10th, when the wounds were found well suppurated, and he was discharged on the 30th January, 1872, with the hernia well supported above the external ring.

2. H. P. R., an Englishman, aged 46, was admitted on the 2nd February, 1872, with right reducible oblique inguino-scrotal hernia of four years' duration. He had been twice operated on before by Wood's method, while under the treatment of Professor Partridge. Both these operations proved unsuccessful. He was operated on for the third time on the 4th February, 1872. The plugs were removed on the 6th March, and he is doing well under treatment.

I have operated on two cases of inguinal hernia by the method recommended by an American surgeon, Dr. Chisholm. The operation is very simple, and its success is dependent on the assumption that metallic wires will lie quiescent in the tissues, without causing suppuration. The operation was performed as follows :—The integument of the scrotum was invaginated with the finger into the inguinal canal. A curved needle with its eye near the point was then introduced on the finger into the

canal, and made to perforate the internal pillar. It was next threaded with a silver wire, and withdrawn sufficiently to enable me to pass the point through the external pillar. The point of the needle was made to emerge through the same opening in the integument, by dragging the skin over the point of the needle. The loop of the wire was then tightened, traction being made on the scrotum, so as to draw it down, leaving only the scrotal fascia invaginated, so that the pillars of the ring were drawn together. The wire being twisted was cut short off, and allowed to retire within the puncture.

This had the effect in both cases of restraining the hernia, in one case only temporarily, in the other apparently permanently; but instead of the parts remaining quiescent and free from irritation, in each case most profuse suppuration was excited, which continued for days, and much exhausted the patients. In one case, the hernia came down, and the patient was operated on with the plug. In the other, a large amount of exudation was induced, and apparently closed the opening. But in neither case did the operation succeed, and it is a fallacy to suppose that wires will not induce suppuration.

Post-mortem Examination in a case of Radical Cure of Hernia.

I have not yet met with any account of the post-mortem appearances in a case where a successful operation for the radical cure of inguinal hernia has been performed, nor am I aware that there is any such case on record. Having had the opportunity of examining the body of a man who died from the results of an accident three months and seven days after undergoing this operation, I made a careful examination of the parts, and have the satisfaction of recording the evidence of complete success:—

J. B., aged 20, a very healthy French sailor, of short stature but extraordinary muscular development and power, was admitted on the 28th December, 1865, with an inguinal hernia

on the right side. It descended into the scrotum when he stood up or made any effort. He said that the hernia was caused by lifting a heavy spar on board ship about a month prior to admission. When he was engaged in raising the spar, he experienced a sensation of something having giving way. A tumour appeared in the site of the rupture, which subsided and reappeared. The erect posture, or the exertion of walking, invariably caused the descent of the gut into the scrotum.

On January 1st, 1866, the operation for the radical cure of inguinal hernia was performed with the wooden plug and ligatures. On the 4th, at 8 a.m., free suppuration having occurred, the plug was withdrawn. There was no constitutional disturbance, and on the 16th it was reported that he was in all respects doing well. The wound had nearly healed, and, with a pad and spica bandage applied, he was able to walk about. The invagination, up to this period, had remained firmly in the canal. On the 24th he was put to a variety of tests, such as lifting weights, jumping, climbing up a pole, but the hernia did not return. On the 29th he was discharged, apparently cured, after remaining under treatment for about twenty-nine days.

I lost sight of him from this date, but meeting him in the street, some time after his discharge from the hospital, he said that he was quite cured, and free from any signs of rupture.

On April 27th, almost three months after his leaving the hospital, he was readmitted in a state of drunkenness, and much injured by a fall from the roof of a house. He had fractured the left angle of the lower jaw, and frightfully bruised his head, face, and body generally. The right femur was dislocated into the ischiatic notch, and the gluteal region, as well as the whole of the limb, was much contused and swollen. I observed at the time, in his condition of semi-consciousness, when struggling from pain and restlessness, that the hernia did not protrude. There was no trace of the invagination

left. A small cicatrix in the abdominal wall, and another in the scrotum, were the sole indications of the passage of the needle.

I reduced the hip dislocation. It was evident that there had been much laceration and injury of the soft parts, for the head of the bone could not be retained in position. Pyæmic symptoms set in, and a large abscess formed at the anterior and upper part of the chest. The gluteal region, thigh, and leg passed into a state of diffused suppuration, and the whole limb became infiltrated with pus. Pyæmia was rapidly developed, and he expired on the night of May 7th.

Post-mortem examination eight hours after death revealed extensive mischief. The limb, pelvis, hip-joint, and thorax were more or less infiltrated with pus. The head of the femur was dislocated from the acetabulum, the muscles and ligaments being much lacerated. The left angle of the lower jaw was fractured. On opening the head, a clot as large as a hazelnut was found in the grey matter of the superior and posterior portion of the right cerebral hemisphere. As there was no contusion over the site of this clot, it was conjectured that it might have resulted from *contrecoup*. I carefully examined the seat of the former hernia, and of the operation by which it had been cured, and the result was most satisfactory; for it was clearly shown that the cure had been radical and complete. On the integument of the abdominal wall, just over the internal ring, there was a small, slightly depressed, but perfect, and quite movable cicatrix. This indicated the point where the needle had emerged and the ligatures had been tied. There was a similar cicatrix on the scrotum, indicating the spot at which the invagination had been formed and the needle entered. It is to be noted that no trace of the invagination remained. On reflecting the integument, there was some slight adhesion and thickening of the areolar tissue and fascia where the needle had passed. The layers of fascia covering the inguinal canal were found to be strong and well developed and

slightly thickened at this point. The external abdominal ring was tolerably well defined; the cord was covered by a strongly-developed intercolumnar fascia and cremaster, blending with the remains of the hernial sac; the cord and testicle were perfectly healthy; the margins of the external abdominal ring were perhaps not quite so clearly defined as in the natural state. On slitting up the inguinal canal towards the point of the hip, the tendon was found to be adherent to the internal oblique at a point corresponding to the track of the needle; the lower margin of the internal oblique and transversalis muscles were universally adherent to Poupart's ligament, and the cord seemed rather to pass through than under them; the connections of the cremaster with these muscles appeared more distinct than usual. On turning down the abdominal wall to examine the internal ring from the inside, the usual depression was observed well marked; the peritoneum around the ring was thickened and firmly attached, sending a prolongation or infundibuliform process through it, which became blended with the cord. Doubtless this was the remains of the hernial sac. The opening was hermetically closed by firm and strong fibrinous bands of adhesion, which crossed it and became blended with the transversalis fascia. This was very strong; in short, the closure of the internal ring was so perfect that it was completely protected against the passage of anything through it. The testicle and the component parts of the cord had not sustained any damage; the epigastric artery was also uninjured.

Remarks.—The appearances in this case prove that it is not necessarily to the invagination that we must look for the occlusion of the peritoneal opening, but rather to changes in and about the aperture itself, or in the parts which pass through it. The internal abdominal ring was found to be completely closed by the organization of exudation, and by the consequent fusion of this with the peritoneum, transversalis fascia, and cord, into a comparatively dense tissue, which not only occluded the opening, but rendered it more firm and unyielding than in the natural state. It was certainly re-

markable how little the relative position and appearance of the parts were otherwise altered. Not a trace of invagination remained, and beyond the complete occlusion of the internal abdominal ring, and the prolongation of the peritoneum in the form of an infundibuliform process into the inguinal canal, where it terminated and became blended with the tissues of the cord near the external ring, there was little or nothing to mark any difference from the natural condition of the parts. It is evident that the needle, in perforating the abdominal wall from the apex of the invagination, must have passed through, or underneath, the margin of the internal ring, and that in all probability the peritoneal sac was perforated, unless indeed this had been pushed aside by the invagination. Be that as it may, the result was the formation of adhesions which so effectually closed the ring as to render a recurrence of hernia well nigh impossible. The history of the poor fellow's case proves that this was really the fact, for he was exposed to all possible causes that might have brought back the hernia had the cure not been completely accomplished. He lived a life of uninterrupted debauchery, and exposed to every kind of privation. He wore no truss, though provided with one on leaving the hospital. He fell from a house, and neither the muscular exertion consequent upon this, nor his struggles during intoxication, and the subsequent suffering he underwent, caused a recurrence of the hernia. I observed on his readmission that though he rolled about and struggled much in bed, there was not the slightest tendency to its return; and when he recovered from the intoxication his constant request was that I would cure him of this accident as thoroughly as I had done of the hernia. It is evident from this case that an essential condition of success is to invaginate the portion of scrotum so effectually that when the needle perforates the abdominal wall it shall pass close to the internal abdominal ring. As noted, the internal epigastric artery seems to have escaped, notwithstanding the proximity of the needle to it; and I think that even if it had been wounded there would not have been much

additional danger, as the immediate tightening of the ligature would have the effect of preventing hæmorrhage.

Radical Cure of Inguinal Hernia in a Child.

A Hindoo boy, named S. S., aged 3½ years, was admitted on April 25th, 1867, with a scrotal hernia on the left side, which was probably congenital. The tumour was as large as an orange, and protruded directly the child stood up or cried. The external ring was large enough to admit the forefinger, and the hernia was easily reduced when the child was not crying. The father, who accompanied him, was a common peasant, and unable to give any satisfactory history of the case. The child was very small for its age, but healthy.

On April 30th I operated by introducing a wooden plug, thus invaginating the scrotum into the inguinal canal. This was secured by two silk ligatures, which were introduced separately, perforating the abdominal wall near the internal ring a little apart, but emerging through the same aperture in the integument. They were firmly knotted over a small piece of wood, thus securing the plug, to the apex of which they were attached, firmly in the inguinal canal, the end of the plug pressing against the internal ring. The operation was performed under the influence of chloroform, as without this it was impossible to keep the child quiet. As the needle perforated the abdominal wall, a quantity of clear fluid escaped, showing that the peritoneum had probably been punctured, as there was no hydrocele. The child was feverish and restless on the following two days; on the third day slight erysipelas of the integument of the abdomen set in, and I removed the plug by cutting the ligatures. A quantity of pus, confined by the outer piece of wood, around which the ligatures were knotted, made its escape. The wound being sponged, a pad and spica bandage were applied. The erysipelatous blush was painted with a solution of nitrate of silver; an aperient, and then some quinine and iron, were administered.

May 5th.—The child is doing well; erysipelas gone; free suppuration. The opening appears to be perfectly occluded, for when he cries no hernia protrudes, and the inguinal canal is filled with a dense cord.

12*th.*—Discharge has nearly ceased; wound cicatrizing. The hernia does not come down, though the child cries vigorously.

20*th.*—The child is quite well; the wound healed. The hernia does not descend, although he runs about the ward without any support, and cries loudly when he is examined. The opening through which the hernia protruded appears to be perfectly closed. The child is in excellent health, and about to be removed by the father, who is anxious to go home, much pleased with the result.

Remarks.—This is the first case in which I have operated on an infant, and I do not know what the experience of other surgeons has been in similar cases. It appears to prove satisfactorily that the hernia may be radically cured, for in this case there were many difficulties in the way, but still it was accomplished. The constant struggling and crying of the patient were very trying, and amply tested the firmness of the barrier set up against the protrusion. In the case of this peasant child it offered the only probability of curing the disease, for it was in the last degree improbable that trusses could either have been procured or worn in the remote village whence he was brought to Calcutta.

2.—*Strangulated Hernia in Bengal.*

I have already* recorded my views on this affection as seen in the natives of Bengal, particularly with reference to the necessity for early operation when the symptoms of strangulation have become marked. I gave a brief history of certain cases in which I found it necessary to operate, and which tended to confirm the opinion I have expressed. I now resume the

* "Clinical Surgery in India," p. 432.

subject by recording the history of other cases of strangulated hernia, some of which still further confirm the conclusions I have come to.

Strangulated hernia, in the natives of Calcutta, is very amenable to treatment if dealt with early. It is, in my opinion, not desirable to delay operating after the usual manipulative measures have failed to effect reduction. The danger then increases rapidly and insidiously. Gangrene sets in without any very demonstrative symptoms, and the patient is lost. It is better to operate early, and as the seat of obstruction is generally at the tendinous opening of the outer ring, the operation is comparatively simple and free from danger, as the sac is not interfered with, and the abdominal peritoneum is not disturbed.

Case 1.—R. S., a Hindoo, aged 56 years, shopkeeper, was admitted on July 29th, 1864, with symptoms of strangulated hernia. He had been the subject of scrotal hernia for six years, and the symptoms of strangulation, which had made their appearance twenty-four hours prior to admission, had come on shortly after the last descent of the hernia. He was admitted at 8 a.m. with all the symptoms of strangulation, such as vomiting, constipation, pain in the tumour and umbilical region, restlessness, rapid and feeble pulse. The taxis was tried under chloroform without success. As no time was to be lost, the operation was performed at once. The stricture was found to be at the external ring, and was divided; the sac was not opened. The hernia was not, however, reduced within the abdomen, as it resisted the attempts that were made. The symptoms abated considerably immediately after the operation, but rapidly returned, and it became evident that there was still mischief progressing in the sac, which was accordingly opened. The hernia was found to consist of omentum and small intestine, which was grangrenous. The patient sank and died the same evening from exhaustion. In this case the operation was performed too late to save life. The gangrene had supervened on the strangulation very insidiously, and without any very marked indication of its approach. The hernia was rather

large, and the stricture was at the external abdominal ring; the sac was therefore not opened at first, as it was hoped that by this division of the stricture at the ring the symptoms would be relieved, and that the contents, if not adherent, would spontaneously return within the abdomen when the congestion caused by the stricture was removed. Moreover, as in old and large inguinal herniæ the difficulty generally is found external to the peritoneum, the sac was not opened until the symptoms indicated the necessity. On being opened the condition I have described was revealed, and death rapidly followed. The gangrene, no doubt, had commenced before the first operation was performed. The hernial protrusion was found to have contracted recent adhesions within the sac, which itself was irreducible; hence the non-return of the tumour within the abdomen when the stricture was divided. Had the stricture at the inguinal ring been divided earlier, the patient would probably have recovered. The twenty-four hours' delay in bringing him to the hospital proved fatal.

Case 2.—I. D., a Hindoo shopkeeper, aged 44 years, was admitted on December 18th, 1864, with symptoms of strangulated inguinal hernia of the right side. The hernia was of ten years' duration. The time of its last descent was not clearly made out. The symptoms of strangulation made their appearance only two hours before admission. The taxis having failed under chloroform, the operation was performed, and the stricture being divided at the external ring, the tumour was reduced without opening the sac. He recovered rapidly, and on January 9th, the wound having healed, I performed the operation with the needle, ligatures and plug for the radical cure. The plug was removed on the fourth day, and he rapidly recovered from the second operation; but this did not prove a complete success, for the hernia again protruded, though as a much smaller tumour than before strangulation. He was discharged wearing a truss, which completely controlled the hernia, on February 8th.

Case 3.—C. A., an East Indian clerk, aged 60 years, was

admitted September 25th, 1865, at 7 p.m., with symptoms of strangulated hernia. The tumour was small, and the constitutional symptoms were not very marked. He had been the subject of inguinal hernia of the right side for nine years. The symptoms of strangulation had set in about two hours before admission. The patient was closely watched, and the usual attempts were made by the application of ice, and the taxis under chloroform, to reduce the hernia, but without success. The symptoms becoming aggravated, the operation was performed, and the stricture was found and divided at the external ring. The hernia was then reduced without difficulty, the sac not being opened. He recovered rapidly without any unfavourable symptom, and was discharged cured October 22nd.

Case 4.—M. J., a Mahomedan servant, aged 40 years, was admitted on February 9th, 1866, at 5.30 p.m., with urgent symptoms of strangulated hernia of the left side. He appears to have suffered from hernia since infancy. The symptoms of strangulation set in at 7 a.m. of the 9th. The operation was performed soon after admission, and the sac was opened. The hernia, however, still proved irreducible. The intestine was drawn out and exposed, and also a portion of the omentum, which formed the tumour; and on examination it was found that a considerable portion of the intestine was already gangrenous. This portion was not returned within the abdomen. The patient sank and died at 11 p.m. of the same day.

In this case the hernia was large, and the ring much stretched, yet symptoms of strangulation set in very early, and proved rapidly fatal. The mischief was said to have commenced at 7 a.m. He was brought to hospital at 5.30 p.m. of the same day, and the operation was performed as soon as I reached the hospital, which was before 9 p.m. The stricture in this case was not only at the external ring, but in the neck of the sac. On dividing these, a large mass of congested small intestine and omentum was found, a considerable portion of the gut having already passed into a state of gangrene. As might be expected, death resulted very shortly. In this case, had the man been

brought to the hospital in the morning and the operation performed without delay, life might have been saved. The fatal condition of gangrene supervened almost before his friends became aware that he was in danger.

Case 5.—S. D., a Hindoo shopkeeper, aged 50 years, admitted February 25th, 1866, at 11 p.m., with symptoms of strangulated hernia of the left side. He had suffered from hernia for many years. Strangulation commenced at about 6 p.m. The usual attempts at reduction having failed, the operation was performed immediately—that is, very shortly after admission. The stricture was found and divided at the external ring, and the tumour reduced without difficulty and without opening the sac. The patient gradually sank and died four hours after the operation. On examination, it was found that a portion of the scrotum, and also of the small intestine, were in an incipient state of gangrene.

This is also an example of rapid supervention of gangrene in a large hernia. The symptoms of strangulation came on only five hours before admission. On finding the ordinary measures for reduction unavailing, no time was lost in performing the operation, but it was too late to save life. The patient sank within four hours after the operation.

Case 6.—B. M., a Hindoo sircar, aged 28 years, admitted June 17th, 1866, at 4 p.m., with symptoms of strangulation of an inguinal hernia in the right side. The hernia was of four years' duration. The usual measures for reduction having failed, the operation was performed at 10 p.m. The stricture was at the external ring, and, being divided, the hernia was easily returned without opening the sac. He did well, and on July 2nd, the wound having healed, I performed the operation for the radical cure. The plug was removed on the fourth day, and the patient rapidly recovered, and was discharged apparently cured on July 19th.

In this case, as in the second, the result was very satisfactory. The strangulation was removed and the hernia subsequently radically cured by a second operation.

Case 7.—J. R., a Hindoo typefounder, aged 34 years, admitted September 17th, 1866, at 6 p.m., with strangulated inguinal hernia of the right side, the hernia being of four years' standing. Symptoms of strangulation had commenced at 3 p.m. of the same day. He was vomiting, was restless, and had a barely perceptible pulse, with great pain in the tumour and umbilical region. Stimulants were given, and when he had somewhat rallied the operation was at once performed, delay being evidently dangerous. The stricture was divided at the external ring, and the hernia then reduced without difficulty. It evidently consisted chiefly of omentum. He recovered rapidly without a bad symptom, and was discharged cured on November 18th, 1866.

This was a good example of the advantage of early operation. He was apparently sinking within three hours after strangulation commenced. Although the hernia was of considerable size, the symptoms were relieved immediately by the operation, and he recovered rapidly.

Case 8.—C. C. G., a Hindoo male, aged 30 years, a shopkeeper, admitted 22nd June, 1866, with strangulated inguinal hernia of the sight side; hernia of eight months' standing, and strangulation of two days. Taxis applied, but without success. Operation performed, and stricture at the external abdominal ring divided. The tumour was reduced without opening the sac. Patient discharged 15th July, apparently cured.

Case 9.—N., a Mahomedan male, aged 35 years, a butcher, admitted 20th April, 1866, at 7 a.m., with strangulated inguinal hernia of the right side; hernia of seven months' duration, strangulated on the evening of the 19th. Operation performed immediately; stricture at the external ring divided, hernia reduced, sac not opened. Vas deferens lay in front of the neck of the sac. On the 10th May, when the wound had healed, the operation for the radical cure performed. Patient discharged 1st June, apparently cured.

Case 10.—K. C. D., a Hindoo gwallah, aged 40 years, was admitted with right inguinal hernia on February 8th, 1867.

The hernia was of one year's duration. It has been down in the scrotum, and symptoms of obstruction, passing into those of strangulation, have been present for five days; but, as they were not severe until to-day the friends, as usual, delayed bringing him to the hospital. The usual measures—enemata, hot baths, taxis with chloroform, and ice to the tumour—having failed, and the symptoms of strangulation becoming urgent, the operation was performed, and the stricture divided at the external ring without opening the sac. The patient did well, and was discharged on March 6th.

In this case the hernia was of considerable size, and the stricture at the external ring had very gradually induced the condition of strangulation. It was not until the symptoms became urgent that the friends brought the patient to the hospital, but fortunately before gangrene had set in. The relief afforded by the operation was immediate, and the patient recovered rapidly.

Case 11.—G. S., a Hindoo durwan, aged 40 years, admitted on February 18th, 1867, with right inguinal hernia in a state of strangulation. The hernial tumour was the size of an orange, and of about four years' duration. The symptoms of strangulation had set in about twenty hours before admission. He was in a very depressed state, with pulse hardly perceptible. He had vomited several times. The taxis was tried under chloroform, but without success, and the operation was at once performed. There was an enlarged inguinal gland on the outer and lower side of the tumour, with the further complication of hydrocele and enlarged testicle so common among the natives of India. The stricture was at the external ring, and was readily divided, and the hernia reduced. The sac appeared perfectly healthy, and was not opened. His pulse improved under the chloroform, and he was much easier after the operation. I was rather surprised to hear at 3 p.m. (the operation was performed at about 9 a.m.) that he had died three hours afterwards. The friends removed the body, so that I had no opportunity of ascertaining the exact amount of disease. Gangrene

may have occurred, but it appeared probable that, being a feeble man, death took place from exhaustion before the gangrenous condition had been thoroughly developed. In this case the delay in bringing the patient for treatment proved fatal. I have no doubt that if the stricture had been divided some hours earlier he might have recovered.

Case 12.—A. H., a Mahomedan moonshee, aged 42 years, a slight, rather delicate-looking man, was admitted on July 19th, 1868, with symptoms of strangulated inguinal hernia of the left side. The hernia was of five years' standing. The symptoms of strangulation set in at 5 p.m. of July 19th, and, all the usual measures for reducing it having failed, the operation was performed at 10.30 p.m. of the same day. The stricture was divided at the external ring; the sac was not opened, and the tumour, which was of considerable size, and distended the whole scrotum, was reduced without difficulty, and the symptoms were rapidly relieved. He had been brought in a native carriage from a distance of six miles, and was much exhausted by fatigue, heat, and pain when he reached the hospital. The pulse was barely perceptible; extremities cold, with cold sweats over the surface of the body, and extreme restlessness. He improved under the influence of chloroform, and soon began to rally after the operation. He did well afterwards, and on September 25th, the herniotomy wound having healed, the operation for the radical cure of the hernia was performed. The plug was removed on the fourth day. He was discharged apparently cured on November 28th, having been put to all the usual tests of carrying weights, &c. &c.

Case 13.—B. R., a Hindoo servant, aged 40 years, was admitted September 11th, 1868, with symptoms of strangulated inguinal hernia of the right side. He had the hernia for five years. It began to show symptoms of strangulation on September 9th, but he was not brought to the hospital until the 11th, when, the symptoms being very urgent, the operation was performed without delay at 9 a.m. In this case the tumour was very small, not larger than a pigeon's egg. The stricture

was at the neck of the sac, which was laid open and the constriction removed. The sac itself, as well as the gut, which were glued together by the products of inflammation, were partly gangrenous. The small intestine protruded in a knuckle of about two inches in length. This was opened and left in the wound. The gangrenous portion of the sac having been removed, the gut was secured to the wound, and an artificial anus formed, out of which fæcal matter passed freely. The patient partially rallied, but soon after sank, and died at 7.30 of the same day. The abdominal cavity was opened after death, and the intestines were found to be greatly distended. A low form of peritonitis had invaded the peritoneal cavity, which contained a quantity of puriform fluid. A portion of the ileum and omentum were gangrenous. The hernia was a direct one.

This was a case of direct inguinal hernia of five years' duration, and not of large size. The symptoms of strangulation supervened, and gangrene must have occurred very rapidly. In this case the stricture was in the sac, which was laid open, and disclosed the disorganized condition of both sac and its contents. Much valuable time was lost, and he was not brought to the hospital until it was too late. The severe symptoms appear to have set in rapidly at last, and had gone too far to leave much hope even from the operation.

Case 14.—On September 19th, 1867, at midnight, I was requested to see a native gentleman, Baboo R. L., aged 70, who was suffering from strangulated inguinal hernia. The patient, though aged, was vigorous and healthy. He had been the subject of right scrotal hernia for several years, which had frequently been temporarily incarcerated, but never hitherto strangulated. On the morning of the 19th, the hernia came down. He was unable to reduce it, and it soon began to give him pain. When I saw him at midnight he was restless and in pain. The signs of strangulation were all present. The tumour was not larger than a large orange; it was painful, tense, and irreducible. Ice had been applied, the taxis under chloroform tried, as also warm baths, and all the usual

measures applicable in such cases, but without success. His pulse, however, was good, and there was little sickness, and the umbilical pain was not severe. I made a long and careful attempt to reduce the hernia under chloroform. Enemata of tepid water and oil were also ordered, and the continued application of ice. I directed that if any unfavourable change occurred I should be at once informed. At 4.30 a.m. I saw him again. The enemata had brought away a quantity of fæcal matter; but he was no better, the tumour being as tense and painful as ever. He was weak, and his pulse was getting more feeble. There was hiccough and desire to vomit. The tumour was intensely painful at its neck, and the abdomen generally tender. One more attempt was made at the taxis, but without success. I therefore proceeded to operate, and for this purpose he was taken out on to the terrace roof, as the room in which he lay was small and hot. Having put him under the influence of chloroform, I commenced the operation in the open air, the starlight and a few candles illuminating the work. In dividing the integument, a large vein bled freely, and was ligatured to prevent the blood from filling the wound. The stricture was at the external ring; it was divided, and the tumour easily reduced without opening the sac. The wound healed rapidly, and he had perfectly recovered on October 3rd.

This was a case of old scrotal hernia, though not of great size. Hitherto reducible, it had become incarcerated, and symptoms of strangulation set in. I saw him early, and had the opportunity of watching him, so that no important change could take place without my knowledge. When it became obvious that the hernia could not be reduced, I operated with the best results. The stricture was at the external ring.

Case 15.—On the night of June 2nd, 1868, I was summoned to a case of strangulated inguinal hernia in a native merchant residing in the Burra Bazaar. I found a very stout, healthy-looking, old Hindoo gentleman, with an oblique inguino-scrotal hernia of the right side, complicated with hypertrophy of the scrotum and enlarged testicle. The hernia had been down for

some hours since morning, and the symptoms of obstruction, which had been distressing, were now changing to those of strangulation, and were very urgent. I could get no very satisfactory information about the history of the case, but that strangulation was rapidly progressing there could be no doubt. The bowels were confined, the abdomen tense and painful, especially at the umbilicus and over the neck of the hernia at the external ring, which could be felt tense and hard through a thick coating of fat. I put him under chloroform and tried to reduce the hernia, but was unable to do so. I then ordered ice to be applied over the tumour, and copious warm-water enemata to be given. Some opium had been given internally before I saw him, which was at 9 p.m. I should note here that the suggestion of an operation was at once rejected. I requested to be informed if any change had occurred, and was not sent for until the following morning, at about 8 a.m. The symptoms were not relieved, and he was constantly vomiting and in great distress. The operation was again urged and now consented to. Making an incision through the thick layer of fat, I arrived at the hernial protrusion, and found that the stricture was at the external ring. The scrotal tumour was larger than an adult head, and the contracted neck as thick as an ordinary man's arm. On slitting up the external oblique tendon, the tumour was reduced, and soon after recovering from the chloroform he said he was altogether relieved. I saw him again in the evening. He was low, but free from pain; the bowels had not acted; no hiccough; no vomiting; very little pain, and that only round the wound and over the lower part of the abdomen. He had had no nourishment. This I had ordered to be given in small quantities, with stimulants, frequently. An opiate also had been ordered, but not given. He had voided no urine since the operation. A catheter was passed on the 4th, and only a few ounces of urine found in the bladder. He gradually sank, and died at 5 p.m.

Death in this case was not the result, as I believe, of gangrene; for the hernia was too large, and the stricture not tight

enough to have caused it so soon. Exhaustion, want of support —he was a bigoted Hindoo, and would take none—and possibly some uræmic poisoning, with perhaps the formation of cardiac coagula, were the causes of death. He was an old man, over 60, and very probably the subject of kidney degeneration.

Case 16.—September 7, 1868, I was asked to see a native gentleman, Baboo K. C., who was suffering from strangulated hernia, at Bhowanipore. He had been the subject of a small inguinal hernia for some years. On September 6th, after a long walk, it came down into the scrotum, rapidly became painful, and could not be reduced. At about 5 p.m. he began to vomit, and had severe umbilical pain, with great tenderness at the ring. He was then some distance from Calcutta. A warm bath and the taxis were tried without success. He was brought home in great suffering, vomiting, in great pain, and the bowels constipated. At 7.30 a.m. I saw him, and found a right scrotal hernia with all the indications of strangulation. The symptoms were rapidly becoming worse. The operation was proposed, after a careful attempt at reduction under chloroform had failed. He was then very low, pulse feeble and rapid, vomiting incessant, abdominal pain very severe. The vomited matter was not stercoraceous, but bilious. I operated at once, found the stricture at the external ring as usual, divided it, and easily reduced the tumour without opening the sac. He was immediately relieved of all the urgent symptoms, and fell asleep. He did well; the wound healed rapidly under the application of the carbolic acid dressing, and on September 23rd he was able to wear a truss.

Case 17.—On April 20th, 1869, I was requested to see Baboo N. C. M., who was suffering from strangulated inguinal hernia. It appeared that he had been the subject of left scrotal hernia for some years, but that hitherto it had given him little trouble excepting on one occasion about a year before, when it became incarcerated, and was ultimately reduced by taxis. On the present occasion the hernia came down, and could not be reduced. Very shortly the symptoms of strangulation set in, and when

I saw him they were very urgent. The taxis, under chloroform, and other measures, had already been resorted to without success. Under chloroform, I made an attempt to reduce the hernia, but failed. The operation was then proposed, and agreed to at about 5.30 p.m. The stricture was found at the external ring, and on being divided the protrusion was then reduced without opening the sac. He remained low after the operation, with symptoms of peritonitis, for which opium was freely administered, and hot stupes applied to the abdomen. Enemata of tepid water, with ʒij. of Condy's solution to the pint, were used to wash out the bowels, from which, after the operation, a quantity of grumous blood was passed. This continued for several days. The pain became less, the pulse improved, and he did well.

The chief point of interest in this case was the passage of blood after the operation, due no doubt to great congestion of the lining mucous membrane of the intestine, and showing how severe the strangulation must have been.

Of the seventeen cases of inguinal scrotal herniæ above recorded, eleven recovered after the operation for division of the stricture, and six died. Four of the eleven who recovered were also operated on for the radical cure, and were discharged apparently cured or much relieved.

The deaths occurred in cases where time had been lost, and gangrene of the intestine had supervened, or where exhaustion and perhaps the formation of coagula in the right cavities of the heart carried the patients off.

The seat of strangulation was found to be in twelve cases at the external abdominal ring, the pillars of the ring and the intercolumnar fascia constricting the neck of the hernia. In one case the stricture was within the sac, and in four it was both at the external ring and in the neck of the sac.

The fatal cases were one in which the stricture was at the external abdominal ring, and five in which it was in the sac, or in the sac and at the ring also. It is worthy of notice that the greater number of these cases were of scrotal hernia, and that

consequently the external abdominal ring must have undergone considerable dilatation during the gradual formation of the hernial tumour.

Besides the above I have records of the nine following cases:

1. M., a Hindoo male, aged 32 years, servant by occupation, was admitted on the 27th of August, 1869, with strangulated inguinal hernia of the left side. The hernia (an ordinary oblique inguinal hernia) was of ten years' standing. It had not gone up for four days before admission. He had no other symptoms of strangulation, save a little vomiting and constipation. The constriction occurred at the outer ring formed mostly by the intercolumnar fascia. The hernia was of the size of an egg, tense, hard, and irreducible. The operation was performed without opening the sac. He was cured, and was discharged on the 21st of September.

2. K., a Hindoo male, aged 25 years, a bearer by occupation, was admitted on the 7th February, 1870, with strangulation of an inguinal hernia of the left side, of long standing. The strangulation occurred seven days before admission. Taxis, ice, and chloroform were tried without success. He was then operated on about three hours after admission. The obstruction was not confined to the ring alone, but there were some adhesions within the sac, which was consequently opened. The gut was highly congested. Still it was thought advisable to return it, which was accordingly done, but without any improvement in the symptoms. He died of exhaustion on the second day after the operation.

3. An East Indian male, aged 43 years, a clerk by occupation, was admitted on the 7th March, 1870, with strangulation of an inguinal hernia of the right side, of nine years' standing. Chloroform and taxis failing to reduce it, he was operated on on the following morning—twenty-one hours after strangulation began. There was no stercoraceous vomiting. The hernia was reduced without opening the sac. The operation afforded him no relief, and he died of peritonitis on the 10th.

4. M. N., a Bengali male, aged 55 years, without any occupation, was admitted on the 17th of June, 1870, with strangulated inguinal hernia of the right side; hernia of fifteen years' standing; strangulation began two days ago, and has had hiccough ever since, but no stercoraceous vomiting. The abdomen was tympanitic, and the tumour was a tense, tough, and large one, which could not be reduced by taxis and chloroform. The hernia was found to be partly omental and partly intestinal. There was some difficulty in reducing the former, and the sac was opened. Even then it was reduced with difficulty. Had a slight attack of peritonitis, which was mostly local, and subsided speedily; but he died of exhaustion on the 30th.

5. N. C. R., a Hindoo cook, aged 20 years, was admitted on the 12th October, 1870, with strangulated inguinal hernia of the left side; had hernia of both sides, the left of four months' duration. The strangulation was of twenty-four hours' standing. Ice and chloroform failing, he was operated on on the 13th. The seat of strangulation was at the outer ring. The hernia was reduced without opening the sac, and he made a rapid recovery.

6. M. M., a Hindoo sircar, aged 45, was admitted on the 15th May, 1871, with symptoms of strangulated oblique inguino-scrotal hernia on the right side. The hernia was of four years' duration, but had hitherto been reducible, and the present symptoms, pain in the tumour, which was very large, and in the umbilical region, constipation and constant vomiting had set in about two hours before admission. His pulse was weak and depressed. The usual measures, chloroform and taxis, &c., having failed, the operation for strangulated hernia was performed without further delay. The stricture was found to be at the external ring; it was divided without opening the sac, and the hernia reduced. The wound was antiseptically dressed and healed rapidly, and he was discharged cured, on the 29th June.

7. M. C. B., a Bengali, aged 55, a broker, was admitted on the 13th September, 1871, with symptoms of strangu-

lated oblique inguino-scrotal hernia on the right side. The hernia, of fifteen years' duration, had once been strangulated before, but was reduced by taxis. The symptoms, vomiting and constipation, had been present for some time. All the ordinary measures for reduction having failed, the operation was performed. The stricture was found to be at the external ring, and was divided without opening the sac. The wound healed, and he did well.

8. F. C., a Hindoo trader, aged 70, a very infirm old man, was admitted on 11th November, 1871, with symptoms of strangulated oblique inguino-scrotal hernia on the left side. It was only of three months' duration, he said, and was not very large. It had never before been obstructed; the symptoms of strangulation, vomiting, and constipation, with pain in the tumour and abdomen, had set in twenty hours before admission. The ordinary measures—taxis under chloroform, enemata, ice applied to the tumour—having failed, the operation was performed. The stricture was found at the external ring, and was divided without opening the sac. He was immediately relieved of symptoms of strangulation, but sank on the 17th with symptoms of gangrene of the scrotum, and chronic dysentery.

On examination, it was found that the lungs were congested. There was a fibrinous clot in the right auricle, extending into the ramifications of the pulmonary artery. The lower portion of the ileum was partially gangrenous, but not perforated. The scrotum was gangrenous. The kidneys were extensively diseased. He was a very infirm old man, and had no power of recovery. The gangrene of the scrotum was probably caused, in his debilitated condition, by the attempts at reduction by taxis before operation.

9. N. P., aged 45, a stout, aged-looking man, by occupation a clerk, had suffered from inguino-scrotal hernia of the right side for five months; the tumour was very large, and the hernia had previously been reducible. When the symptoms of strangulation set in, the hernia had been incarcerated for two days; it had come down when travelling on the railway, and

he could not reduce it. When I saw him on the 5th November, 1871, the symptoms of strangulation were urgent, and general peritonitis was setting in.

I operated without delay, and had to divide thick layers of adipose tissue, before the stricture, which was at the external ring, and in the canal at the margin of the internal oblique and transversalis, was reached; it was divided without opening the sac. The symptoms of strangulation were immediately relieved, and the bowels acted freely, but he never rallied, and sank five hours after the operation.

He was evidently of an unhealthy constitution, and had probably diseased kidneys.

No post-mortem was permitted.

Strangulated Femoral Hernia in a Male Subject.

On April 8th, 1866, I was asked by Dr. Bird, of Howrah, to see a case of strangulated hernia in the Howrah Hospital. The patient was a Madras Portuguese servant, of about 25 years of age. He had been admitted into hospital at about 5 a.m. on that day. It appears that the previous night, whilst chasing a cat, he fell and injured the lower part of his abdomen. He felt great pain at the time, and a swelling in the groin immediately appeared. This rapidly became intensely painful, accompanied by great abdominal pain, especially in the umbilical region, and vomiting. Dr. Bird ascertained that he had ruptured himself, and, under the influence of chloroform, he tried to reduce the hernia. The tumour appeared to subside somewhat, but the symptoms were not relieved. The tumour became so painful that he could not bear it to be touched; vomiting continued, and great constitutional depression set in, indicated by rapid, feeble pulse, and cold, damp skin. With this there was tympanitis and abdominal tenderness. In this condition I found him, the pulse being 120, feeble, and thread-like. He was very restless. The pain was not only severe in the groin, but over the whole abdomen. It was evident that there was no inguinal hernia,

for the swelling was below Poupart's ligament. It was irregular, soft, nodulated, and intensely painful when touched. I could not isolate any one spot as more painful than another, nor could I make out any particularly tender inguinal gland. These glands were all painful, but it was evident from the general symptoms that there was a strangulated hernia somewhere; so after putting him under chloroform and trying the taxis without success, I determined, with Dr. Bird's consent, to cut down on the seat of the probable strangulation. Accordingly, I made a ⌐-shaped incision, with its upper limb just below Poupart's ligament, and the vertical one over the femoral canal. I found that the inguinal glands were enlarged, and the lymphatics dilated, a quantity of pale pinkish fluid flowing from the wound. On dividing the cribriform fascia a very small knuckle of intestine was found protruding through the femoral ring. I divided the seat of constriction—Gimbernat's ligament—carefully with a probe-pointed bistoury, and the protrusion at once returned. There was hæmorrhage. I stitched the wound, and applied a pad and bandage. The symptoms soon passed away; the most urgent were at once relieved, and on the 22nd of the month Dr. Bird wrote to inform me that the wound had healed and the patient had recovered.

Remarks.—This is a very interesting case, a femoral hernia occurring in a man, and caused, as it apparently was, by a fall, being a most unusual occurrence. The enlarged inguinal glands and the great pain on pressure in the groin were peculiar concomitants. They might, indeed, have almost explained all the suffering, only the suddenness of the attack, and the progressive symptoms of strangulated hernia, were so marked that I put aside all other considerations, and made an incision down to the probable seat of strangulation. I knew it could do no harm if there were no strangulated hernia, and on the other hand, if there were, it was the only chance of saving life. I found the protrusion very small, it is true, but all the more dangerous on that account. The stricture was divided, and the danger all passed away.

TREATMENT OF STRICTURE OF THE URETHRA BY IMMEDIATE DILATATION.

I HAVE treated several cases of urethral stricture in the manner recommended by Mr. Holt, and give the following examples as good illustrations of the results. I confess that I had an unfavourable impression of this operation before trial, and only felt justified in performing it on the confident recommendation it received from the distinguished surgeon with whom it originated. I do not think it is adapted for all strictures, nor can it replace the operation of perineal section in many. But I believe that in a very large number of cases which would otherwise be treated by the slower method of simple dilatation, it is likely to be not only useful, but desirable, as a more expeditious, if not a more perfect way of conferring relief.

I have not, contrary to my expectation, found that it was attended either with very great pain in its application or with great constitutional disturbance afterwards; indeed, not more of either than I have frequently seen to accompany or follow the passage of a simple instrument through an irritable stricture. My impression of the mode of treatment is that it is a valuable addition to our previous methods; and although my experience is still too limited to enable me to speak with authority, yet I am satisfied that it is one likely to meet with favour the more it is tried.

The instrument is now so well known that a description of it is almost unnecessary. The principle on which it acts is

that of a wedge, and its action is either forcibly to stretch or to split the contracted part of the urethra. The instrument with which I have operated consists of a director slightly curved, with two blades, which are forcibly opened by the passage down the centre, on a central directing rod, of a silver tube, of which there are various sizes, the largest forming, with the expanded blades, an instrument equal in circumference to a full-sized bougie. The only real difficulty is to pass the director in the case of a tight or irritable stricture. That effected, there is no difficulty in passing down the dilator with a firm and steady pressure, care being taken not to injure the bladder by pressing the director with the dilator against its walls.

The stricture being opened out I withdraw the instrument, and pass a full-sized bougie, if there be no constitutional disturbance consequent on the operation, and I continue to pass the bougie daily, until all irritability ceases, and the stream flows in a full size, and at proper intervals. This is not always effected by one operation. I had, in the third case here related, to pass it a second time, for either the rupture had united or the dilatation had contracted; at any rate the stream diminished, and another passage of the dilator was needed. Even after this, for some time, either some irregularity or loss of power existed; for although a full-sized No. 12 bougie would pass easily, the stream of urine remained small, and somewhat scattered. This, however, gradually gave way before the regular passage of the bougie, and the improvement in general health and spirits concurrent with the restoration of the natural calibre of the urethra was remarkable. Therefore, without speaking dogmatically of a proceeding of which as yet I have had only a limited experience, I feel that I am justified in recommending others to do what I have done, and test its value by their own experience. With reference to the permanency of the cure, I am at present unable to form any opinion from my own experience; my cases have all been in the hospital, and it is seldom that we have the opportunity of seeing a patient again when he has been discharged. Europeans,

generally sailors, leave the place. Natives leave it also, or if cured, or even relieved, do not often return.

Case 1.—J. C., aged 27, an Englishman, admitted September 2nd, 1864. He began to notice symptoms of stricture seven months previously, the stream of urine becoming gradually smaller. On admission he was in great distress, and passed his water only in drops, and with great straining. Instruments up to Nos. 6 and 8—beginning with the smallest—were introduced. Sometimes the irritability was so great that no instrument would pass, and the passage of the larger sizes was always attended by great hæmorrhage, and that broken-down condition, so peculiar to the constitutional disturbance following the passage of instruments in some men. The dilatation of the stricture proceeded very slowly, and its perineal section was proposed. On the 30th, however, I determined to try the effect of Holt's dilator. A full-sized instrument was passed into the bladder. It gave little pain, caused no bleeding, and was followed by no greater amount of fever than had resulted from the use of bougies. The stricture remained dilated, and readily admitted the daily passage of a No. 10 bougie, which caused no disturbance, and the stream of urine was good. On the 6th of October he was doing well, had no fever, and less pain, and passed urine in a full stream. No. 10 entered the bladder easily. So far the case was satisfactory; the stricture, which had been very intractable, had yielded, and no constitutional mischief had followed its dilatation and rupture. He went on improving, and on the 14th November, a full-sized instrument passing with ease, he was discharged.

Case 2.—J. M., aged 49, a sailor, admitted 25th of October, 1864, with stricture in front of both the bulb and the scrotum. He had, also, constitutional syphilis, in the form of cutaneous eruptions, and gleety discharge from the urethra, for which he was treated with iodide of potassium, vapour baths, and injections of acetate of lead. He remained in the hospital up to 15th January, 1865, repeated attempts being made to treat the stric-

ture by ordinary dilatation, but always with the effect of causing rigors and fever; so that little progress was made, although his general health improved and the eruptions disappeared.

On the 15th of January Holt's dilator, of the second size, was passed at 8.30 A.M., and at 11 A.M. he had rigors, followed by fever. On the next day he had fever still, but no perineal pain, and his urine passed freely. On the 17th No. 7 catheter was easily introduced, No. 3 having been with difficulty passed before the splitting of the stricture. During the next few days he had pains in the back, and appeared much depressed and weakened; and on the 23rd symptoms of mischief appeared in the eye. The globe inflamed and suppurated, and exit was given to the matter by an incision into the anterior chamber. The eye then gradually shrank, and cicatrized. In April he was discharged, much improved in general health. No further attempt was made to pass instruments, but as he passed his urine freely it would appear that the urethra remained patulous. It is worthy of notice that neither after catheterism nor the operation with the dilator was there any local pain. Holt's operation was attended by little pain, and scarcely any bleeding.

CASE 3.—T. S., aged 52, a Swede, admitted on the 4th May, 1866. Five years ago he went into the hospital at Mauritius, for stricture of the urethra. The stream had been gradually diminishing for five years previous to this, and when he sought relief he passed his urine only in drops. No. 1 catheter, up to No. 7, were passed when he left the hospital. He then passed urine in a middling-sized stream. It soon began to diminish; and eighteen months ago it almost completely stopped. Was in hospital at Rangoon for five days, when No. 1 was passed with great difficulty. Since then he has passed urine in a very fine stream, and occasionally in drops, about twelve times a day, and a little at a time.

On the 5th no instrument could be passed. He was ordered a dose of castor oil, and a warm-water enema. On the 6th No. 4 catheter was passed with much difficulty. The stricture was seated just in front of the triangular ligament. There

were some false passages found in the course of the urethra. Tr. opii ℥xxv. Quin. gr. v. statim. On the 8th the stricture was split with a full-sized Holt's dilator. No. 10 catheter was passed directly afterwards, and kept in for about ten minutes. There was very little hæmorrhage. He had a rigor during the night, followed by heat of skin; no sweating. Passed water in a better stream. No. 10 catheter passed easily the next morning. Pulse 64.

On the 10th, No. 8 catheter was passed with some difficulty. There was a little hæmorrhage. Pulse 64. Still passes his water in a very thin stream. No more rigors.

11*th*.—No. 8 catheter passed with difficulty. There was some hæmorrhage. Not much improvement in the size of the stream. Pulse 60. No instrument was passed the next day.

On the 13th, the stricture was very irritable, and bled on the slightest touch. Attempts were made to pass a catheter and Holt's director, but without success.

On the 14th, No. 8 catheter was passed. Holt's instrument was then introduced, and the stricture again dilated with the largest-size tube. No. 10 catheter was passed directly afterwards, and kept in for some time. There was a little bleeding. He had fever, preceded by shivering, during the day. His pulse rose to 104. He sweated a good deal during the night. The next morning his pulse was 80. Quin. gr. v. ter die.

On the 16th, No. 8 catheter passed easily, no hæmorrhage. Passes water in a better stream, and less frequently.

On the 24th May a full-sized instrument passes easily, he is in fair health, passes urine freely, and is in all respects doing well.

27*th May*.—A full-sized instrument passed easily. He is in good health and spirits; says he feels well. The stream which has been scattered and irregular is now nearly of natural size, and the calls to micturition are much less frequent.

Case 4.—B. M., a Hindoo, aged 30 years, was admitted on January 28th, 1866. Has observed diminution in the size of the stream of urine during the last year. At present the stream is of the size of a No. 1 catheter. Sometimes it passes in drops.

Had retention of urine twice last month; was relieved without the aid of the catheter. Has had hydrocele of the right side for the last three years. Catheterism was tried, but not successfully. The hydrocele was tapped and injected with tincture of iodine, and the scrotum kept raised. He was ordered three grains of quinine three times a day.

January 29th.—The right testicle swollen. The sac refilling. Had slight fever yesterday. Bowels costive.

On February 1, No. 3 catheter was attempted, without success. Hydrocele smaller; no pain in it.

3rd.—No. 3 bougie passed with much difficulty. There was much bleeding from the urethra. No fever. He was ordered morph. gr. $\frac{1}{2}$ h. s.

No attempt was made to pass the instrument again till the 11th, when it was tried without success.

13th.—Holt's director introduced, and the stricture dilated afterwards by No. 9 dilator. No. 12 catheter was passed afterwards without any difficulty. There was a little bleeding. He did not complain of much pain. Passed water in a good stream. Morph., gr. $\frac{1}{4}$ h. s.

14th.—Pulse 96; skin hot; tongue moist. No. 11 catheter passed. Quinia and tinct. opii, ℥xx. ter die.

15th.—No. 9 catheter passed without difficulty. No shivering. No pain in the perineum. No bleeding. Slight purulent discharge from the urethra. Pulse 84. Passes urine in a good stream.

16th.—No. 9 catheter passed with ease. No bleeding.

19th.—Nos. 10 and 11 catheter passed easily. Passes urine in a natural stream. No pain in micturition.

No. 10 catheter was passed easily for five or six days successively. No more purulent discharge from the urethra.

26th.—No. 12 catheter passed easily. Passes urine in good stream. Hydrocele still contains fluid; fluid drawn off to the extent of one pint, and the sac again injected with tinct. iodin. ʒ iij.

The next day he had slight fever.

A day or two afterwards he left the hospital quite cured of the stricture, and the hydrocele rapidly subsiding.

Case 5.—R. C. C., a Hindoo, aged 35 years, was admitted on March 2, 1866. He had an attack of gonorrhœa ten years ago, that resulted in gleet, which continued for three years. The stream of urine gradually became smaller, and a swelling appeared on the right side of the perineum below the scrotum. This burst, and a quantity of pus was evacuated, and was followed by discharge of urine through the opening during micturition. Four or five months afterwards a similar swelling appeared below the former, and terminated in the same manner. A third one appeared on the left side of the perineum, and the opening resulting from its bursting formed another passage for the flow of urine. At the site of these openings there are three swellings from which pus continues to be discharged. These sinuses are now of three years' standing, three-fourths of the urine passing through the urethra, and one-fourth through the fistulæ. About seven months ago, the passage of urine through the urethra was completely obstructed, and it almost entirely passed through the fistulæ. This continued for twenty days, after which he says the passage was somewhat restored. Since then the scrotum has been increasing in size. It is now red, swollen, œdematous, and thickened. There is some swelling of the prepuce. The perineum is much thickened. Passes urine mostly through the perineum. On introducing the catheter the urethra is found not only strictured, but is somewhat tortuous. Has had fever for three or four days following the inflammation of the scrotum. Fomentations and poultices were applied to the perineum. The scrotum to be suspended.

March 3.—No. 6 catheter introduced with some difficulty. On making an incision in the perineum in the median line, pus and urine escaped. Urethra not opened. Two free incisions made in the swellings on each side, and two in the scrotum. Some fluid issued from the right side, but the urinous smell was not well marked. The cellular tissue was not sloughing.

The next day he had fever. Pulse 120. The scrotum much

shrunk. The wounds looking healthy. Passed urine more freely. A part of it still dribbles through the sinuses.

For the next two or three days he had fever. The urine continued to pass more freely through the urethra, and less through the perineum. Wounds looking healthy.

On the 10th and 11th No. 6 catheter was passed.

On the 31st the stricture was dilated by Holt's largest dilator. No. 9 catheter afterwards passed. Morph. gr. $\frac{1}{4}$ h. s.

14*th*.—No. 9 passed this morning. Pulse 104. Skin slightly warm. Passes water through the sinuses as well as through the urethra.

16*th*.—No. 9 catheter passed easily; passes urine mostly through the urethra; one-fourth of it passes through the perineal sinuses.

22*nd*.—No. 9 catheter passed easily; sinuses looking healthy and granulating.

25*th*.—A full-sized catheter passes easily; the sinuses are nearly closed, and the perineal wounds all but healed. He passes urine naturally, and in a full stream.

Case 6.—F. F., an East Indian, aged 39, a resident of Calcutta, admitted on March 14th, 1866. He has had more or less constant discharge from the urethra for the last twenty-one years. First noticed a diminution in the size of the stream of water ten years ago. The stream was sometimes forked and twisted, but always passed about the size of a No. 6 catheter. Has been in the habit of having catheters passed often to keep the stricture from contracting. Nos. 6 and 7 used to be passed without much difficulty. The last time he had No. 5 catheter passed four years ago. No instruments have been passed since then. Passed water in a fine stream till a fortnight ago, since which it has been passing in drops. Never had fever as the result of the passage of instruments. The stricture is at the anterior portion of the triangular ligament, and extends even behind this. No. 7 catheter passed this morning, after dilating the stricture with Holt's dilator. On this occasion the dilatation was not perfect, owing to the extreme toughness of the stricture.

6 p.m.: Pulse 118; has fever, which came on with shivering at 2 p.m.; had much difficulty in passing urine; passed some small clots from the urethra. Mist. febrif. ℥j.; pot. acet. gr. x.; tinct. hyoscyami ♏ xv., quâque tertiâ horâ. Fomentation. He had no return of fever for the next three days; passed his urine in a pretty good stream.

On the 18th the stricture was split more effectually with Holt's largest dilator. No. 10 catheter was passed immediately afterwards. In this instance the director entered well into the bladder, and the dilator seemed to thoroughly divide the stricture. There was very little bleeding. Tinct. opii ♏xl.; quiniæ sulph. gr. x.; aquæ ℥j., stat. In the evening he had fever, but not so strong as on the former occasion. Feels difficulty in passing urine. Mist. feb. ℥j.; pot. acet. gr. x.; tinct. hyoscyami ♏xv., quâque tertiâ horâ. Fomentations to hypogastrium.

19*th*.—No. 9 catheter passed easily; no fever now. There was a little bleeding from the urethra during the day; passed urine in a better stream.

20*th*.—Nos. 10 and 11 catheter passed easily. There is still a feeling of roughness along the urethra; passes urine freely.

21*st* and 22*nd*.—Nos. 10 and 11 catheter passed easily; no pain, no fever, no discharge from the urethra.

25*th*.—Full-sized instrument passes easily; no pain, no discharge, no constitutional disturbance; appears to be quite cured.

This case is interesting, as the stricture was very tough, rigid, and unyielding, and it required the exertion of considerable force to pass the dilator through it. The result was very satisfactory—no great constitutional disturbance, and rapid restoration of the urethral canal to its original calibre.

Case 7.—T. S., a Swiss cook of a ship, aged 52 years, a healthy-looking man, admitted on March 4th with a tight irritable stricture of ten years' duration. For some time the ordinary treatment by dilatation was tried, but the progress made was very slow. On May 8th, the stricture was ruptured by the passage of Holt's largest dilator. Very little bleeding followed,

and comparatively slight constitutional disturbance. A full-sized catheter was passed immediately after the withdrawal of the dilator, and repeatedly afterwards until he was declared cured on July 25th.

Case 8.—L. A., an East Indian, aged 50, was admitted on July 27th with stricture of one year's duration. The urethra was strictured in two places—in front of the scrotum and just in front of the bulb. He was otherwise in good health. The director having been introduced with some difficulty, the largest dilator was at once passed. A large catheter was passed immediately and daily afterwards. The constitutional symptoms were very slight, but he had incontinence of urine for some days. He rapidly recovered, and was discharged cured on August 8th.

Case 9.—B. C., Hindoo, aged 40, admitted June 22nd with stricture and urinary fistula, combined with scrotal elephantiasis. The stricture was very narrow, and just in front of the bulb. It was split with the largest-sized dilator, and kept dilated with a full-sized catheter. The sinuses closed, and the scrotal tumour was then removed, and having recovered from the operation, he was discharged.

Case 10.—S. C. G., a Hindoo boy, aged 5, was admitted on August 14th, 1866, with a contraction of the urethra near the neck of the bladder, the result of lithotomy performed two years previously. The director having been introduced into the bladder with some difficulty, the smaller dilator was passed, and a corresponding catheter was introduced immediately after. He attended for some time as an out-patient, and appeared to be cured.

Case 11.—D. I., a healthy-looking young Hindoo, aged 24, admitted on September 3rd, with a stricture in the usual site. It was not very tight, nor of long duration. It was split with the full-sized dilator the same day, with comparatively little pain or hæmorrhage. He would not remain in the hospital, but attended as an out-patient for a few days until he was cured.

Case 12.—M. C. B., Hindoo, aged 60, a trader, was admitted

on September 5th, with stricture of some years' duration, situated in front of the bulb. The director was introduced with great difficulty, and the full-sized dilator passed on the 8th. He recovered rapidly, attending as an out-patient until he was cured.

Case 13.—E. S., an American, steward of a ship, aged 32 years, admitted on September 7th, with a tight stricture of ten years' duration. The stricture was ruptured with the full-sized dilator. He would not remain, but attended as an out-patient until cured.

Case 14.—F. K., a Mahomedan servant, aged 44 years, admitted on March 11th, 1867, with stricture in the usual situation, of eighteen months' duration. No. 4 catheter was passed with difficulty on March 11th, and the stricture was split with the full-sized dilator; this was followed by a full-sized catheter. He did well, and left the hospital on March 17th of his own accord.

Case 15.—A., a Malay khalassie, aged 25 years, was admitted on April 29th, 1867, with a very tight, almost cartilaginous stricture just in front of the bulb, of three years' duration. Catheters No. 2 and 4 were passed with great difficulty until May 2nd, when the stricture was split by the passage of the full-sized dilator. This was followed, as usual, by a full-sized catheter, which was passed daily until May 27th, when he was discharged cured.

Case 16.—J. O., European, aged 36 years, admitted December 21st, 1867, with stricture of ten years' duration, the stricture being just in front of the bulb. It was split on December 24th, with the full-sized dilator; this followed, as usual, by a full-sized catheter (No. 12). He was discharged cured on February 15th, 1868. On admission, catheter No. 2 was passed with difficulty.

Case 17.—R. B., Mahomedan, aged 30 years, admitted July 6th, 1868, with stricture of six years' duration. Had several times been in great trouble from retention of urine. The stricture was split with the full-sized dilator on the 7th, and he was discharged cured on August 1st, No. 12 passing easily.

Case 18.—W. A., sailor, European, aged 33 years, admitted on August 18th, 1868, with stricture of eleven years' duration. The stricture came after gonorrhœa, was in front of the bulb, and very narrow. It was split with the full-sized dilator on August 22nd, and he was discharged cured on September 6th.

Case 19.—J. K., a West Indian, carpenter, aged 34 years, admitted on December 6th, 1868, with stricture of ten years' duration. It was a very bad case, for the stricture seemed to extend throughout the whole canal from the anterior extremity to the membranous portion, and water was passed with great suffering. After long trial, No. 4 was passed. The canal was dilated on December 28th with the full-sized dilator, and No. 12 passed immediately afterwards. I have not the date of his discharge, but he left the hospital perfectly cured.

Case 20.—A. A., a Mahomedan, aged 56 years, was admitted on February 17th, 1869, with stricture of six months' duration. No. 3 was passed with great difficulty, and the stricture was split with the full-sized dilator on the 21st. No. 12 passed easily after the operation. The patient suffered little or no constitutional disturbance, and left the hospital on the 26th, apparently well.

Case 21.—C. M., an East Indian, aged 52, has had stricture for six years. Catheters have been passed from time to time, and about three years ago No. 12 was passed. He was admitted on March 9, 1869, with return of the stricture, and no instrument could be passed at the time. In a few days a small bougie was passed into the bladder, and on the 12th the full-sized dilator was introduced, and, immediately after it, No. 12 catheter. He had no fever, and since the operation has been doing well, and full-sized instruments pass easily. He has no difficulty in micturition, and is quite cured of the stricture, though up to this date (May 28th) he is detained in hospital by an ulcer on the leg. This is healing, and his general health has much improved.

Case 22.—W. C., an English sailor, aged 43, admitted on April 23, 1869, with stricture, which followed gonorrhœa about

eight years ago. For the last eighteen months he has been suffering from difficulty in passing water, and when he was admitted he had complete retention, which was relieved by placing him under the influence of chloroform, and passing a small catheter, No. 5. On the 24th, the next morning, the stricture was split with the largest-sized dilator, and a full-sized instrument passed immediately, without difficulty. As he was evidently of an irritable constitution a dose of quin. gr. v. and tinct. opii ℥xxv. was immediately administered; but notwithstanding this he had, the same afternoon, a severe rigor, and subsequent fever. This fever continued to return for three days, remitting in the morning, and caused great prostration, but there was no local mischief. The use of catheters was discontinued, and he began to recover, though looking wretchedly broken down and aged, with a profuse herpetic eruption on the lips, and great irritability of stomach. He continued to pass a full stream, and has not had the least inconvenience since. He was still in hospital at the time of the report, being rather weak from the prostration caused by this urethral fever, but he was perfectly well as to the stricture.

In this case, that of a man of a peculiarly nervous and irritable constitution, urethral fever of rather a severe form followed, but he recovered, and I feel satisfied that similar results might have followed the passage of an ordinary bougie through the narrow and irritable stricture. The nature of the relief afforded is, I believe, not unlike that which follows the splitting or dividing of an irritable ulcer or fissure in the rectum; the division releases tension, and, so far from increasing irritation, gives relief.

Case 23.—S. R., an East Indian clerk, aged 43, was admitted 27th November, 1871, with stricture, of four years' standing, the result of gonorrhœa. It was very tight, so that urine passed in a small stream, and sometimes only by drops—sometimes stopping short altogether. The urethra was very hard and narrow, so that No. 3 was passed with difficulty. On the 29th it was dilated by Holt's instrument, and No. 10 was passed.

There was some bleeding, which was arrested by cold. A draught, containing quinine and opium, was given immediately. On the same evening he had shivering and fever, which, however, abated under treatment. On the 5th December No. 11 was passed, and he left the hospital at his own request.

Case 24.—G. W., a Mahomedan farmer, aged 40, was admitted December 6, 1871, with a very tight stricture, the result of gonorrhœa of two months' duration. He passed water in a fine stream, and sometimes only by drops, but he never had retention. His urethra had been laid open about three months since for urethral calculus. On admission No. 3 was passed with great difficulty, and was followed by a good deal of bleeding. On the 8th the urethra was dilated under chloroform by Holt's largest instrument, and No. 10 was passed. There was much bleeding, which was arrested by cold. A draught, with opium and quinine, was given. In the evening there was fever, which was relieved by the 11th. No. 11 passed easily, and on the 29th he was discharged, able to pass his water in a good stream.

Case 25.—R. K., a Hindoo servant, aged 30, was admitted September 28th, 1871, with traumatic stricture of four months' standing, the result of goring the anterior part of the left thigh and perineum by a buffalo's horn. The wound in the thigh healed, with the exception of two sinuses through which the urine found its exit—the deep pelvic fascia having been probably torn off at the time of the injury. As the stricture, on admission, seemed a tight one, it was at once dilated by Holt's largest instrument; after which No. 10 was passed in, and a quinine and opium draught administered. The urethra was kept well dilated by Nos. 11 and 12; but as the urine nevertheless continued to flow through the sinuses, the perineum was on the 20th October laid open, under the influence of chloroform, on a full-sized staff, and the sinuses were slit up. The S-shaped tube was introduced, and kept in for ten days, when it was removed, and No. 12 catheter was passed. As the urine still continued to infiltrate into the thigh, No. 12 was kept

constantly in the bladder, in order that it might thus be discharged. The sinuses gradually closed, and the patient left at his own request, 12th January, 1872.

Case 26.—J. L., an East Indian clerk, aged 47, was admitted 6th September, 1871, with stricture of five years' standing, the result of gonorrhœa. No. 3 was passed with little difficulty, and dilatation was effected by Holt's largest instrument on the 7th. Next day he passed urine in a good stream, and within a week No. 12 was passed. He was discharged at his own request 23rd September.

Case 27.—D., a Hindoo cook, 36 years of age, was admitted 10th December, 1870, with traumatic stricture of the urethra of eight months' duration, produced by a fall on the perineum. Immediately after the accident there was a good deal of bleeding from the urethra, and difficulty in micturition came on within a week. He passed urine in a thin stream and sometimes in drops, but there had never been actual retention. No. 5 was passed with much difficulty, and no improvement resulting, dilatation was effected by Holt's largest instrument on the 20th. Nos. 10 and 12 were afterwards passed, and he was discharged cured on the 8th February.

Case 28.—G., aged 30, a Hindoo writer, and a healthy man, was admitted 2nd January, 1871, on account of a stricture of five years' standing, the result of gonorrhœa. On admission No. 7 was passed with great difficulty, and considerable hæmorrhage followed its introduction. This was arrested by the application of cold, and half a drachm of tincture of hyoscyamus was administered. When the irritation had somewhat subsided, Holt's largest instrument was employed, after which Nos. 11 and 12 were introduced. There was a little bleeding, but neither shivering nor fever. On the 4th No. 10 was easily passed, and he made water in a good stream. He left the hospital of his own accord on that day.

Case 29.—R. McC., aged 32, an Irish sailor, was admitted 8th March, 1871, with stricture resulting from gonorrhœa of twelve years' standing. He was in the hospital about eight

years ago for the same complaint, and had been since doing well until four months ago, when the difficulty in micturition again returned, the urine sometimes passing in a thin stream and at others by drops. On the 16th the urethra was at once dilated by from No. 5 to No. 9, and was afterwards dilated daily by No. 5. On the 25th Holt's largest instrument was employed, and No. 10 passed. He was doing well until the 11th of April, when he was seized with shivering and fever. This yielded to treatment, but his constitution remained much broken after it. On the 19th No. 9 was passed, and the urethra was kept dilated by instruments of a gradually increasing size until he was discharged 18th May.

Case 30.—A. H., an American seaman, aged 45, was admitted 22nd January, 1872, with stricture of four months' standing, due to an old gonorrhœa. On account of the irritability of the bladder and urethra, tincture of hyoscyamus and nitric ether were ordered; and when this had somewhat subsided on the 24th No. 5 was passed with difficulty, the stricture being situated in the spongy part of the urethra. Holt's instrument was at once employed, followed by the passage of No. 9. Quinine and opium were ordered, and when the report was drawn up he was doing well.

CASES OF URETHRAL FEVER AND URETHROTOMY.

Case I.—*Stricture of the Urethra; Death from Urethral Fever and Uræmia.*

I was requested by his medical adviser, to see a gentleman who was suffering severely from urethral stricture of several years' duration. The patient was about 35 years of age; a stout, flabby, pallid, and unhealthy-looking person. Several years previously I had seen him, and had then passed instruments up to No. 10. He was suffering from an irritable stricture, partly organic, but greatly aggravated by muscular spasm. Again, during the rainy season of 1868, I had seen him when in similar trouble, and was unable to introduce any instrument owing to the extremely irritable state of the stricture. He was exceedingly anxious to be operated on. I advised him to wait until the cold season, unless some urgent symptom should render immediate interference necessary. I saw him again on the 10th day of the month, on the occasion I am about to describe, and found him looking in his usual state of health, but he was very nervous, restless, and irritable; the bladder constantly attempting to empty itself, and the stricture consequently causing him extreme distress. His bowels had responded to an aperient that day.

I immediately, and without any difficulty, passed instrument

No. 10 into the bladder; being conscious both of the structural as well as the spasmodic nature of the stricture, which offered some resistance. The operation caused him comparatively little pain. Directly after it, he went into the bath-room, and voided some urine, which, I believe, was not even tinged with blood; whilst passing the urine he had a rigor, and I heard that he had fever during the evening.

I did not see him again until the 14th, five days later, when I was requested by his medical adviser to do so, at about 8 p.m. I found him very ill; he was partially unconscious, tossing about in bed in an extreme state of restlessness and jactitation, picking and snatching at the bed-clothes; his face was convulsed and distorted; the pupils partially dilated, with converging strabismus occurring at intervals. He was continually muttering or rather moaning, and seemed to be in great suffering, the entire muscular system being in a state of irregular spasm; his pulse was quick, feeble, and intermittent. He had been very sick during the day, and had had fever at intervals; but it was only since about 7 p.m. that he had passed into the condition in which I found him, and which was gradually becoming worse. His body was then cool, and his skin moist, and there was a peculiarly offensive ammoniacal odour in his breath and from his person; the abdomen was not distended, and the bladder was apparently empty. The bed and his lower extremities were moistened by a urinous smelling fluid; the bowels were reported to have acted during the day; there was no tenderness on pressure over the pubes, neither was there any swelling or pain in the perineum, nor had he complained of any during the day or previously. I could get no satisfactory evidence as to the quantity of urine that had been voided during the day, nor indeed as to the exact quantity passed during the four days that had elapsed since I introduced the instrument. The attendants said that if he had passed it at all, it must have been where he lay, or when the bowels acted; there was very little apparent evidence of any in the clothes. He appeared to be partially conscious, though unable to speak; he

attempted to put out his tongue when told to do so, and it was dry and red at the edges, but brown in the centre.

It appeared to me that this was a case of uræmic poisoning supervening on urethral fever; the kidneys, probably originally defective, had succumbed, and rapid blood poisoning had supervened in consequence.

His hair had already been cut short, and ice applied to the head; it was now shaved and covered with ice. Hot fomentations were applied, as also leeches and dry cupping to the loins; an enema of sulphuric ether with assafœtida, soap and water, and a powder of jalap and calomel were administered. He, however, got rapidly worse; the convulsions became more marked with intervals of comparative quiet, and finally, after a convulsion, he died at 10 p.m.

Remarks.—Until the 14th, when I was asked to see him again, there had been nothing in his condition to cause anxiety. He had feverish attacks occasionally with restlessness, and his urine had been passed until that morning. The treatment, I believe, had been chiefly sedative, with a simple and unstimulating diet. On the morning of the 14th he was peculiarly restless, and appeared to be dull intellectually. The urine, as far as I could gather from those about him, had been less in quantity, and there had been unusual nausea and vomiting of bilious matter. In the evening he passed rapidly into a state of uræmic convulsions, in which I found him, and after this he rapidly sank. I do not know much of his previous history, but I have reason to believe that his life had been somewhat irregular; and he had the puffy, bloated aspect of a man whose habits are irregular, and whose general health is not good. I regard this as a case of typhoid uræmia, supervening on urethral fever developed by the passage of a bougie through the strictured urethra of a person of extremely irritable constitution, with defective kidneys. The state of the stricture, which was constantly threatening him with, and had more than once caused, complete retention and endangered his life, rendered interference necessary; and, accordingly, selecting the best season of the

year, the winter, the treatment was commenced by the passage of a bougie, which, I was astonished to find, was accomplished so easily. It can only be said in this case, that the faulty state of the general health was the cause of the evil consequences that followed. It indeed shows the danger that impends over any one so affected, and proves that such cases are not only the subject of great anxiety, but that they render the greatest care necessary, not only in the treatment, but in the mode of the patient's life. It was supposed, I believe, that the patient had undergone a formidable cutting operation. The only surgical proceeding was, as I have stated, the passage of a bougie, and this was accomplished with the greatest ease. I regret that I never had an opportunity of examining the urine, and that a post-mortem was not obtained.

The subject of urethral fever in persons of irritable constitution, with imperfect blood-making power and defective eliminating organs in the malarious climate of Lower Bengal, is one of considerable interest, and I regard this case as illustrative of it, from its most interesting point of view.*

CASE II.—*Stricture—Two Attacks of Urethral Fever—Recovery.*

In the month of June, 1871, I was consulted by an English gentleman, 43 years of age, of robust and muscular frame, and who had been in India for some years, though not a constant resident of Calcutta, on the subject of a stricture of many years' duration. He was in good health, of temperate habits, married, and regular in his mode of life; much of his time had been spent at sea. He informed me that several previous attempts had been made, at long intervals, to dilate the stricture, but without any very satisfactory results, each attempt to pass a bougie or catheter having been followed by fever. He had been able himself to pass No. 4 at times, but apparently this

* *Vide* "Address in Surgery," p. 35.

size had never been exceeded. Lately the stricture had been very troublesome and irritable. Attempts to micturate were frequent, disturbing his rest at night, and rendering him very uncomfortable during the day. I passed No. 6 metallic bougie with comparative ease, without causing much pain, and only a trace of hæmorrhage. At this time he had been remaining quietly at home for some days; his bowels were regular, and his general health was very fair.

I passed the instrument at about 8 a.m. He was free from uneasiness all day; took his wonted food, and passed water in a better stream than usual. There was neither hæmorrhage nor pain. At about 5 p.m. he began to feel chilly and uncomfortable. He felt weary; pains in the limbs and body supervened; shortly after a rigor came on, which was rapidly followed by others, each more severe than the last, and when I saw him a little later they were so violent as to assume the aspect of general convulsions. He was almost unable to speak, but he made me understand that although his body, especially his back between the shoulder-blades, was intensely painful, he had no pain in the bladder, urethra, or perineum, and that he had passed urine in a fuller stream than before. Hot fomentations to the back gave him relief; warm brandy-and-water with quinine and opium were administered. The convulsions lasting for several hours, were followed by slightly increased heat of the body, with great prostration, and this again by moistness of the skin, which did not amount to free diaphoresis. His pulse, soon after the commencement of the rigors, became much depressed, rapid, and very feeble, and at times could scarcely be felt at the wrist. His face was congested, and his appearance that of extreme suffering.

He gradually recovered, and regained his strength, but he looked broken and aged by the attack. Throughout he steadily maintained that he had no pain in the urethra, and that the urine passed more freely and less frequently (though still in ample quantity) than before. A herpetic eruption on the lips followed. For several days he continued to take quinine, and

was kept fully under its influence; his bowels were regulated, and as good a diet as he could take, with a very moderate amount of stimulants was given. He had for some years abstained almost entirely from stimulants, but apparently had lived more freely formerly.

In about a fortnight, having recovered, and being encouraged by the improvement already made, he was anxious to continue the treatment, and accordingly at about 9 a.m. I again passed an instrument. On this occasion No. 8 passed with no more difficulty than No. 6 on the first occasion. I observed that there was a certain amount of spasm, and that the urethra grasped the bougie tightly. There was only a slight tinge of blood, but he passed water freely immediately after the instrument was withdrawn. The urine was clear and natural. He said that as the instrument passed through the stricture it gave him considerable pain, perhaps rather more than on the last occasion.

I gave him gr. x. of quinine with opium gr. ij., immediately; and ordered them to be repeated in about six hours. He passed the day well, and felt no inconvenience (except that the quinine slightly affected his hearing, and the opium made him feel rather drowsy) until about 4 or 5 p.m., when he was again attacked with rigors and vomiting, but not so severely as on the former occasion. There was neither pain nor difficulty about the urethra; a very small quantity of water was passed with ease, and the bowels acted. The rigors were neither so severe nor so prolonged this time; but when they ceased he passed at once into a state almost amounting to collapse; the face being deeply congested, and the pulse intermittent (about 140) and frequently barely perceptible. His condition was most alarming, and I feared that he would not recover. Stimulants, quinine, and diuretics were given; hot fomentations and sinapisms were applied to the loins; for after the first discharge no urine was secreted for several hours. He was conscious, but seemed so exhausted that he could not at times speak even in the faintest voice.

The following day he remained in much the same condition; the skin was moist, and the temperature but slightly exalted. Towards the evening he voided a small quantity of urine; the irritability of the stomach, which had been very distressing, subsided, and he gradually, but very slowly, recovered. For many days he remained in a state of great prostration; and when he was sufficiently recovered to enable him to move I sent him out of town, for change of air. He had then the gait and aspect of quite an aged man. He continued to take quinine, and had no recurrence of anything like a paroxysm of ague. The urethra on this occasion was apparently slightly benefited; he never had any pain, even on pressure, over the seat of the stricture, and he passed water in an improved but by no means a fully natural stream. The improvement was, however, purchased at such cost—so terrible a risk of life—that I did not deem it right to make any further attempt to dilate the stricture.

Remarks.—I have already expressed my belief that urethral fever is more prone to occur in a malarious climate like that of Lower Bengal than elsewhere. I have no recollection of ever having seen it elsewhere in such a marked and severe form as in Calcutta; for not only does it sometimes supervene here after catheterism in tight strictures, where the instrument is passed with difficulty, and the patient's constitution is irritable from the effects of the disease, but in slighter cases, and sometimes even when there is no stricture at all, and the instrument has been passed for other reasons.

The case I have just related seems to support this view. The patient was a healthy man, free from visceral disease, and not, as far as I could judge, previously influenced by malarious cachexia. Though a resident of Calcutta, he was not a constant one, and as great part of his time was spent on board ship at sea, he might fairly be supposed to be, as he looked, in good health. He admitted that his stricture was an irritable one, much worse at times, and that every attempt to dilate it, especially in this country, had been followed by a

certain amount of constitutional disturbance, though far less than on this occasion. He informed me, also, that some of these operations had been attended with considerable difficulty, pain, and hæmorrhage.

I had not the least difficulty in introducing Nos. 6 and 8 into the bladder. There was certainly some obstruction, chiefly arising from spasm; but it was easily overcome, and there was scarcely more than a trace of hæmorrhage. But the treatment was commenced at a most unfavourable season, when malarious influences were exceedingly rife, intermittent fever, neuralgia, and other disorders expressive of their effects being very common. In other respects the season, whilst one of the wettest, had been one of the healthiest ever known in Bengal.

The constitutional disturbance that followed each attempt to dilate the stricture was exactly like malarious fever in a severe form; and, on the second occasion, nearly proved fatal during the state of collapse that rapidly supervened on the rigors. The resemblance of the rigors in the first attack to convulsions is worthy of note, showing how nearly the two conditions are related to each other. Quinine and opium, which were freely administered on the second occasion, directly after the operation, and in anticipation of mischief, seem to have had but little effect. The rigors were certainly less severe than in the first attack, but the subsequent condition was much worse, and for some time his life was in great peril.

I have not the least doubt in my own mind that, had the same treatment been followed in England, or in the dry climate of the North-West of India, a certain amount of urethral fever, due to the peculiar influence exerted on the nerve-centres by the operation, would have followed; but it would have been of a less severe character than it was here in the damp and malarious atmosphere of Calcutta. How far the internal and external conditions mutually influence and intensify by reaction on each other I cannot say; but that they do exert an influence I feel convinced. And it is not improbable that pathologists

may see in such cases something to throw light on the subject of the peculiar perturbation of the nerve-centres, which, in malarious poisoning, whatever that may be, expresses itself sometimes by convulsions in a child, by an ague fit, continuous or intermitting cold sweats, neuralgia, or other neurotic conditions in the adult.

Case III.—*Stricture—Occurrence of Fever after each Catheterism—Recovery.*

W. C., a sailor, 43 years of age, who had syphilis and gonorrhœa some years since, and had been suffering from difficulty in passing water during the last eighteen months, was admitted with retention of urine on the 23rd April, 1869. This was relieved by No. 5, and it was found that No. 7 could be passed. On the 24th the urethra was dilated by Holt's instrument, and No. 10 was passed. A dose of opium and quinine was administered immediately, but within a couple of hours he was seized with shivering and fever. The fever prevailed during three days, after which it passed off. When, however, No. 11 was passed on the 28th, the fever again returned, and lasted for two or three days.

On the 1st of May, No. 9 was passed, quinine with opium being also administered, but the fever came on as before, accompanied by sleeplessness. By the 5th he declared himself well as regards fever and nervous symptoms. On the 8th it was tried in vain to introduce No. 8, and three hours after the attempt, and in spite of the quinine and opium, the fever recurred. This passed off as soon as the other attacks; and at the date of the report, catheterism had not been again performed, the patient passing his urine in a pretty good stream.

Case IV.—*Stricture and Retention of Urine—Urethrotomy—Recovery.*

B. N., a Hindoo barber, aged 32, was admitted on the 13th

November, 1871, with retention of urine due to stricture, a result of gonorrhœa, of four years' duration. For the last two years he has passed urine only in drops. Had retention of urine about two months ago, which was relieved by catheterism. On the present occasion the bladder was found distended so as to reach even above the umbilicus. All the means tried, such as large doses of hyoscyamus, hip-bath, catheterism, &c., having failed, he was placed under the influence of chloroform, and a small-sized staff was introduced with difficulty. Upon this the perineum and urethra were divided, opened, and found infiltrated with decomposed urine. There was extravasation of urine also into the scrotum, which was incised and the fluid evacuated. An S-shaped tube was placed in the bladder, through which the urine was discharged. A draught containing opium, quinine, and chloric ether, was ordered. There was very little bleeding during the operation. The wound suppurated favourably, and the tube was taken out on the 17th and No. 10 catheter passed. He gradually improved under treatment, and the number of the instrument was increased from 10 to 12 within a month. When he left the hospital the wound had completely healed, No. 12 catheter could be easily passed, and he made water in a pretty large stream through the natural channel. He was discharged cured the 6th January, 1872.

CASE V.—*Stricture with Sinuses—Urethrotomy—Death from Diarrhœa.*

G. C. R., a Hindoo clerk, aged 55, was admitted on the 23rd October, 1871, with stricture of the urethra of fifteen years' duration, a result of gonorrhœa. There were sinuses in the perineum as well as in the scrotum and at the root of the penis, through which the urine found exit. He had been in the hospital before in the month of August, and in much the same condition. The urethra was then dilated by sounds (Nos. 8 to 10), and when he left the sinuses were closing, and he could pass a pretty good

stream of urine. On the present occasion he came in in a still worse condition, and the stricture was found so tight that even the smallest catheter could not be passed without causing profuse hæmorrhage. On admission some iron and quinine were ordered, and his health having improved, he was on the 27th placed under the influence of chloroform, and a small staff having been introduced, the perineum was laid open on it. The urethra was found hard and thickened, cutting like a potato; after the operation an S-shaped tube was introduced and kept in until the sinuses had closed. There was very little hæmorrhage. A draught of opium and quinine was given. Next day his bowels being costive and the abdomen tympanitic, a purgative was ordered, after which he continued improving until the 30th, when he was very much troubled with hiccough and tympanites. The pulse was small and 80. The hiccough was somewhat relieved by a mixture containing acid hydrocian, chloric ether, and liq. opii sedativus; but he was suddenly attacked with obstinate diarrhœa, which resisted all astringents. During the whole time he was well supplied with wine and nutritious diet, but he gradually sunk and died on the 13th of November. No post-mortem was allowed.

Case VI.—*Stricture—Urethrotomy.*

S. N., a Mahomedan farmer, aged 50, was admitted into the hospital on the 10th of November, 1871, with traumatic stricture of fifteen years' standing. He used to make water in a small stream and sometimes only in drops, but he never had had retention. On examination the stricture was found to be a very tight one, so that the smallest instrument could not be passed. On the 17th he was placed under the influence of chloroform, and a grooved staff having been introduced, the urethra was divided upon it. The S-shaped tube was introduced and an opium draught was ordered. On the 20th the tube was taken out, and No. 10 catheter was passed into his bladder. The

urethra was kept dilated by gradually increasing numbers of the instrument being passed daily. The wound healed very rapidly, and he absconded from the hospital, having a small sinus still in the perineum, on the 25th.

Case VII.—*Stricture with Perineal Abscess—Urethrotomy.*

H. A., a Mahomedan fireman, aged 30, was admitted on the 5th July, 1871, with stricture of the urethra, a result of gonorrhœa of one year's standing, and accompanied by an abscess in the perineum. He used to make urine in a small stream, sometimes in drops. Prior to his admission, sounds had been passed into the bladder daily, and during this treatment, the abscess above-mentioned had made its appearance. On admission, the perineum and urethra were at once divided on a staff, and about an ounce of pus let out. The urethra was found hard and thickened. The wound bled freely during the time of operation. An S-shaped tube was introduced, through which the urine flowed freely. Secondary hæmorrhage occurred twice after the tube was taken out, which was stopped by cold and pressure. This bleeding reduced the patient, and stimulants, tonics, and good diet were therefore ordered. The urethra was gradually dilated. The wound in the perineum did not make much progress towards the latter part of his stay in the hospital, and the patient was discharged at his own request, the 24th November, still having a sinus in the perineum.

Case VIII.—*Stricture and Extravasation of Urine—Urethrotomy—Death.*

J. B., aged 69, an East Indian hotel-keeper, admitted on the 7th September, 1871, in a very low state, with extravasation of urine, due to a stricture of ten years' standing. Ten

days before admission he had retention of urine, which remained unrelieved until he came up to the hospital. On examination after admission, a distinctly crepitant swelling was detected in the perineum, extending upwards to the scrotum. He was placed under the influence of chloroform, a grooved staff was introduced into the bladder with difficulty, and the perineum divided. An S-shaped tube was introduced, and the wound was plugged with lint. Bold incisions were made in the groins, scrotum, and ischio-rectal fossæ to let out the decomposed urine. There was very little bleeding at the time of the operation. After a few minutes a draught consisting of opium and quinine was administered; and as the wounds were now found bleeding freely, it was thought advisable to take out the tube and plug them. The patient became feeble during the operation, and ammon. carb. and chloric ether were given every half hour. He revived a little under careful management and the employment of the constant and slow galvanic current; but at last he sank and died on the morning of the 8th. No post-mortem examination was allowed.

Case IX.—*Stricture and Perineal Sinus—Urethrotomy—Recovery.*

B., aged 31, a Hindoo talookdar, was admitted on the 16th July, 1871, with stricture of the urethra of one year's duration, as a result of gonorrhœa. He had also a sinus in the perineum communicating with the urethra, consequent upon an abscess opened about six months ago. His urine flowed partly through the natural passage and partly through the sinus. On admission, No. 2 sound was introduced into the bladder with great difficulty, and there was much bleeding at the time. He had severe fever after the introduction of the instrument, which subsided under ordinary treatment. The operation, therefore, was deferred until the 19th, when the perineum was divided on

a small grooved staff, and an S-shaped tube was introduced into the bladder. There was very little hæmorrhage after the operation, and this was stopped by ice and pressure. The tube was taken out on the 27th, and No. 9 catheter was passed. On the evening of the same day, secondary hæmorrhage occurred and pulled him down greatly. From the 24th, the urethra had been kept dilated by the gradual increase of the numbers of the instruments. He was discharged on the 29th November, with the sinus in the perineum quite closed and the wound healed. No. 12 catheter could be passed easily.

Case X.—*Stricture and Perineal Abscess—Urethrotomy—Recovery.*

W. W. L., aged 47, an Irish sailor, admitted 2nd January, 1871, with stricture of the urethra of nineteen years' duration, as a result of gonorrhœa, from which he suffered about twenty-seven years ago. He had undergone the operation of internal urethrotomy while he was in California. For five years after this operation he remained perfectly well, but then he commenced passing water only in drops, but he has never had retention of urine. The stricture is a very tight one, and the urethra is thickened. Four days before admission he noticed a painful swelling in the perineum, which was distinctly fluctuating when he came in. A small grooved staff was introduced with difficulty; the perineum was divided on it, and about two ounces of thick pus let out. An S-shaped tube was introduced into the bladder, through which urine issued freely. A draught consisting of tr. opii. and quinine was given after the operation. The tube was taken out on the 4th, and No. 8 catheter was passed, and the urethra was daily dilated until No. 11 could be easily passed. The wound in the perineum closed, leaving a small sinus which was very stubborn in healing. It was touched with nitrate of silver. In the meantime he had a relapse of the gonorrhœal attack, which was treated by the following

medicine:—Liq. potass., ♏x; tinct. hyoscyami, ♏xx.; spt. æther nit. ʒss.; decoct. lini, ℥jss. After a long time he was cured of the gonorrhœa, and the sinus having healed up, he was discharged the 22nd July.

Case XI.—*Stricture with Extravasation—Operation—Recovery.*

D. S., aged 50, a Portuguese sailor, admitted 2nd January, 1871, with extravasation of urine due to stricture of six months' duration. Says that he had gonorrhœa about ten years previously. Ten days ago he noticed a painful swelling in the perineum, attended with difficulty in micturition, and he went to a medical man, and had an instrument passed. Since then the urine passed in a larger stream. He formerly made water in drops, but never had retention. The swelling gradually extended upwards, and within a short time, involved the scrotum and penis. He came in in a very low state, with small and quick pulse. On admission the scrotum was found swelled to an enormous size, and distinctly crepitating under pressure. He was ordered carbonate of ammonia gr. v., chloric æther ʒss., decoct. cinchonæ ℥j., every hour, and the perineum was divided without a guide in the median line; urine mixed with bloody serum was discharged. The depending portion of the scrotum was found to be sloughing, and it was freely incised, and a poultice applied. An S-shaped tube was introduced into the bladder, and the urine found its exit through it. There was very little bleeding during the operation. After the operation he was very much troubled with hiccough, and his pulse was 108 and small. The following draught was ordered to be taken every four hours:—Tinct. opii ♏xx., bismuth gr. v., hydrocyanic acid dil. ♏iij., aq. menth. pip. ℥j. He revived much after the operation, and was well nourished with port wine and animal extracts. On the 4th the pulse was small and 88. The left groin was found

ecchymosed and gangrenous, and was freely incised and poultices applied. On the 6th the tube was taken out, and urine commenced to flow freely through the wound. Under treatment his health improved, and the wound began to heal. No attempt to pass an instrument was made till the 2nd February, when it was unsuccessful. On the 24th a small catheter was introduced through the wound with great difficulty. After a short time the catheter was taken out and the S-shaped tube reintroduced. On the 26th the tube was taken out and No. 6 catheter was passed easily. After this the urine began to flow partly through the natural passage, and partly through the wound. The urethra was kept dilated daily by gradual increasing numbers of instruments. He was discharged the 19th April, when he could pass a pretty good stream of water, and No. 12 sound could be easily introduced. When he left the hospital all the wounds had healed, excepting a sinus in the perineum.

Case XII.—*Stricture with Extravasation—Urethrotomy—Recovery.*

J. K., aged 37, an East Indian carpenter, was admitted 14th April, 1871 ,with stricture of the urethra, a result of gonorrhœa, from which he suffered in 1852. Difficulty in micturition commenced fifteen years since. Had retention of urine in 1868, which was relieved by catheterism, and since then he had passed urine in a pretty fair stream until some time before admission, when the difficulty came on with swelling in the perineum. On admission an attempt to pass an instrument was made, but without success. On the 16th the parts were carefully examined again, and the scrotum was found to be in a fearful state of disorganization. He was at once placed under the influence of chloroform, the perineum divided in the median line without a guide, and some purulent matter let out. Free incisions were also made into the scrotum. An S-shaped tube

was introduced, and the wound plugged with lint to stop the bleeding, of which there was not much at the time of operation, On the 17th he had slight fever, and was treated accordingly. His strength was carefully supported by wine and nutrient diet. On the 19th the tube was taken out, and No. 9 catheter passed in easily. The wounds were looking clean. On the 20th he had fever again, and consequently no instrument was passed till the 27th, when the employment of gradually increasing numbers was resumed. Under proper treatment the wound in the scrotum healed, and urine gradually passed through the natural channel. He was discharged the 18th June, having a small sinus in the perineum remaining. He could pass the instrument himself.

Case XIII.—*Stricture with Extravasation—Urethrotomy—Death from Exhaustion.*

B., aged 35, a Hindoo coolie, was brought in in a reduced state of health from malarious enlargement of the spleen, from which he had been constantly suffering for the last six months. He was admitted on the 4th May, 1871, with stricture of the urethra and sloughing of the deep tissues of the perineum from extravasation of urine. Pulse small and 116. On admission a grain of opium every six hours was ordered. For a long time he had been passing water in a thin stream, and sometimes in drops. Had retention of urine about two years ago. He was suffering from fever with shivering, and the following draught was ordered to be taken every four hours:—Quiniæ sulph. gr. iij., acid nitric dil. ♏x., ferri. sulph. gr. j., infus. calumb. ℥j. He had phimosis, which rendered the meatus so small that No. 4 catheter was introduced with great difficulty. It was obstructed at the bulbous portion, and was instantly withdrawn; with it issued some dark-coloured disorganized matter. The urethra was found as hard as cartilage.

On the 5th the phimosis was laid open and the perineum divided on a grooved staff. The S-shaped tube was introduced, and urine flowed freely through it. The wound bled freely, consequently it was plugged with lint soaked in tincture of steel, and a draught consisting of opium and quinine was ordered immediately. On the 7th the S-shaped tube was taken out, and the wound plugged with lint. On the 10th obstinate diarrhœa came on, and chalk mixture with tinct. opii was given after each stool. On the 11th bronchitis was very troublesome, and he had become low from the effects of the diarrhœa. The following draught was ordered to be taken every four hours:—Amm. carb. gr. v., chloric æther ʒss., vini rubri ʒiv., decoct. cinchonæ ℥j. He gradually sank, and died on the night of the 11th May.

LITHOTOMY IN CALCUTTA.

The following tabular statement of lithotomy cases in the Medical College Hospital shows that vesical calculus is neither of very frequent occurrence in Lower Bengal, nor are the results of the operation very successful. Out of fifty cases thirty-six only recovered, giving a mortality of 28 per cent.—a result which must be regarded as unfavourable, when compared with the success which attends the operation in the Upper Provinces, where the average mortality is only 1 in 8 or 10.

The operations here recorded were chiefly lateral, a few were by the median section.

It is necessary to analyze the fatal cases to understand the causes of so high a rate of mortality in an operation generally so successful in other parts of India. The fifty cases here recorded have occurred in my wards during the past eleven years, and represent about half of those admitted into the hospital during that period, the other half having been under the care of my colleague. The total is a small one for a large hospital, and the mortality is high. It is to be remarked that some of the cases came in at a time when it was almost too late to hope for success, and when the operation offered, perhaps at the best, but relief from suffering, and a faint chance of life.

The disease, being comparatively an uncommon one in this part of Bengal, the subjects of it are less prepared to submit to treatment. They know little of the success of the operation when performed at the proper time, and only make up their minds to seek relief at the hospital when the mischief has

advanced so far that the chance of recovery is reduced to a minimum. On one occasion I remember seeing a poor emaciated creature carried into my ward who had, after years of suffering, made up his mind to come to Calcutta for relief. He reached the hospital in a dying state, and sank from exhaustion, within ten minutes after entering the ward. The post-mortem examination revealed a very large vesical calculus, with extensive disease of the bladder, ureters, and kidneys.

In the North-West Provinces, where the disease is common, its nature and prospective dangers are thoroughly appreciated by the sufferers; they seek relief early, and numbers find it in the dispensaries of the civil stations, where, in a dry and healthy climate, they rapidly recover. In the Medical College Hospital there is very little selection of cases. The object is to confer the greatest amount of relief, and in some cases, as I have said, the operation affords, at the best, little hope of more than temporary amelioration of suffering, or of promoting "euthanasia." But as knowledge becomes diffused it may be hoped that a more intelligent comprehension of the danger will make these persons seek more timely relief.

The first fatal case recorded is that of a man aged 40, from whose bladder eighty-six small calculi, two of them of the mulberry form, were removed by the median section. Death in this case was caused by blood-poisoning and exhaustion, depending on the formation of pus in the prostate, and between the bladder and rectum. On examination after death, which occurred on the twenty-ninth day, it was found that there was much induration, and a large collection of pus between the bladder and rectum. The prostate gland was riddled with abscesses, and its ducts dilated into pouches filled with small calculi (96 in number), varying in size from a grain of rice to that of a pea. The bladder also was thickened, and its rugæ were of a deep red colour. The kidneys were healthy. The weight of the calculi removed by the operation was 162 grains.

The second death occurred in the case of a man aged 24.

A calculus, coated with phosphates, and weighing 1,271 grains, was removed by the lateral operation. He was in a wretchedly exhausted and emaciated condition, and suffering so severely that he gladly accepted whatever hope of relief the operation afforded. The stone was large, heavy, and roughened by the deposit of triple phosphates, in the form of lancet-shaped crystals, set edgeways. He died of pyæmia, and after death pus was found in the right pleural cavity. Calculi were found in the pelves of both kidneys, the left being shrunken, softened, and infiltrated with pus. The bladder was much thickened and ulcerated, the ulceration having opened into the rectum. The left iliac fossa contained a large collection of pus, extending behind the pelvic fascia as high as the diaphragm.

The third death was that of an old man, who died of acute dysentery, on the tenth day after the operation. The disease was not connected directly either with the calculus or the operation from which he was recovering.

The fourth death was that of a man aged 35, who died the day after the operation, which was performed by the median section. Right kidney hypertrophied; ureter dilated; left kidney atrophied; bladder thickened, with inflamed patches in the vesical mucous membrane, and a gangrenous spot near the opening of the right ureter into the bladder; cellular tissue around the neck of bladder ecchymosed.

The fifth death occurred in the case of a man aged 23. The calculus was encysted in the upper fundus of the bladder, and was extracted with great difficulty. It was found after death, which occurred on the fourth day, that there was suppuration about the neck of the bladder and in the sub-peritoneal cellular tissue. The prostate was bruised, and suppuration had taken place in the kidneys, in the iliac fossa, and the scrotum. Death in this case was due partly to shock, partly to the pyæmic condition which so rapidly supervened.

In the sixth case death occurred from peritonitis on the sixth day, after removal, by the lateral section, of a phosphatic calculus weighing 230 grains.

In the seventh case death occurred after the removal of a small calculus, 37 grains in weight, from pyæmia and the formation of fibrinous coagula in the right side of the heart and pulmonary arteries. The liver was fatty; the spleen and kidneys healthy. The right knee-joint was full of pus. There was a large collection of pus in the left psoas muscle. The right lobe of the prostate contained an abscess, and the calf of the right leg was infiltrated with pus under the gastrocnemius. The lungs were congested, but contained no pyæmic patches.

In the eighth case, the abdominal cavity was lined with a layer of greenish aplastic lymph. The lower portion of the descending colon was displaced; it lay on the anterior surface of the bladder, and was adherent to it. The perineal wound had a sloughy aspect, and the cellular tissue between the bladder and rectum was sloughing. The liver and kidneys were healthy. Both the lungs were studded with patches of pyæmic origin. Death in this case was due to a low pyæmic form of peritonitis and cellulitis.

The ninth case terminated fatally from pyæmia, on the eighteenth day, after the removal of a uric acid calculus, weighing 360 grains. The right pleural cavity was filled with sero-purulent fluid. The right lung contained at its posterior, and especially its lower aspect, numerous gangrenous patches, from the size of a sixpence to that of a shilling. There was nothing morbid about the prostate, bladder, or kidneys.

The cause of death in the tenth case was exhaustion. The patient was a very old, feeble man, much emaciated, with cataract in both eyes, and arcus senilis. The urine was albuminous and purulent. The stone was large, and he lost a considerable quantity of blood. Death occurred three hours after the operation, which was performed in the hope of relieving his great suffering.

In the eleventh case death occurred from uræmia, after the removal of a small calculus by the lateral section, on the day following the operation; no urine was secreted after the operation, which was followed by considerable hæmorrhage. The

kidneys were found to be extensively diseased, the right having a cyst at the upper part, of the size of an orange, and the left containing many small cysts. They were shrunken and fatty, and the bladder was thickened, and ulcerated. No infiltration of urine. The other organs were all healthy.

In the twelfth case death occurred after removal, by lateral section, of a uric acid calculus, 180 grains in weight, from a man aged 40 years. The perineum in this case was very narrow, and the operation was followed by a good deal of hæmorrhage. Death resulted on the sixteenth day, from erysipelas of the scrotum, which rapidly spread to the neighbouring tissues. The post-mortem examination revealed the kidneys containing cysts, the bladder thickened, but otherwise healthy, and the heart adherent to the pericardium at the apex of the left ventricle, the cardiac wall being thinned at a corresponding point. There were decolorized fibrinous clots in the right ventricle, and atheromatous patches in the aorta.

The thirteenth case was that of an Englishman, aged 44, who had recto-vesical fistula after injury, and subsequent calculus. The stone was removed by the lateral operation 7th January, 1869. He died of pyæmia and cardiac obstruction 18th February. The autopsy revealed extensive pyæmic mischief in the liver, numerous dead patches of tissue, and firm fibrinous coagula in the right cavities of the heart. The lungs were normal. The lithotomy wound had healed.

The fourteenth case was that of a feeble, aged native who had a uric acid and phosphatic calculus, weighing two ounces and five drachms, removed by lateral operation 25th September, 1869. The wound was nearly healed, when he sank from chronic diarrhœa the 27th November.

It will be observed that the deaths were, with few exceptions due to toxæmic causes—all pointing to an unhealthy state of the patients, or to unfavourable hygienic conditions. A tendency to pyæmia exists in the hospital, but the unfavourable results cannot be attributed altogether to local influences. The nature of the deaths, however, makes it evident that the com-

bination of unfavourable circumstances was very fatal. It is to be borne in mind that the subjects of the operation themselves were frequently most unfavourable.

The calculi were for the most part uric acid or uric acid coated with phosphates, with an occasional example of the oxalate of lime. The weight of the calculi varied from 21 grains, the smallest, to 1,271 grains, the largest. For the most part the patients had suffered from the disease for a considerable period before applying for relief, and had been proportionately damaged in constitution.*

The number of deaths was fourteen—being two of the median, and twelve of the lateral operations. The causes of death were :—

Pyæmic conditions . .	5	Erysipelas . . .	1
Peritonitis . . .	2	Uræmia	1
Cellulitis	1	Shock	1
Dysentery, diarrhœa . .	2	Kidney disease . . .	1

The age of the patients varied from 2½ years to 60 years.

The mortality was confined to patients above adult age, and was as follows :—

1 death at	40	Pyæmia.	1 death at	45	Pyæmia.
,,	24	,,	,,	30	Peritonitis.
,,	65	Dysentery.	,,	42	Pyæmia.
,,	35	Kidney disease.	,,	†60	Shock. Exhaustion.
,,	32	Cellulitis.	,,	60	Uræmia.
,,	50	Peritonitis.	,,	50	Diarrhœa.
,,	40	Erysipelas.			
,,	44	Pyæmia.			

Of the 45 cases there were	Hindoos . . .	29	—died	7
,, ,,	Mahomedan . .	15	,,	1
,, ,,	English . . .	1	,,	1

* Few seek relief in Bengal before the calculus begins to show the lancet-like phosphatic crystals on its surface; it is then that suffering becomes intense, and overcomes the reluctance to submit to seek relief.

† Called himself 60, but looked 70 or more.

And they were all, with three exceptions,* from Lower Bengal. Below the age of puberty there were :—

3 of 12 years old.	1 of 3 years old.
1 of 11 ,, ,,	2 of 2 ,, ,,
1 of 9 ,, ,,	These boys all recovered.†

As I have already said, the percentage of deaths among adults is very high, and almost entirely due to toxæmic causes.

To any one accustomed, as I have been, to lithotomy in the North-West, it is disheartening, and the operation is necessarily here regarded with apprehension. I unfortunately lost my records of numerous cases of lithotomy at Lucknow during the mutiny, and I do not remember the exact proportion of recoveries to deaths; but it was much more favourable than my results here, and compared well with the statistics of the North-West, Central Provinces, and Punjab, where the highest measure of success is obtained.

From information I collected some time ago from the records of the medical department, it appears that in six months of 1863, 554 cases of lithotomy occurred in the Punjab, North-West, and Central Provinces; and that of this number fifty-six died, or nearly one in ten. Mr. Coulson deduced from 1,743 cases of lateral lithotomy, that the average mortality is 1 in 6·93 cases. In France it is 1 in 5·7, and in Europe generally 1 in 5·14. Sir H. Thompson's statistics of lateral lithotomy give, out of 1,827 cases, 229 deaths; or as nearly as possible 1 in 8. The contrast of this death-rate with that in my record, which gives about 1 in 3·73, is very favourable. I think it is right that the facts should be known, because I believe that the more thoroughly the obstacles to satisfactory results are appreciated, the more likely they are to be ultimately removed.

It is unnecessary to detail the steps of an operation so thoroughly understood in all its forms; but I may just remark, that in the case of the lateral operation, I use the simple

* 1 Englishman. 1 Pathan. 1 Lucknow Mahomedan.

† One European child, aged 1 year 7 months, who was not in the hospital, also recovered.

laterally-grooved staff, the common lithotomy scalpel, and the ordinary forceps. I usually commence the incision at about an inch and a quarter or a half in front of the anus, and make an opening sufficiently large, in the perineal tissues and prostate, to permit of extraction of the calculus with as little violence to the tissues through which it passes as possible.

In the median operation (adapted only for small calculi) I use a staff grooved on the back, a common scalpel, a long probe as a guide, and a pair of ordinary lithotomy forceps. I make the perineal incision by puncture with the back of the scalpel towards the rectum, half an inch anterior to it—piercing directly into the membranous portion of the urethra, and then cutting forwards and outwards until an aperture large enough, after dilatation with the finger, is formed for removal of the calculus. Or I cut down on the staff, opening the membranous portion of the urethra. Then introducing a probe, as a guide to the finger, which is insinuated along it into the bladder, I gradually dilate the prostate until the forceps can be introduced, and the calculus withdrawn. I do not, as a general rule, introduce a tube after the operation, unless there be hæmorrhage; in which case I use a silver tube, with a piece of linen tied on at one end, like an umbrella, so that it can be stuffed with lint in the wound, when plugging is needed. Otherwise it is unnecessary, as the urine flows through the wound, without danger of infiltration, if this only be made freely and in the right direction.

In addition to these fifty cases, I supplement the record with five others which have occurred, out of the hospital, and slightly modify the death figure.

A. B., a healthy English gentleman, about 45 years of age. Uric acid calculus, size of a marble, removed by median section, the 2nd January. Recovered rapidly.

C. D., a stout healthy gentleman, aged 48 years. A phosphatic calculus, formed on a portion of a gutta-percha bougie, which had been broken into his bladder by accident some months previously. He died the 24th January, 1865, eight days after the operation, of a most violent and sudden invasion of

pyæmia. The left knee-joint was filled with pus, and the pericardium and left pleura with fluid.

E. F., an English child, aged 1 year and 7 months. Uric acid calculus, weighing 154 grains, was removed by the lateral operation 24th June; he recovered perfectly.

G. H., a Bengali gentleman, aged 17. Uric acid calculus, coated with triple phosphates, weighing one ounce, was removed by lateral section 20th August. Recovered. He had hæmorrhage after the operation.

I. J., a Bengali police officer, aged 48. Mulberry calculus coated with phosphates, removed 27th April, 1869. Recovered 20th June. A sinus remained for some time at the site of the wound, but ultimately closed. Calculus weighed about 200 grains.

The record, therefore, with this addition, stands thus:—

	Operations.	Deaths.
Hospital cases	50	14
Private ,, ...	5	1
Total .	55	15

Or 27·2 per cent.

It is worthy of remark that the recoveries have been more numerous during the last three or four years, and coincidentally with other evidences of improved hygienic condition.

TABLE OF VESICAL AND URETHRAL CALCULI REMOVED IN THE MEDICAL COLLEGE HOSPITAL.

Number.	Date of Admission.	Caste or Country.	Age.	Occupation.	Operation.	Date of Operation.	Calculus.		Result.	Date of Result.	Remarks.
							Its Composition.	Size or Weight.			
1	Nov. 11	H.	60	Servant ...	Lateral Lithotomy	Nov. 12	Uric Acid ...	One 100 grs. / One 94 grs.	Cured ...	Dec. 1	
2	Jan. 29	M.	40	Trader ...	Extracted with Forceps.	Jan. 29	Ditto ...	... ...	Ditto ...	Feb. 10	No incision.
3	April 30	H.	36	Farmer ...	Lateral Lithotomy...	May 5	Uric Acid coated with Phosphates.	360 grs.	Ditto ...	June 17	
4	Nov. 21	H.	12	Boy ...	Ditto ...	Nov. 24	Ditto ...	349 grs.	Ditto ...	Dec. 17	
5	Nov. 28	H.	28	Servant ...	Perineum opened ...	Nov. 28	Ditto ...	One 50 grs. / One 30 grs.	Ditto ...	Dec. 31	Median Section.
6	Jan. 5	H.	36	Sircar ...	Extracted with Forceps.	Jan. 5	Uric Acid ...	... ...	Ditto ...	Jan. 5	No incision.
7	May 15	M.	50	Farmer ...	Lateral Lithotomy...	May 18	Ditto ...	800 grs.	.....	June 16	Taken away by his friends whilst under treatment.
8	May 25	H.	70	Syce ...	Ditto ...	May 27	Phosphate of Lime ...	211 grs.	Ditto ...	July 3	
9	Feb. 10	M.	40	Farmer ...	Median Lithotomy...	Feb. 10	Uric Acid ...	86 stones, in all 42 grs.	Died ...	Mar. 7	Pyæmia.
10	April 9	H.	32	Ditto ...	Lateral Lithotomy...	April 10	Ditto coated with Phosphates.	100 grs.	Cured ...	April 29	
11	May 12	M.	12	Boy ...	Ditto ...	May 12	Ditto ...	150 grs.	Ditto ...	June 17	
12	July 18	M.	20	None ...	Ditto ...	July 19	Phosphatic ...	1,271 grs.	Died ...	Aug. 16	Pyæmia.
13	July 21	M.	65	Farmer ...	Ditto ...	July 22	Ditto	Ditto ...	Ditto ...	July 31	Dysentery.
14	Dec. 26	H.	38	Trader ...	Perineum opened ...	Dec. 26	Ditto ...	Size of a hard nut.	Ditto ...	Dec. 27	Kidney Disease.
15	Feb. 25	M.	69	Cultivator...	Lateral Lithotomy...	Feb. 27	Uric Acid ...	225 grs.	Cured ...	Mar. 23	
16	Mar. 2	H.	32	Servant ...	Ditto ...	Mar. 2	Ditto ...	576 grs.	Died ...	Mar. 6	Pelvic Cellulitis.
17	Mar. 30	H.	40	Barber ...	Prepuce removed and Urethra laid open.	April 1	Ditto ...	5 small ones ...	Cured ...	May 4	
18	May 28	H.	9	Boy ...	Median Lithotomy...	May 28	Mulberry ...	21 grs.	Ditto ...	June 10	

19	July 6	H.	2½	Child ...	Ditto ...	July 6	Fawn-colored Uric Acid	Small bean ...	Ditto ...	July 18		
20	July 8	H.	3	Ditto ...	Ditto ...	July 8 & Aug. 6	Ditto ...	Ditto ...	Ditto ...	Aug. 8		
21	Aug. 5	H.	11	Student ...	Lateral Lithotomy...	Aug. 6	Uric Acid coated with Phosphates.	1½ inch long, ¾ inch broad.	Ditto ...	Aug. 19		
22	Oct. 12	H.	25	Priest ...	Ditto ...	Oct. 12	Uric Acid ...	1,620 grs.	Ditto ...	Nov. 29		
23	Oct. 24	H.	28	None ...	Perineum opened ...	Oct. 25	Ditto ...	Ditto ...	Ditto ...	Ditto	Left hospital, doing well.	
24	Oct. 27	H.	50	Farmer ...	Lateral Lithotomy...	Oct. 28	Ditto ...	418 grs.	Ditto ...	Ditto		
25	Nov. 4	H.	50	Ditto ...	Ditto ...	Nov. 4	Triple Phosphate ...	230 grs.	Died ...	Nov. 9	Peritonitis.	
26	Nov. 11	M.	45	Ditto ...	Ditto ...	Nov. 14	Uric Acid ...	67 grs.	Ditto ...	Nov. 21	Pyæmia.	
27	Jan. 17	H.	12	Student ...	Ditto ...	Jan. 18	Oxalate of Lime, coated with Phosphates.	Ditto ...	Cured ...	Feb. 18		
28	April 17	M.	30	Farmer ...	Ditto ...	April 17	Oxalate of Lime ...	52 grs.	Died ...	April 24	Peritonitis.	
29	May 18	H.	24	Cobiraj ...	Perineum opened ...	May 18	Ditto ...	Ditto ...	Cured ...	June 9		
30	Aug. 29	H.	42	Farmer ...	Lateral Lithotomy...	Sept. 3	Uric Acid, coated with Phosphates.	360 grs.	Died ...	Sept. 20	Pyæmia.	
31	Sept. 10	M.	32	Choprassie	Ditto ...	Sept. 11	Ditto, no coating ...	7 Tolahs ...	Cured ...	Oct. 9		
32	Nov. 2	H.	60	Bearer ...	Ditto ...	Nov. 7	Ditto ...	A big one ...	Died ...	Nov. 7	Shock.	
33	Jan. 6	M.	38	Farmer ...	Ditto ...	Jan. 8	Uric Acid ...	282 grs.	Cured ...	Feb. 11		
34	Jan. 23	H.	41	Broker ...	Ditto ...	Jan. 27	Ditto ...	235 grs.	Ditto ...	Mar. 4		
35	April 30	H.	45	Servant ...	Ditto ...	May 3	Ditto ...	930 grs.	Ditto ...	June 11		
36	May 22	M.	32	Farmer ...	Ditto ...	May 31	Ditto ...	¾ oz.	Ditto ...	July 14		
37	June 7	H.	2½	Child ...	Ditto ...	June 10	Ditto, coated with Phosphates.	120 grs.	Ditto ...	June 25		
38	July 19	H.	55	Barber ...	Ditto ...	July 20	Ditto ...	2⅛ oz.	Died ...	July 21	Uræmia from fatty kidney.	
39	Sept. 30	M.	50	Farmer ...	Ditto ...	Sept. 18	Ditto ...	4 drachms ...	Cured ...	Oct. 5		
40	Nov. 6	H.	40	Coolie ...	Ditto ...	Nov. 9	Uric Acid ...	180 grs.	Died ...	Nov. 24	Erysipelas.	
41	Mar. 2	M.	32	Farmer ...	Ditto ...	Mar. 6	Ditto ...	3 drachms ...	Cured ...	April 13		
42	May 3	H.	40	Ditto ...	Ditto ...	May 9	Uric Acid, coated with Phosphates.	1 drachm ...	Ditto ...	June 3		
43	Dec. 16	Eng.	44	Conductor...	Ditto ...	Jan. 7	Ditto ...	131 grs.	Died ...	Feb. 18	Pyæmia and Cardiac Obstruction.	
44	Sept. 24	H.	50	None ...	Ditto ...	Sept. 25	Ditto ...	2 oz. 5 drs. ...	Ditto ...	Nov. 27	Diarrhœa.	
45	April 1	Pathan	55	Jemmadar, Cavalry.	Ditto ...	April 4	Ditto ...	383 grs.	Cured ...	May 1		
46	June 22	H.	36	Peasant ...	Ditto ...	June 27	Triple Phosphate ...	140 grs.	Ditto ...	Oct. 6		
47	Oct. 9	H.	24	Servant ...	Ditto ...	Oct. 10	Ditto ...	160 grs.	Ditto ...	Nov. 4		
48	Feb. 18	H.	19	Student ...	Median Lithotomy...	Feb. 23	Phosphatic ...	28 grs.	Ditto ...	Feb. 17	Had been cut laterally 6 years previously.	
49	Nov. 10	H.	50	Farmer ...	Lateral Lithotomy...	Nov. 11	Uric Acid ...	88 grs.	Ditto ...	Dec. 8		
50	Jan. 24	M.	31	Ditto ...	Ditto ...	Jan. 28	Uric Acid, coated with Phosphates.	187 grs.	Ditto ...	Still in hospital		

ELEPHANTIASIS OF THE LEG.

Case I.—*Elephantiasis Treated by Removal of the Tumour and Ligature of the Femoral Artery.*

I have on a former occasion * described two cases of elephantiasis of the leg which were treated by ligature of the femoral artery, according to the recommendation of Professor Butcher, of Dublin, and Dr. Carnochan, of New York. The result of these cases was not encouraging. The first patient died of pyæmia on the nineteenth day. The limb had diminished considerably, and so far it promised to do well; but his death prevented any opinion being formed as to the probability of permanent decrease in the hypertrophy, so that, beyond the fact of an immediate diminution in the swelling, as a result of the operation and the consequent bandaging, nothing definite could be arrived at from this case. My own impression is, that the reduction of the swelling was due more to the bandaging and rest in the recumbent posture than to the ligature of the artery; and I have good reason for believing this, as I have frequently observed in the elephantoid legs of those who have been operated on for scrotal elephantiasis that, with the necessary rest in bed after the operation, the leg diminished considerably —to increase again when the recumbent posture was no longer continued. Elephantiasis of the leg, like elephantiasis of the scrotum, is the local expression of a constitutional disorder, and I do not see why temporary deprivation of the blood-supply to

* "Clinical Surgery in India," p. 682.

the limb should have any permanently curative effect on the local disease. The anastomotic circulation provides for the nutrition of the limb, and, indeed, it is probable that the part especially diseased, the cutis, is there even more vigorously supplied than under ordinary circumstances; for the result of the cutaneous hypertrophy must certainly be an enlargement of the cutaneous blood-vessels, and as these are concerned in carrying on the anastomotic circulation when the main trunk is obstructed, it appears hardly probable that this condition can be conducive to a curative action in the affected part. Nor is it at all probable, I think, that a mere change in the mechanical arrangements for the distribution of blood to the limb can have any effect in removing what is only a local symptom of a constitutional disease.

The result of the second case tends, I think, to show that this view is correct, for whilst there was a marked diminution at first after the artery had been tied, the swelling gradually returned as the man recovered from the operation, and when I saw him some time afterwards he was just as bad as when I tied the artery.

A third case (that I now record) is not more satisfactory. There was the same temporary diminution of size during the rest and confinement to bed after the operation; but when the patient had recovered the swelling slowly returned, and he was, six months after the operation, just as bad in respect of elephantiasis of the leg, as when the femoral artery was tied.

I have before referred to the improvement that takes place in the constitutional health after the removal of a scrotal tumour—the absence of the periodically recurring paroxysms of elephantoid fever and the consequent cachectic condition it induces. The removal of an ever present source of blood dyscrasia is attended with the best results, and patients have frequently told me that the great relief they had obtained was not so much due to the removal of the abnormal growth, as to the cessation of the periodic fever which caused them such great distress. In this case the same improvement took place, and

the elephantoid fever was removed with the tumour; but notwithstanding the amendment in the general health, the leg returned to its original size, proving in this case, as in the others, that the ligature of the artery had not been followed by any permanent benefit to the limb.

G. R., aged 45, a Bengali sircar, born near Burdwan, who came to Calcutta about nine years ago, and has lived there since, was admitted April 20th, 1869, with elephantiasis of the scrotum, from which he had suffered for ten years, and of the left leg, which commenced about fifteen years ago. He had been subject to attacks of elephantoid fever twice a month, and lately to even more frequent recurrences, attributing it, as his countrymen generally do, not to the disease, but to lunar influences. After his admission he had only one recurrence of the fever before he was operated on. This was probably due to change of air and the influence of quinine, iron, and perhaps the improved diet. When admitted he was in a wretched state of health, anæmic, flabby, and apparently in a state of fatty degeneration, the heart's action being so feeble that the sounds were barely audible, and the areolar tissue of the limbs in an incipient state of anasarca, due no doubt to the impoverished condition of blood caused by malaria and constant recurrences of elephantoid fever.

It was not until June 28th that he was considered fit to undergo an operation, and on that day the scrotal tumour was removed in the usual way. It weighed 2 lbs. 5 ozs. after removal. He bore the operation fairly and recovered, though slowly. On October 4th, when the femoral artery was tied, the wound was still not quite cicatrized.

The dimensions of the left leg were as follows before the operation:—September 28th; just above ankle, 13 in.; below knee, 12½ in.; instep, 12 in. The right leg was also very slightly affected. The corresponding measurements were: Just above ankle, 8 in.; below knee, 11 in.; instep, 9½ in.

On October 4th, I placed a ligature on the femoral artery, at the apex of Scarpa's triangle. It was enclosed in a fatty

sheath, and required great caution in passing the ligature to avoid injuring the femoral vein. The operation was satisfactorily completed, and the limb was swathed in cotton-wool and wrapped in flannel bandage. The wound was stitched with horsehair, and dressed with carbolic oil.

5th.—He is doing well, slept, and complains only of a little pain in the wound. The temperature this morning is as follows: axilla, 100·4°; left ham, 100°; right ham, 100·2°; left toes, 97°; right toes, 99·2°. No numbness or tingling of the limb; pulse 94; tongue clean; no pain beyond slight aching behind left knee. Wound dressed with carbolic oil.

6th.—8 a.m.: Had slight fever yesterday, none at present; no pain or numbness of the leg; pulse 94; purulent discharge beginning from the wound; tongue clean. Temperature: axilla, 99°; left ham, 98·3°; right ham, 96·5°; left toes, 95·6°; right toes, 92°. Thus the affected limb is two degrees warmer than the other limb. Measurements of the left leg this morning are as follows:—

	October 6th.	October 4th.
Above the ankle	12½ inches	13 inches.
Below the knee	13 ,,	12½ ,,
At the instep	11 ,,	13 ,,

The foot has become smaller, and the skin of instep shrivelled.

7th.—Was feverish again during the day; pulse 96; integument above the wound slightly inflamed; apply argenti nitrat. solution. This morning reddish pus discharged from the wound. Temperature: axilla, 98°; left ham, 95°; right ham, 94°; left toes, 92·6°; right toes, 93°. Measurements: instep, 11 in.; above ankle, 11½ in.; below knee, 12½ in. The leg to be anointed with an ointment of iodide of lead, and he is to take a solution of quinine when he is free from fever. He has no numbness in the leg.

8th.—Slight fever yesterday, but none at present. Wound looks healthy. Two ligatures in the wound came away this morning. Temperature: axilla, 99°; right ham, 96°; left ham, 95·4°; right toes, 93·2°; left toes, 92·6°.

11*th.*—Doing very well. Sutures removed from the wound, which is rapidly healing. Pulse 80; no fever. Temperature: axilla, 97·8°; right ham, 96·8°; left ham, 96°; right toes, 93·6°; left toes, 94°. Measurements: instep, 10⅝ in.; above ankle, 10¾ in.; below knee, 12⅜ in. He is in very fair general health now.

12*th.*—Ligature on femoral artery came away to-day. Temperature: axilla, 98°; left ham, 96°; right ham, 97·2°; left toes, 95°; right toes, 96°. Measurements: instep, 10½ in.; above ankle, 11½ in.; below knee, 12¼ in. He now takes quinine and iron.

19*th.*—He is doing well. The wound is nearly healed. Temperature: axilla, 98°; left ham, 96·3°; right ham, 95·8°; left toes, 93·8°; right toes, 90·4°. Measurements: instep, 10½ in.; above ankle, 10½ in.; below knee, 11¼ in.

22*nd.*—Doing well. The temperature of the limbs is about equal. The wound is healed. He eats and sleeps well. Measurements: instep, 10⅝ in.; above ankle, 10⅝ in.; below knee, 11 in.

24*th.*—Has been walking about the ward since last report. He says the leg and foot feel lighter.

Measurements.

	October 24th.	September 28th.	Difference.
At the instep . . .	10 in.	12 in.	2 in.
Above the ankle . . .	10 in.	13 in.	3 in.
Below the knee . .	11 in.	12½ in.	1½ in.

November 16*th.*—The wound has quite healed for some days. Measurements: instep, 10 in.; above ankle, 10 in.; below knee, 11 in.

23*rd.*—The foot and leg have been steadily increasing in size during the last few days. Instep, 10¼ in.; above ankle, 10¼ in.; below knee, 11 in.

December 4*th.*—He is very well, but the leg is gradually increasing. Instep, 10½ in.; above ankle, 10½ in.; below knee, 11 in. It should be noted that the scrotal wound is not yet quite cicatrized.

13*th*.—For the last few days he has had low remittent fever, and for change of air he has been transferred to another ward.

27*th*.—He returned to my ward weak, but recovered from fever. Measurements: instep, $10\frac{1}{2}$ in.; above ankle, $10\frac{1}{4}$ in; below knee, $10\frac{1}{4}$ in. He is taking quinine. Scrotal wound almost cicatrized.

30*th*.—He would not remain in hospital any longer; feeling quite well he took his discharge.

Measurements.

	On discharge.	At operation.	Difference.
At the instep . . .	$10\frac{1}{2}$ in.	12 in.	$1\frac{1}{2}$ in.
Above the ankle . . .	$10\frac{1}{4}$ in.	13 in.	$2\frac{3}{4}$ in.
Below the knee . . .	$10\frac{1}{4}$ in.	12 in.	$1\frac{3}{4}$ in.

So far there was an mprovement, the leg being $1\frac{3}{4}$ in. smaller below the knee, $2\frac{3}{4}$ in. above the ankle, and $1\frac{1}{2}$ in. round the instep than on admission; but the improvement was not permanent, and, since his discharge, the limb has already almost returned to the original size.

Measurements on April 16th, 1870, six months after the operation:—

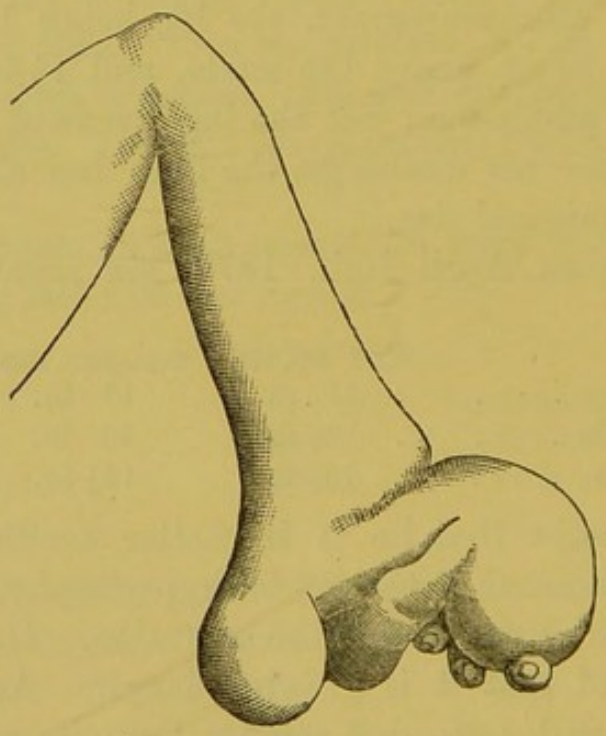
	April 6th, 1870.	Sept. 28th, 1869.	Difference.
At the instep . . .	11 in.	12 in.	1 in.
Above the ankle . . .	$12\frac{1}{4}$ in.	13 in.	$\frac{3}{4}$ in.
Below the knee . . .	$12\frac{3}{4}$ in.	$12\frac{1}{2}$ in.	$\frac{1}{4}$ in.

The patient says that he is in better health, and much relieved by the removal of the scrotal hypertrophy, but that his leg is now just as it was before the operation. He thinks it is just as large, and that it is growing larger. As a matter of fact, the leg is still somewhat smaller than it was before the operation, but it is gradually returning to the original dimensions. When he left the hospital on December 30th, the measurements were: instep, $10\frac{1}{2}$ in.; above ankle, $10\frac{1}{4}$ in.; below knee, $10\frac{1}{4}$ in. On April 16th it had increased to: instep, 11 in., increase $\frac{1}{2}$ in.; above ankle, $12\frac{1}{4}$ in., increase 2 in.; below knee, $12\frac{3}{4}$ in., increase $2\frac{1}{2}$ in.; so that I think there can

be no doubt that in this case also the operation has not conferred any permanent benefit.

CASE 2.—*Hypertrophy of the Leg, probably due to Syphilo-Elephantoid Disease.*

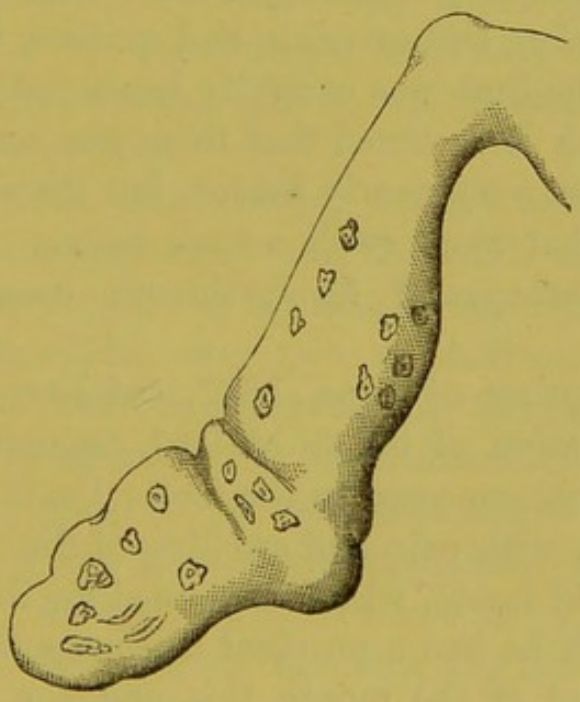
B., a Hindoo peasant, aged 22 years, was admitted on January 16th, 1867, with hypertrophy of the right leg and foot. He said he had had syphilis a year previously, and had been mercurialized by fumigation; an eruption of constitutional syphilis followed, and the cicatrices indicate rupia as the form the disease assumed. The ulcers made their appearance in successive crops over the body and extremities, and at the same



Outer Aspect, January 23, 1867.

time the right foot and leg began slowly but steadily to enlarge, until it attained its present enormous magnitude. The swelling commenced in the foot, but gradually extended upwards, until the leg was involved. There is no history of any periodic recurrences of fever, nor has there been any pain attending the

swelling. The patient was an unhealthy, cachectic-looking individual, marked all over with rupial cicatrices, some of which were so extensive in the left hand as to have contracted the wrist-joint. The appearance of the foot and leg on admission is depicted in the accompanying sketch. The measurements are also noted. The ulcerated spots in the hypertrophied leg were covered with patches of sloughy-looking matter. The swelling itself seemed to depend on hypertrophy of the skin, and had exactly the appearance of elephantiasis. The swelling was of a peculiar character, large lobular folds of integument concealing the natural shape of the foot, and hiding the toes almost entirely. I am not certain, indeed, that it was not that disease, though the history of the patient, the absence of elephantiasis in other parts of the body, and the mode of its growth



Inner aspect of leg and foot, January 23, 1867. Measurements: Instep, 18½ in.; above ankle, 14¼ in.; below knee, 11 in.

incline me to consider it rather syphilitic than elephantoid in its nature. It is true the man was a native of Bengal, and therefore liable to be the subject of elephantiasis; but the previous history, as well as the results of treatment, lead me to believe it had more affinity with syphilis than with elephan-

tiasis. He was ordered to keep in bed, and was put under a tonic and nutritive plan of treatment, quinine and iron, good food, and a little wine. The sores were dressed with simple applications, and a bandage was applied to the thickened limb.

In the beginning of February his bowels became relaxed, for which Dover's powder was administered. The ulcers were healing, and the limb evidently somewhat diminishing. Bitter tonics were next prescribed. In the beginning of March the ulcers were cicatrizing; general health good; very little, if any, diminution, in the size of the limb. Towards the middle of April the ulcers had nearly all healed. On April 27th the measurements were: instep, 18 in.; above ankle, 11 in.; below knee, 10 in.—showing a slight diminution in the size of the limb. The unguentum plumbi iodidi was ordered to be rubbed in morning and evening, and quinine, with other tonics, continued. The limb was carefully bandaged day and night.

On May 25th it is noted that there was no fresh ulceration. The ulcers were very nearly healed, but the upper part of the leg was somewhat more swollen than before. There had been no marked paroxysmal fever, though occasionally he was feverish.

In the beginning of June, 1867, cod-liver oil was ordered, and the application of iodide of lead discontinued. On June 12th a new ulcer appeared in the foot. On the 18th he had an attack of fever, with pain and swelling of the leg (this was very like elephantoid fever), which continued for three days.

On July 5th he had a purulent discharge from the right ear, but by the end of the month this and the ulcers were well. About the middle of July iodide of potassium was prescribed. This brought on catarrhal symptoms, but it was continued, as the leg sensibly diminished under its use. The iodide of lead ointment was again employed, and over the most hypertrophied part of the integument of the foot a blister was applied on the 19th, and kept open for some time. The foot and lower part of the leg had considerably diminished by this time, but the

upper part of the leg was larger. The measurements were: at instep, 14 in.; below knee, 13 in. By the middle of September the blistered surface was allowed to heal.

He continued to improve under the iodide of potassium, and in October the measurements were: instep, $13\frac{1}{8}$ in.; above ankle, 11 in.; below knee, $10\frac{3}{8}$ in. A blister was now applied to the leg, and the potass. iodid. continued as before, gr. iij. ter die. He had another attack of fever on October 22nd, with irritability of stomach, which passed over in three or four days.

On November 20th an ulcer made its appearance at the root of the third toe, which healed under an opium lotion. The blister was renewed on the leg.

About January 10th, 1868, he had enlargement of the cervical glands, which soon passed away under the influence of tincture of iodine. On the 14th had fever and diarrhœa, which soon ceased. The potass. iodid. was continued, and the blistered surface kept open.

By February 15th the blistered surface had been allowed to heal, and now the unguent. hydr. biniodidi was rubbed into the leg. The swelling of the leg had by this time considerably abated. The biniodide, after two applications, brought on violent salivation, with swelling of the tongue and cheeks. This soon passed away under the application of astringent and brandy-and-water gargles. It left him very weak and depressed, but the leg had diminished considerably. The measurements now were: instep, $11\frac{1}{2}$ in.; above ankle, 9 in.; below knee, 9 in. It is evident from this that the blister, the potass. iodid., and the biniodide ointment had a marked effect.

By the beginning of March the salivation and ulceration of the mouth, the result of inunctions of the biniodide of mercury, had passed away. A more solid diet was now given, and the iodide of potassium resumed April 9th. The leg was again blistered. He had an attack of bronchitis about this time.

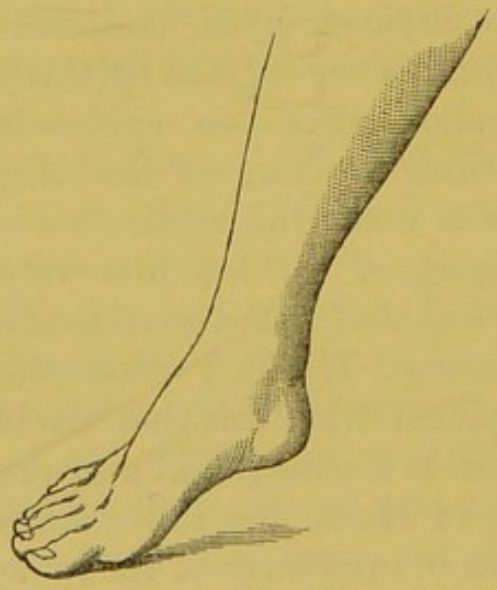
On May 15th he was ordered nitro-muriatic acid and chiretta, and for some time he continued to improve in general health.

On June 2nd the potass. iodid. was resumed, and the leg and foot again blistered, the thickening still diminishing.

On the 28th the blistered leg had healed, and pressure with strapping was tried. This was continued for some days, with apparent benefit.

This again, on August 16th, gave place to a repetition of the blister, and, on September 11th, the unguent. iodidi plumbi was again ordered to be rubbed in. Under this treatment he has continued ever since, and, although the progress has been slow, it has been nevertheless most satisfactory. The swelling has almost disappeared, the toes are all visible, and naturally placed. The integument of the leg has become soft and pliant, and the power of walking and using the limb naturally has been almost entirely restored. He begins to walk with the natural spring from the ball and end of the great toe, and his general health is better, perhaps, than he has ever known it to be.

He is still, May 11th, 1869, in hospital, but is anxious to go out, and his wishes will shortly be complied with. He still



Measurements, April 29, 1869: Instep, 8¼ in.; above ankle, 7⅞ in.; below knee, 10 in.

takes potass. iodid. gr. iij. ter die, and has the leg bandaged, and occasionally rubbed with the unguent. plumbi iodidi. The present measurements are, as compared with those on admis-

sion into hospital on January 16th, 1867, or nearly two years and four months before :—

	Jan. 23, 1867.	April 29, 1869.
At the instep . . .	18½ in.	8¼ in.
Above the ankle . . .	14¼ in.	7⅜ in.
Below the knee . . .	11 in.	10 in.

So that a diminution has taken place at the instep of 10¼ inches; above ankle, 6⅞ inches; below knee, 1 inch. The measurements of the sound leg, as compared with the diseased one, are as follow :—

	Right.	Left.
At the instep . . .	7¾ in.	8¼ in.
Above the ankle . . .	7⅛ in.	8 in.
Below the knee . . .	9¼ in.	9½ in.

These measurements were taken on May 13th, by which time the diseased leg had actually become rather smaller than the sound one. The progress of this case was very slow, but the result has been very satisfactory; for whether due to elephantiasis or syphilis, or to a combination of both, it was a most serious disease of the limb. The result of treatment certainly seems to point to syphilis as the origin of the morbid condition; but the fact of the man being a resident of Bengal, and that the progress of the disease was at times accompanied by paroxysms of fever, together with the general appearance and similarity of the hypertrophy to that of elephantiasis, leave a doubt as to whether it may not have been a combination of both diseases. It is the only instance in which I have seen either local or constitutional treatment make any permanent impression upon elephantiasis, if such were the disease; and it therefore encourages me to hope that success may attend constitutional treatment, if persevered in, and especially if there be any probability of the disease being combined with constitutional syphilis. Had the femoral artery been ligatured in this case, no doubt the improvement would have had the appearance of

being due to the operation; and it is very suggestive of how far the reputed favourable results of the cases recorded in which the artery has been tied may not have been due to the prolonged rest or other causes altogether apart from the operation. I think that this suggestion is perfectly fair in reference to an operation which, so far as I can understand, has no physiological reasoning to recommend it. It is also remarkable that the removal of the local disease was followed by removal of the constitutional symptoms.

ELEPHANTIASIS OF THE SCROTUM.

1.—*Statistics of Operations for Scrotal Tumour in Bengal.*

The following summary of 115 operations performed from 1859 up to February, 1866, was drawn up from the returns by Baboo Gopaul Chunder Roy :—

Of the 115 cases, ninety-four occurred in Hindoos, and fourteen in Mussulmans. The number of deaths after operation was altogether seventeen. The most frequent cause of death was pyæmia, under which seven sank ; after this came diarrhœa and exhaustion, which proved fatal in six instances ; whilst shock led to death in two cases, tetanus and gangrene each in one case.

In 1859 five cases were admitted, all the patients coming from Bengal, and all being Hindoos. The smallest tumour removed in the course of the year weighed 12 lb., the largest 23 lb. 3 oz. In both instances the patients died after the operation from pyæmia.

In 1860 there were five cases of enlarged scrotum, and all were Hindoos. One tumour weighed 65 lb., and its removal was followed by death from shock and hæmorrhage. Another weighing 19 lb. was removed and proved fatal, death in this instance being caused by pyæmia.

The admissions amounted in 1861 to twelve, three patients being Mahomedans, the rest Hindoos. The largest tumour removed weighed 58 lb. 9 oz. ; the disease had lasted six years. The patient, a native of Lucknow, died after the operation, which was unusually severe, as the tumour had a broad base,

and was very vascular. Part of the penis had also to be removed. Gangrenous deposits were found after death in the lungs and kidneys, and the pleura was inflamed. In another case, in which the disease had lasted eight years, although the tumour only weighed 2½ lb., the patient, a Hindoo, also died from pyæmia. No pus was found in any of the viscera in this instance, but the right arm and shoulder were greatly swollen, and contained pus just beginning to form. A Mussulman syce was operated on for enlarged scrotum on August 6th. The tumour when removed weighed 14½ lb. On the 13th the patient died of tetanus. In one instance, where the tumour weighed 9¾ lb., there existed a complication in the form of elephantiasis of the right leg, and in another the tumour weighed 46 lb.

In 1862 twenty cases were admitted, the ages of the patients varying from 20 to 50—two being Mussulmans, the rest Hindoos. The tumours were generally smaller than those already mentioned, but in one successful case it weighed as much as 75 lb. 9 oz., the entire weight of the patient before the operation being only 198 lb. In the case just mentioned one of the testicles being disorganized was removed. In three instances the tumour was preputial. Only two deaths occurred this year—in one case the penis sloughed off, and the patient died of exhaustion consequent on the sloughing; he had also suffered from fever and enlargement of the spleen. The other fatal case resulted from exhaustion following the formation of a prostatic abscess. In both death occurred a considerable time after the operation.

In 1863 there were twenty-three persons operated on, two being Mussulmans, the rest Hindoos. Two died—one from pyæmia after sloughing of the left testicle; the other had gangrene of both testes, and on examining the body after death it was found that the heart was loaded with fat, and that its right side contained decolorized clots extending into the pulmonary artery. The liver was also fatty, and the right kidney contained a calculus. In neither of these cases was the tumour

unusually large—weighing in the one case 7 lb., and in the other 8½ lb. The largest removed in this year weighed 34 lb. In this case, which resulted favourably, the right testicle was adherent to the diseased mass, and was extirpated. In another instance, where the disease had lasted two years, and in which the tumour weighed 5 lb. 7 oz., it was found that the right tunica vaginalis was ossified and the right testicle diseased. The latter was therefore cut away, and he rapidly recovered. In a Hindoo who had laboured under the disease for three years, the tumour, which consisted chiefly of hypertrophied prepuce weighed only 15 oz., whilst in another Mussulman the disease had only lasted nine days, yet the tumour weighed 1 lb. 3 oz.

In 1864 there were twenty-one operations, three of the patients being Mussulmans, the remainder Hindoos, one of the latter having suffered from the disease for twenty years. In this case the right testicle was found to be diseased, and was removed with the tumour, which weighed 9 lb. 8 oz. The patient left the hospital cured three months after the operation. Three of the twenty-one died, one after being two months in the hospital, from chronic diarrhœa, another after being six weeks in the hospital from dysentery, and the third from exhaustion. Hospital gangrene having attacked him, his penis sloughed off; the gangrene extended, dysentery supervened, and the patient sank two months after the operation. The majority of the tumours removed during 1864 were small, the largest weighing 14 lb. 5 oz., the majority little more than a pound.

During 1865 twenty-two men, four being Mussulmans, the rest Hindoos, were operated on, with a fatal result in three instances. One man aged 40, died six weeks after the tumour, which weighed 3 lb. 4 oz., was removed. Death was caused by exhaustion, the case being complicated by an inguinal hernia of the right side; another Hindoo died in less than a month after the removal of the tumour weighing 4 lb., also from exhaustion. The remaining death

was caused by pyæmia. The patient—a Hindoo, aged 36—was relieved of a tumour weighing 6 lb. on December 4th, but succumbed on the 27th of the same month. On inspecting the body, about 8 oz. of thick pus was found in the right pleural cavity; the lungs were scattered over with dead pulmonic patches, some of the deeper ones being surrounded by a collection of pus. Both the liver and spleen were healthy. Only one large tumour (it weighed 35 lb.) was removed this year. The case terminated favourably.

The following abstracts of cases occurring during the years 1866—70 have been furnished me by my house-surgeon, Baboo Ishen Chunder Roy :—

1866.

Case 1.—S. D., a Hindoo harness-maker, aged 50, resident of Entally, Calcutta, admitted December 19th, 1865, with a tumour of seven years' standing. Operated on January 2nd. The tumour weighed 3 lb. 13 oz. Died of tetanus on January 18th. There was hydrocele of the right side, and the tunica vaginalis was thickened and cartilaginous. No post-mortem examination.

Case 2.—B., a Hindoo shoemaker, of Bhowanipore, aged 32, admitted January 2nd with a tumour of twelve years' standing. It weighed 8 lb. after operation, which was performed on January 4th. There was hydrocele on both sides, and the sacs were thickened and cartilaginous. He had elephantiasis of the left leg, and has had syphilis. Discharged cured March 11th.

Case 3.—B., a Hindoo harness-maker, aged 36, of Toltollah, Calcutta, admitted December 20th, 1865, with a tumour of ten years' standing. Has had syphilis, and elephantoid fever. Was operated on on January 4th. The tumour weighed 4 lb. There was no hydrocele; testicles healthy. Discharged cured March 19th.

Case 4.—K. C., a Hindoo labourer, aged 32, of Collinga,

Calcutta, admitted January 2nd with a tumour of six years' standing. There was no elephantiasis of the legs. After operation on the 8th, the tumour weighed 22 lb. There was hydrocele of the right side; testicles were healthy. Died of pyæmia on January 20th. No post-mortem permitted.

Case 5.—I., a Hindoo, aged 25, of Bally, admitted October 16th, 1865, with a tumour of two months' growth. No elephantiasis of the legs nor hydrocele. Never had elephantoid fever. Has had syphilis. By the application of biniodide of mercury and the internal administration of iodine, the scrotum for a time decreased in size, but as no further improvement took place, the growth was removed by operation on January 18th. He was discharged cured on April 7th.

Case 6.—B. M. G., a Hindoo coolie, aged 40, of Calcutta, admitted January 22nd with a tumour of four years' growth, which weighed 1 lb. 10 oz. after removal on the 24th. There was no hydrocele of the right side, no elephantiasis of the legs. Has had syphilis. Had elephantoid fever. The testicles were healthy. Died of pyæmia on February 23rd. No post-mortem permitted.

Case 7.—G. S., a Mahomedan farmer, aged 50, of Burdwan, admitted January 25th with a tumour of twenty-five years' growth, which weighed 4 lb. after removal on February 1st. There was double hydrocele, but no elephantiasis of the legs. Has had syphilis; was subject to elephantoid fever. Died on February 9th. Post-mortem:—Fibrinous clot in the right side of the heart, extending to the minute ramifications of the pulmonary artery. Pulmonary obstruction and fibrinous clot in the right side of the heart.

Case 8.—M. C., a Hindoo shopkeeper, aged 28, of Sankari Tollah, Calcutta, admitted April 27th with a tumour of two years' growth, which weighed 2 lb. 12 oz. after removal on May 1st. There was double hydrocele, but no elephantiasis of the legs. Was subject to elephantoid fever, and has had syphilis. The testicles were quite healthy. Discharged cured July 8th.

Case 9.—R. B., an East Indian, aged 37, of Calcutta,

admitted May 18th with a tumour of seven years' growth, which weighed 3 lb. 10 oz. after operation on the 22nd. There was hydrocele on both sides, but no elephantiasis of the legs. No history of elephantoid fever, but has had syphilis. The testicles were healthy. Discharged cured September 15th.

Case 10.—B., a Hindoo washerman, aged 60, of Bhowanipore, admitted June 8th, with a tumour of twenty years' duration, which weighed 2 lb. 12 oz. after operation on the 19th. There was hæmatocele of the right side, but no elephantiasis of the legs. Has had elephantoid fever and syphilis. The testicles were healthy. Discharged cured August 30th.

Case 11.—N., a Hindoo, aged 25, of Calcutta, admitted June 25th with a tumour of six years' duration, which weighed 3 lb. after operation on July 5th. There was no hydrocele. Had elephantiasis of the right leg. Was subject to elephantoid fever, and has had syphilis. The testicles were healthy; he was discharged cured August 30th.

Case 12.—B. C. G., a Brahmin, aged 40, of Nuddea, admitted June 27th with a tumour of about six months' duration, complicated with stricture of the urethra and urinary fistula. The tumour weighed 1 lb. after operation on August 17th. It was very vascular. There was neither elephantiasis of the legs, hydrocele, elephantoid fever, nor syphilis, but the left testicle was found to be atrophied. Discharged cured October 15th.

Case 13.—G., a Mahomedan tailor, aged 28, of Barrackpore, admitted August 15th with a tumour of one year's growth, which weighed 2 lb. 10 oz. after removal on the 24th. There was left hydrocele, but no elephantiasis of the legs. Was subject to elephantoid fever, but has not had syphilis. The testicles were healthy. He was discharged cured October 23rd.

Case 14.—J., a Hindoo, aged 45, of Calcutta, admitted August 24th with a tumour of two years' duration, which weighed 3 lb. after removal on September 3rd. There was hydrocele of the left side, but no elephantiasis of the legs. Has had elephantoid fever, but never had syphilis. The testicles

were healthy. He sank after the operation, and died of pulmonary obstruction September 10th. Post-mortem:—Decolorized clot from the venæ cavæ, through the right side of the heart, into the branches of the pulmonary artery; some coagula in the pulmonary veins also, and in the aorta, attached to its wall, and extending up in a tapering form to near the opening of the left subclavian. Other organs healthy, excepting the kidneys, which were pale and flabby.

Case 15.—S. C. G., a Hindoo coolie, aged 50, of Serampore, admitted August 13th with a tumour of two months' growth, which weighed 2 lb. 15 oz. after operation on September 3rd. There was hæmatocele on the left side, and hydrocele on the right, but there was no elephantiasis elsewhere. Has had syphilis, but there was no history of elephantoid fever. The testicles were healthy. Discharged cured November 15th.

Case 16.—H., a Hindoo shopkeeper, aged 31, of Chandney (Calcutta), admitted August 24th, with a tumour of four years' duration. Had been tapped two years ago, but it increased subsequently. It weighed 2lb. 10oz. after operation on September 4th. There was hydrocele of the right side, but no elephantiasis elsewhere. Has had syphilis. No regular elephantoid fever. The testicles were healthy. His father suffered from the disease. Discharged cured October 29th.

1867.

Case 1.—G., a Hindoo washerman, aged 30, of Calcutta, admitted January 2nd with a tumour of three years' growth, which weighed 1 lb. 8 oz. after operation on the 16th. There was hydrocele on both sides. Never had syphilis, but had elephantoid fever. The testicles were preserved. He came in very low, and was threatened with pyæmia, but recovered and went out cured April 29th.

Case 2.—R., a Hindoo sweeper, aged 60, of Calcutta, admitted February 15th with a tumour of ten years' growth, which weighed 11 lb. after operation on February 20th. There was a small hydrocele on either side, no other elephanti-

asis; no history of syphilis, but had elephantoid fever. The testicles were healthy; he died of fatty degeneration of the heart on March 23rd. The wound was healing. Post-mortem examination:—Fatty, flabby heart—walls of the right ventricle thin. A firm white clot in the right ventricle passing for some distance into the pulmonary arteries.

Case 3.—K. M., a Hindoo farmer, aged 45, of Moorshedabad, admitted February 20th, with a tumour of four years' growth, which weighed 12 lb. 11 oz. after operation on the 22nd. There was no hydrocele or elephantiasis of the legs; had elephantoid fever; never had syphilis. Testicles were healthy. Discharged cured on April 24th.

Case 4.—G. C., a Hindoo barber, aged 25, of Calcutta, admitted April 15th, with a tumour of five years' duration, which had once been tapped, and 16 oz. of fluid withdrawn from the left side. The tumour weighed 4 lb. 11 oz. after operation on May 3rd. There was still some hydrocele on the left side. Died of pyæmia on May 12th, with puriform effusion under the peritoneum. Post-mortem examination:—Lower lobes of both lungs consolidated. Lymphy deposit at the base of the right lung; some fluid in the right pleura; heart contracted, contained no clots, but only frothy blood; sub-peritoneal purulent collection down to the testicles; and the stomach strongly adherent to the colon and the posterior wall of abdomen.

Case 5.—S. B., a Mahomedan, aged 25, of Jamulpore, admitted May 22nd, with a rapidly growing, painful scrotal tumour of one month's duration, which weighed 1 lb. 5½ oz. after operation on June 4th. There was double hydrocele, but no elephantiasis of legs; was subject to elephantoid fever, but never had syphilis. The testicles were healthy. Discharged cured October 2nd.

Case 6.—B., a Hindoo labourer, aged 35, of Calcutta, admitted July 6th, with a tumour of ten years' growth, beginning in the left side. The tumour weighed 1 lb. 4 oz. after removal on August 6th. There was hydrocele on the left side,

but no elephantiasis of the legs; was subject to elephantoid fever, but never had syphilis. Testicles were healthy. Discharged cured November 4th.

Case 7.—S. K., of Calcutta, aged 40, admitted June 23rd, with a tumour of five years' growth, which weighed 3 lb. 5 oz. after operation on September 4th. There was neither hydrocele nor elephantiasis of the legs; was subject to elephantoid fever; no history of syphilis. He was fat, and probably had fatty heart. The testicles were preserved. He was discharged cured on January 12th, 1868.

Case 8.—K. N., aged 23, a Hindoo native doctor, of Burdwan, admitted August 28th, with a tumour of five years' growth, which weighed 3 lb. after operation on September 23rd. There was double hydrocele, but no other elephantiasis, no history of syphilis or elephantoid fever. The testicles were healthy. He was discharged cured November 24th.

Case 9.—T. N. D., a Hindoo writer, of Agurparah, aged 27, admitted October 11th, with a tumour of seven years' growth, which weighed 8 lb. 5 oz. after operation on the 28th. There was hydrocele of the right side, but no elephantiasis elsewhere. No history of syphilis, but was subject to elephantoid fever. Testicles were healthy. He was discharged cured on January 12th, 1868.

Case 10.—D., a Mahomedan tailor, aged 30, of Calcutta, admitted July 7th, with a tumour of eight years' standing, which weighed 8 lb. 10 oz. after operation on November 16th. He was suffering from enlarged liver and chronic bronchitis, and he died of pulmonary obstruction on November 24th. No post-mortem allowed.

Case 11.—H., a Mahomedan cook, of Calcutta, aged 36, admitted November 6th, with a tumour of ten years' growth, which weighed 8 lb. 14 oz. after operation on December 4th. There were double hydrocele and elephantiasis of both legs. Was subject to elephantoid fever, but there was no history of syphilis. The testicles were healthy, and he died of diarrhœa and exhaustion on the 22nd. No post-mortem allowed.

Case 12.—M. S., a Hindoo, aged 35, of Narkuldangah (Calcutta), admitted October 28th, with a tumour of twenty years' duration, which weighed 2 lb. 12 oz. after operation on December 5th. There was double hydrocele, but no elephantiasis of the legs. Was subject to elephantoid fever, but there was no history of syphilis. The testicles were healthy. Died of tetanus on the 17th. No post-mortem examination.

Case 13.—J. D., a Hindoo, aged 25, of Calcutta, admitted December 20th, with a tumour of seven years' growth, which weighed 2 lb. 3 oz. after operation on the 26th. There was hydrocele on the right side, but no elephantiasis elsewhere. Was subject to elephantoid fever, and has had syphilis. The testicles were healthy. He was discharged cured on September 25th, 1868.

1868.

Case 1.—O., a Mahomedan butcher, aged 40, of Calcutta, admitted December 20th, 1867, with a tumour of ten years' growth, which weighed 2 lb. 2 oz. after operation on January 13th, 1868. There was double hydrocele, but no elephantiasis of the legs; was subject to elephantoid fever, but there was no history of syphilis. The testicles were healthy. He was discharged cured May 11th.

Case 2.—R., a Brahmin, aged 33, of Raneegunge, admitted February 24th, with a tumour of eight years' duration, which weighed 15 lb. 15 oz. after operation on March 2nd. There was double hydrocele, but no other elephantiasis; was subject to elephantoid fever; no history of syphilis. The testicles were healthy. He was discharged cured September 8th.

Case 3.—T. W., an East Indian, aged 30, of Calcutta, admitted February 17th, with a tumour of two years' duration, which weighed 1 lb. 13 oz. after operation on March 16th. There was hydrocele of the left side (tapped several times), but no other elephantiasis; was subject to elephantoid fever, but had no history of syphilis. The testicles were healthy. He was discharged cured on August 20th.

Case 4.—P. C. G., a Hindoo boatman, aged 25, of Konenuggur, admitted March 15th, with a tumour of a year's standing, which was removed on the 23rd. There was hydrocele of the left side, but no other elephantiasis; was subject to elephantoid fever, but had no history of syphilis. Testicles were healthy. He was discharged cured September 28th.

Case 5.—N. C., a Hindoo farmer, aged 22, of Nuddea, admitted February 18th, with a tumour of four years' duration, which weighed 14 oz. after operation on April 14th. There was hydrocele on both sides, but no other elephantiasis; no elephantoid fever nor syphilis. Testicles healthy. Discharged cured September 2nd.

Case 6.—S. M., a Mahomedan sailor, aged 25, of Madras, admitted July 3rd, with a tumour of four or five weeks' duration, which weighed 2 lb. 8 oz. after operation on the 6th. There was no hydrocele nor elephantiasis of the legs; has had syphilis, but no elephantoid fever. Testicles were healthy. He was discharged cured November 26th.

Case 7.—T. H., a Mahomedan constable, aged 28, of Calcutta, admitted on July 24th, with a tumour of five years' growth, which weighed 2 lb. 1 oz. after operation on the 29th. There was hydrocele of left side, but no elephantiasis of the legs; no history of syphilis nor elephantoid fever. Testicles were healthy. He was discharged cured on January 5th, 1869.

Case 8.—J. N., a Hindoo weaver, aged 28, of Burra Bazar (Calcutta), admitted June 1st, with a tumour of one year and a-half's duration, which weighed 3 lb. 10 oz. after operation, under bichloride of methylene, on August 24th. There was hydrocele of the left side, and the feet were œdematous. Was subject to elephantoid fever, but there was no history of syphilis. Testicles were healthy. He was discharged cured February 23rd.

Case 9.—B. C., a Hindoo farmer, aged 30, of Calcutta, admitted on November 4th, with a tumour of three years' duration, which weighed 7 lb. 4 oz. after operation on the 10th. There was hydrocele of the right side, but no elephantiasis

of the legs; had elephantoid fever; has had syphilis. The testicles were healthy. He was discharged cured on March 15th, 1869.

Case 10.—P. C., a Hindoo printer, aged 32, of Calcutta, admitted September 27th, with a tumour of five years' growth, which weighed 3 lb. after operation on October 8th. There was hydrocele on the left side. Discharged cured February 23rd, 1869.

Case 11.—K. R., a Hindoo farmer, aged 34, of Bancoorah, admitted November 9th, with a tumour of seven years' duration, which weighed 9 lb. 5 oz. after operation on the 17th. Has had hydrocele; no elephantiasis of the legs; has had elephantoid fever, but no history of syphilis. Testicles were healthy. Discharged cured March 15th, 1869.

Case 12.—R. S. R., a Hindoo farmer, aged 32, of Bancoorah, admitted November 9th, with a tumour of ten years' duration, which weighed 5 lb. 9 oz. after removal on the 23rd. There was no hydrocele; has had elephantoid fever. Testicles were healthy. He was discharged cured on March 15th, 1869.

1869.

Case 1.—S. I., a Mahomedan washerman, aged 40, of Tarrukeshwar, admitted October 11th, 1868, with a tumour of three years' duration, which weighed 2 lb. 13 oz. after operation on January 12th. Had double hydrocele and elephantiasis of the right leg and foot; was subject to elephantoid fever, and has had syphilis. The testicles were healthy. Discharged cured May 23rd.

Case 2.—S. S., a Hindoo watchmaker, aged 35, of Burdwan, admitted February 5th, with a tumour of eight years' duration, which weighed 6 lb. 6 oz. after operation on the 12th. Had double hydrocele, but no elephantiasis of the legs; was subject to elephantoid fever, but had no history of syphilis. The testicles were healthy. Died of cholera April 3rd.

Case 3.—J. C., a Hindoo priest, aged 25, admitted February 12th, with a tumour of two years' duration, which

weighed 1 lb. after operation on the 16th. There was no hydrocele; was subject to elephantoid fever, and has had syphilis. Testicles were healthy. He was discharged cured April 10th.

Case 4.—G. D., a Hindoo farmer, aged 30, of Soorie, admitted January 15th, with a tumour of twelve years' duration, which weighed 2 lb. 10 oz. after operation on February 16th. There was hydrocele of the right side; was subject to elephantoid fever, and had no history of syphilis. Testicles were healthy. Died of pyæmia on the 26th. No post-mortem permitted.

Case 5.—H. C., Hindoo, aged 50, of Kidderpore, admitted February 24th, with a tumour of five years' growth, which weighed 4 lb. 8 oz. after removal on March 16th. There was hydrocele on the left side; no history of syphilis. He was discharged cured July 11th.

Case 6.—J., a Mahomedan driver, aged 40, of Calcutta, admitted March 24th, with a tumour of a month's growth, which weighed 2 lb. after operation, on the 26th. Had double hydrocele; was subject to elephantoid fever; and has had syphilis. Discharged cured May 15th.

Case 7.—M. A., a Mahomedan priest, aged 35, of Jessore, admitted April 3rd, with a tumour of eighteen or nineteen years' growth, which weighed about 2 lb. after operation on the 13th. Discharged cured July 19th.

Case 8.—R. N., a Hindoo, aged 26, of Hurripore, admitted May 28th, with a tumour of two years' growth, which weighed 5 lb. 2 oz. after operation on June 3rd. Had hydrocele of the left side; was subject to elephantoid fever, but had no elephantiasis of the legs; testicles healthy. He was discharged cured September 28th.

Case 9.—G. R. H., a Bengali sircar, aged 45, of Calcutta, admitted on April 20th, with a tumour of ten years' growth, which weighed 2 lb. 5 oz. after operation on June 28th. No hydrocele; the left leg was hypertrophied; has had elephantoid fever and syphilis. The testicles were healthy. The femoral

artery was ligatured in this case for elephantiasis of the leg on October 4th. He was discharged December 31st, without any permanent improvement in the leg, but cured of the scrotal tumour.

Case 10.—R. B. K., a Bengali Brahmin, aged 30, of Calcutta, admitted July 30th, with a tumour of seven years' growth, accompanied by right oblique inguinal hernia. Operated upon eight years ago for radical cure. There was no elephantiasis of the legs, nor hydrocele; no history of syphilis, but he has had elephantoid fever. The tumour was removed in the usual way on the 31st, but the hernial sac having been wounded, it was united by iron wire sutures to the extent of an inch. The tumour weighed 4 lb. 15½ oz., and the testicles were healthy. A little peritonitis ensued, which soon passed off. The wound took a long time to heal, and he was discharged cured on January 4th, 1870.*

Case 11.—M., a Mahomedan tailor, aged 36, of Puddipukur, admitted August 6th, with a tumour, with chronic enlargement of the right testicle, and hydrocele on the left side. The tumour was removed with the diseased testicle on the 21st, and it weighed 2 lb. 3 oz. There was no history of syphilis, but he has had elephantoid fever. The patient was anæmic before the operation, and he died of tetanus on September 11th. No post-mortem permitted.

Case 12.—M. D., an Ooryah bearer, aged 40, of Calcutta, admitted September 27th, with a tumour of two years' growth, which weighed 3 lb. 9½ oz. after removal on October 6th. There was no hydrocele, and no elephantiasis of the legs; never had elephantoid fever, but has had syphilis. Suffering a long time from pyæmic symptoms, he recovered at last. Discharged cured on February 5th, 1870.

Case 13.—H. M., an East Indian clerk, aged 39, of Calcutta, admitted November 17th, with a tumour of seven years' growth, which weighed 5 lb. after operation on the 20th. There was

* *Vide* p. 429.

an old-standing hæmatocele of the left tunica vaginalis, with laminated fibrinous clots adhering to the walls. Has had syphilis. The testicles were healthy. Discharged on March 15th, 1870, with the wound nearly healed.

Case 14.—K. D., a Hindoo mohurrer, aged 25, of Chundunnugger, admitted November 22nd, with a tumour of five years' standing, which weighed 12 lb. after removal on December 2nd. There was neither hydrocele nor any other elephantiasis; was subject to elephantoid fever, but there was no history of syphilis. Testicles were healthy. He died on December 16th, from tetanus. No post-mortem.

Case 15.—P. C., a Bengali Brahmin, aged 25, of Kossipore, admitted December 5th, for hypertrophy of the prepuce, of three years' growth. Was operated on as for scrotal tumour on the 14th. The parts weighed about 1 lb. Discharged cured February 9th, 1870.

Case 16.—K. C., a Hindoo goldsmith, aged 23, of Budabatty, admitted November 28th, with a tumour of only two months' growth, which weighed about 1 lb. after removal on December 18th. There was hydrocele of the right side, but no elephantiasis of the legs. He is now doing well. The wound has nearly healed.

Case 17.—T. R., Hindoo, aged 32, of Potuldangah, admitted November 7th, with a tumour of three years' growth, which weighed about 3 lb. after operation on the 11th. There was hydrocele, but no elephantiasis elsewhere. Testicles were healthy. He was discharged cured on January 25th, 1870.

1870.

Case 1.—F. K., Hindoo, aged 25, of Chagdah, a blacksmith, admitted January 8th, with a tumour of only three months' duration, which weighed 2 lb. after operation, on January 11th, 1870. There was hydrocele of the left side. No elephantiasis of the legs. He is now doing well, and the wound is cicatrizing.

Case 2.—H. J. De S., an East Indian, aged 28, of Calcutta,

admitted January 19th, with a tumour of only three months' growth, which weighed 2½ lb. after operation on the 22nd. There was neither hydrocele nor elephantiasis of legs. Gradually sank from exhaustion, on February 7th. No post-mortem.

Case 3.—H., Hindoo, a cultivator, aged 15, of Burdwan, admitted February 28th, with a tumour of ten years' growth, which weighed 4¾ lb. after operation on March 2nd. There was a large hydrocele on the left side, and a small one on the right, but no leg disease. Died of tetanus, on March 11th. Post-mortem :—A decolorized clot in the right ventricle, other organs being healthy.

Case 4.—O. C. K., Hindoo, aged 40, of Nuddea, admitted February 19th, with a tumour of ten or eleven years' duration, which weighed 1¾ lb. after operation on March 7th. There was a large hydrocele on the right side, and a small one on the left. No elephantiasis elsewhere. The right testicle was so imbedded in the thickened tunica vaginalis and hypertrophied structures, that it was removed with the tumour. He died of exhaustion on the 11th.

There were (1866-70) sixty-two cases of scrotal elephantiasis ; of these forty-five were in Hindoos, thirteen in Mahomedans, and four in Eurasians. The weight of the largest tumour was 23 lb., of the smallest 14 oz. The shortest time under treatment from the date of operation to that of discharge was fifty days for recovery, and four days for death ; the longest 273 days. The mortality was rather high, and was due to the following causes : —pyæmia, tetanus, pulmonary embolism, cholera, diarrhœa, exhaustion. A large proportion of the deaths was due to causes that one cannot but think must be classed under the head of "avoidable," but which it is to be feared will prevail so long as hospitals are not constructed on sound hygienic and sanitary principles. The tumours were all comparatively small, indeed it is rare to see a large one now. The inference is that most of the very large growths have been removed, and that the people no longer wait until exaggerated growth drives them to seek admission into the hospital.

The following are notes of twenty-three cases that have subsequently occurred :—

1. K. D., a Hindoo coolie, aged 40, a native of Malta, was admitted on the 18th March, 1870, with a small tumour of three years' standing, which weighed 3 lb. 12 oz. after operation on the 1st April. There was no hydrocele. Testicles were healthy. He was subject to elephantoid fever, but had no syphilis. No elephantiasis elsewhere. He was discharged with the wound quite healed on the 15th October.

2. R. B., a Hindoo, aged 22, a native of Calcutta, was admitted on the 27th June, 1870, with a tumour of one year's duration, which weighed 1 lb. 12 oz. after operation on the 29th. There was neither hydrocele nor elephantiasis elsewhere. He was not the subject of elephantoid fever. Had syphilis three months before the commencement of the disease. Testicles were healthy. He was discharged cured on the 19th December.

3. N. K., a Hindoo native of Burdwan, aged 40, was admitted on the 18th July, 1870, with a tumour, which weighed 5 lb. 12 oz. after operation on the 23rd. There was neither hydrocele nor elephantiasis of any other part. He was subject to elephantoid fever. Never had syphilis. Testicles healthy. Discharged cured on the 18th November.

4. G. L. S., a Hindoo native of Midnapore, aged 36, was admitted on the 5th August, 1870, with a tumour of five years' duration, which weighed 1 lb. 10 oz. after operation on 8th October. Was subject to elephantoid fever. Had neither hydrocele nor elephantiasis elsewhere. The testicles were healthy. Never had syphilis. There was a hernia, containing omentum and intestines on the right side. The hernial sac was dissected from the surrounding hypertrophied tissues before the tumour was removed. Died next day from peritonitis.

5. B. N., a Hindoo, aged 40, native of Burdwan, was admitted on the 23rd September, 1870, with a tumour of two years' duration, which weighed after operation 2 lb. 6 oz. on the 18th October. There was a small hydrocele on the left side. He was subject to elephantoid fever. Has had neither syphilis,

nor elephantiasis anywhere else. Testicles were healthy. He was discharged cured on 31st December.

6. S. N., a Hindoo, aged 25, a native of Kishennugger, was admitted on the 21st October, 1870, with a tumour of ten years' duration, which weighed after operation 17 lb. 12 oz. on the 1st of November. There was hydrocele on both the sides, and the right sac was slightly thickened. Has had elephantoid fever and syphilis. The testicles were healthy. No elephantiasis elsewhere. He was discharged cured on the 20th February, 1871.

7. C. C., a Hindoo, aged 24, native of Bidyabatty, was admitted on the 29th November, 1870, with an incipient tumour of two years' duration, which weighed 1 lb. after the operation on the 8th December. Was subject to elephantoid fever. There was a small hydrocele on the left side. No elephantiasis elsewhere, but has had syphilis. The testicles were healthy. He was discharged cured on the 8th September, 1871.

8. K. C., a Hindoo, aged 43, a native of Calcutta, was admitted on the 5th December, 1870, with a tumour of eight years' duration, which weighed 19 lb. 8 oz. after operation on the 13th. There was a large hydrocele on the right side and a small one on the left. The sacs were thickened and cartilaginous. The testicles were healthy. Was not subject to elephantoid fever. Has not had syphilis, nor elephantiasis elsewhere. He was discharged cured on the 9th February, 1871.

9. N. D., an Ooryah, aged 40, was admitted on the 7th December, 1870, with a tumour of six or seven years' duration, which weighed 18 lb. 8 oz. after operation. Was subject to elephantoid fever. There was no hydrocele. Has had no syphilis, nor elephantiasis elsewhere. Testicles healthy. He was discharged cured on the 6th June, 1871.

10. K. M., a Hindoo, aged 28, a native of Calcutta, was admitted on the 15th March, 1871, with a tumour of a year and a-half's standing, which weighed 12 oz. only after operation on the 16th. Had syphilis four years before the commencement

of the disease. He was subject to elephantoid fever. There was double hydrocele. Testicles were healthy. No elephantiasis in any other part. Discharged cured on the 17th June.

11. N., a Hindoo, aged 40, a native of Daoodpoore, was admitted on the 26th March, 1871, with a small tumour of six years' duration, which weighed 2 lb. 6 oz. after operation on the 27th. Was subject to elephantoid fever. There was double hydrocele, but never has had syphilis. The testicles were healthy. The disease existed nowhere else in the body. Discharged cured on the 27th June.

12. P. M., a Mahomedan, aged 30, a native of Poranpore, was admitted on the 21st July, 1871, with a tumour of two years' duration, which weighed after operation 1 lb. 3 oz. on the 27th. There was no hydrocele. Has had syphilis. Testicles healthy. No elephantiasis anywhere else. Had elephantoid fever. Discharged cured on the 27th October.

13. S., a Hindoo, aged 40, a native of Chandni, was admitted on the 12th July, 1871, with a small tumour of a year and a-half's duration, which weighed 2 lb. 6 oz. after operation on the 15th. Was subject to elephantoid fever. Has had syphilis, but there was no hydrocele. The testicles were healthy. Discharged cured on the 26th October.

14. N., a Mahomedan, aged 22, a native of Calcutta, was admitted on the 20th September, 1871, with a tumour of six months' standing, which weighed 1 lb. 8 oz. after operation on the same day. There was hydrocele on both the sides. Has had syphilis, but was not subject to elephantoid fever. No appearance of the disease in any other part. The testicles were healthy. He was discharged cured on the 14th January, 1872.

15. B., a Hindoo, aged 40, a native of Burdwan, was admitted on the 23rd September, 1870, with a tumour of two years' standing, which weighed 2 lb. after operation on the 3rd October. There was a little hydrocele on either side, the left sac being thickened. Had no syphilis, but was subject to

elephantoid fever. There was no elephantiasis in any other part. The testicles were healthy. He was discharged cured on the 7th January, 1871.

16.—J. C. M., an East Indian, aged 41, a native of Calcutta, was admitted on the 7th January, 1871, with a tumour of nineteen years' standing, which weighed 3 lb. 6 oz. after operation on the 12th October. The right testicle was found diseased, and was removed during the operation. The other was left, and in the course of time became inflamed and diseased, and was also removed. There were hydroceles on both sides. Had elephantiasis in the left leg, and was subject to elephantoid fever. Has had no syphilis. He died from the effects of diarrhœa on the 22nd November.

17.—B. N., a Hindoo, aged 40, a native of Noadunga, was admitted on the 20th September, 1871, with a tumour of three years' duration, which weighed 12 lb. 6 oz. after operation on the 13th November. Had syphilis about five years before the commencement of the disease. There was elephantiasis of the right leg and forearm. Was subject to elephantoid fever, and had hydrocele on the left side. The testicles were healthy. He is still in the hospital. The wound healing.

18.—K. B., a Hindoo, aged 26, a native of Jessore, was admitted on the 31st December, 1871, with a tumour of four months' duration, which weighed 1 lb. 6 oz. after operation on the 14th January, 1872. There was no hydrocele; was subject to elephantoid fever. Has had syphilis. The testicles were healthy. No elephantiasis in any other part. The wound was healing at the time of the report.

19.—G. N., aged 40, a native of Burdwan, was admitted on the 4th December, 1871, with a tumour of four years' duration, which weighed 6 lb. 4 oz. after operation. There was hydrocele of the left side; both the testicles were healthy; was subject to elephantoid fever. No elephantiasis in any other part. Had syphilis two years before the commencement of the disease. He was doing well at the time of the report.

20.—K. C. B., aged 25, a native of Jessore, was admitted

on the 17th January, 1872, with a tumour of six months' duration, which weighed 1 lb. 6 oz after operation on the 21st. There was hydrocele on both sides. Was subject to elephantoid fever, but has elephantiasis nowhere else. Had syphilis five months before the commencement of the disease. The testicles healthy. He was doing well.

21.—K .B. M., aged 28, a native of Shantipore, was admitted on the 11th December, 1871, with a tumour of sixteen years' duration, which weighed 2 lb. 7 oz. after operation on the 29th. There was hydrocele on the left side only. Has had syphilis. Was subject to elephantoid fever. Has elephantiasis in no other part of the body. The testicles were healthy. Doing well.

22.—R. L. C., aged 43, a native of Calcutta, was admitted on the 29th December, 1871, with a tumour of four years' duration, which weighed 16 lb. 8 oz. after operation on the 4th February, 1872. There was a large hydrocele on the left side, and a small one on the right. Was subject to elephantoid fever. Has elephantiasis of the right forearm. Has had no syphilis. Both the testicles were healthy. He was improving.

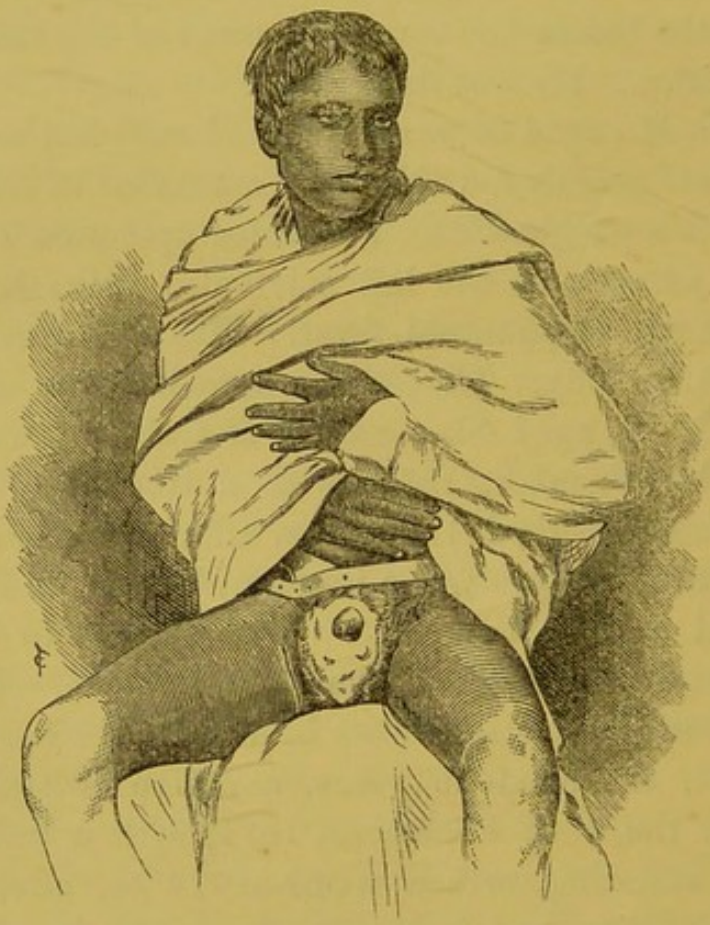
23.—I. N. G., aged 30 years, a native of Burdwan, was admitted on the 18th December, 1871, with a tumour of sixteen years' standing, which weighed 14 oz. after operation. There was neither hydrocele nor elephantiasis of any other part of the body. Has had no syphilis. The testicles were healthy. Was not subject to elephantoid fever. The wound had nearly healed, and he was still in the hospital.

The total number of cases operated upon during the years 1859—71 amounted to 193, of which thirty-five, or 18·2 per cent., proved fatal.

2.—*Case of Elephantiasis of the Scrotum, complicated with Hernia.*

R. B. K., 30 years of age, a Hindoo, and a native of Bengal, district Burdwan, admitted July 30th, 1869, suffering from

scrotal tumour, with inguinal hernia. About seven years ago he had an attack of fever, preceded by pain and swelling of the right cord and general swelling of the scrotum. The fever



subsided after three days, but the swelling continued, though slightly diminished. After fifteen days he had a relapse of fever, accompanied by the same symptoms, but aggravated. Had several such attacks, pain and swelling increasing with each. Six months ago the pain became intense and continued. He has fever bi-monthly, corresponding, he says, with the lunar changes. The tumour evidently contains fluid, and is of the size of a medium-sized melon. Slight pain in the penis, which is completely drawn into the scrotum.

The tumour was excised on July 31st, 1869, and weighed 4 lb. 15½ oz. Twenty-eight ligatures were applied; he bled freely, and became very low, requiring stimulants. Tumour was very vascular. Weight of patient before operation,

7 st. 8 lb. He was too low to be weighed immediately afterwards. During the operation the hernial sac was slightly wounded, but was stitched up at once. After the operation he became very feverish, which was checked by quinine and diaphoretics.

August 14th.—Surface of the wound of the scrotum covered with purulent discharge, with slight granulations. Excoriations on the right thigh and left hip, from tight bandaging and uncleanliness. Treated with carbolic oil dressing morning and evening externally, and aperients occasionally, as required. Tonics thrice daily; good and nourishing diet.

September 10th.—The granulations very healthy, and the wound contracting rapidly.

October 5th.—Wound steadily healing since last report. General health good.

November 2nd.—The surface of the wound almost healed. General health good.

The above case is interesting, being a combination of elephantiasis of the scrotum with scrotal hernia. The hernia was reduced, and kept back by pressure during the operation. The sac was slightly wounded, but no evil effect followed. The cicatrization is now almost complete, and the hernia is restrained at the external ring by the cicatrix. There was no symptom of peritonitis throughout the treatment.

3.—*Case of Scrotal Elephantiasis of Enormous Size.*

A. A., a Mahomedan, said to be 41, but seemingly very much older, a resident of Moorshedabad, was admitted October 2nd, 1871, with a scrotal tumour of great size. He was a small man: height, 5 feet 1 inch; girth of chest, 32 inches; body moderately well nourished, but his appearance was suggestive of fatty degeneration and of advanced age; his hair and beard were perfectly white; he had lost all his teeth; and his face, body, and limbs were covered with large patches of leucoderma. The tumour of the scrotum was similarly affected. His heart-

sounds were normal, but rather feeble; his pulse steady, but wanting in force; his weight, 15 st. 8 lb., or 218 lb. He stated that the tumour commenced about twelve years ago with hydrocele, and that he has been subject to frequent recurrences of elephantoid fever, during each of which the tumour increased in size and became painful; but it is only during the last two years that it has attained its present great dimensions. Its measurements were as follow :—Around the neck, 17 inches; horizontal circumference, 51 inches; vertical circumference, from a line drawn round the neck of the tumour behind to a corresponding point in front, 61 inches; distance of the meatus urinarius from the symphysis pubis, 16 inches. When standing the tumour reached within two inches and a half from the ground. The legs were widely separated by the growth, which protruded backwards between them to a great extent. His general health was, on the whole, fair, his spirits good, and his anxiety to have the encumbrance removed great. He was most urgent in his solicitations for relief, and expressed his willingness to undergo the operation, at whatever risk.

In order to improve his health and prepare him by good food and tonics, the operation was deferred until November 20th. Early on that morning the tumour was suspended by pulleys, and ice applied, with the view of emptying it of blood as much as possible. At 9 a.m. the operation was performed in the usual way. The penis was exposed by laying open the sinus at the bottom of which it lay. A few sweeps of the knife, during which the hæmorrhage from the large venous sinuses was excessive, sufficed to release it. The testes were then exposed by long and deep incisions. The left testicle was surrounded by an enormous hydrocele, the right by a comparatively small one. They were exposed and disengaged from the surrounding mass without loss of time, and with little difficulty, but the hæmorrhage was severe. A few bold strokes with a large scalpel completed the removal, and the mass fell heavily on the floor. During the operation it had been raised or depressed, as circumstances required, by the pulleys and a canvas sling on which

it rested. The vessels, which were very large and numerous, were then tied.

He became very low on the table, but rallied under the influence of stimulants, sinapisms, warmth, and the magnetic current, and was removed to the ward. He remained low; the pulse at times rising, and then falling again. Reaction never perfectly set in, and he died at about 11 p.m.—fourteen hours after the operation. The operation was certainly a very formidable one, and in effecting it I received most able assistance from my colleague, Professor Cutliffe. There was no hæmorrhage after the operation, but the shock to the nervous system was more than he could bear. He was most carefully tended, stimulants were given, and warmth applied, but to little purpose. His bowels acted freely during the day. He took nourishment, but remained in a state of only semi-consciousness, opening his eyes when spoken to, but not speaking. His pulse gradually failed, and death occurred as I have before stated.

His weight after the operation was 108 lb., that before it 218 lb., so that 110 lb. was the actual weight removed, being 2 lb. more than that which remained. The solid fibrous mass, after all fluid had drained away, was over 78 lb. in weight. Larger tumours have been removed with success, but I do not know that more than half of a man's weight has ever before been removed by a surgical operation. I believe that, had his general condition been more vigorous, he would have done well.

The post-mortem examination was made at 9 a.m. of November 22nd. The body was that of a small, slightly-made old man, moderately well nourished and tending to obesity. The lungs were healthy, but slightly emphysematous and hypostatically congested; the pericardium contained a quantity of serum. The heart was small, had some fat deposited externally, and was friable, being easily torn; it looked fatty; there were small fibrinous coagula in both ventricles. The liver, spleen, and kidneys were smaller than natural, and seemed to be fatty. The muscles generally looked feeble, pale, and

flabby. There was a considerable layer of subcutaneous fat; the tissues generally seemed to be in a state of adipose degeneration. The arteries were healthy, and the aorta remarkably so. About the wound there was nothing peculiar. The testes were apparently healthy, though small; the cords were elongated and hypertrophied, with much gelatinous matter in their substance. The remains of the left tunica vaginalis were much thickened; it had contained an enormous amount of fluid. The right tunica vaginalis was also somewhat thickened, and had contained a certain amount of fluid. The mouths of many large vessels were apparent on the wounded surface. Dr. T. R. Lewis, Staff Assistant-Surgeon, H.M.S., most kindly made a microscopical examination of the organs as well as of the tumour. I append his report as follows :—

"Liver: The hepatic cells were no longer recognisable as such. Their usual granular appearance had entirely disap-

Minute Structure of the Scrotal Tumour.

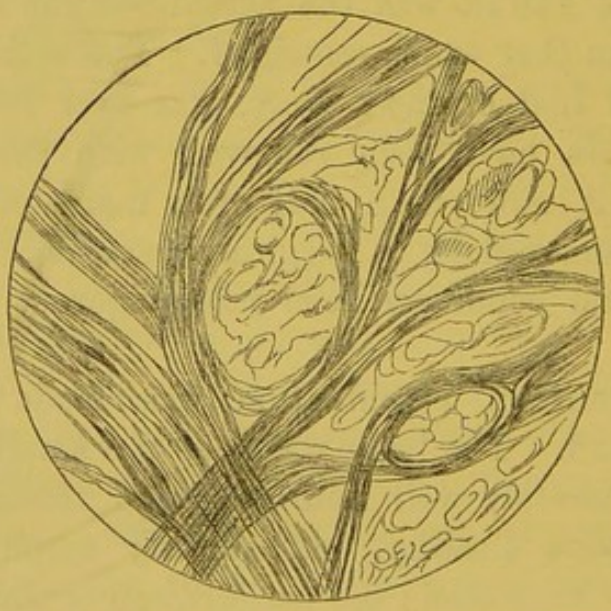


Fig. 1.

Microscopic appearance presented by a fragment after prolonged immersion in glycerine, showing areolar tissue (chiefly) in an hypertrophied condition. Magnified 300 times.

peared, minute molecules of fat alone being seen. It was with difficulty that a tolerably normal cell could be picked out.

Kidney: The cortical portion extremely fatty, and the lining epithelium of the tubules had degenerated into what appeared to be mere globular accumulations of oil molecules. Heart: The fibres had undergone extensive fatty degeneration; in fully one-half of the fibrillæ the transverse striæ had disappeared, or become so granular as scarcely to be visible.

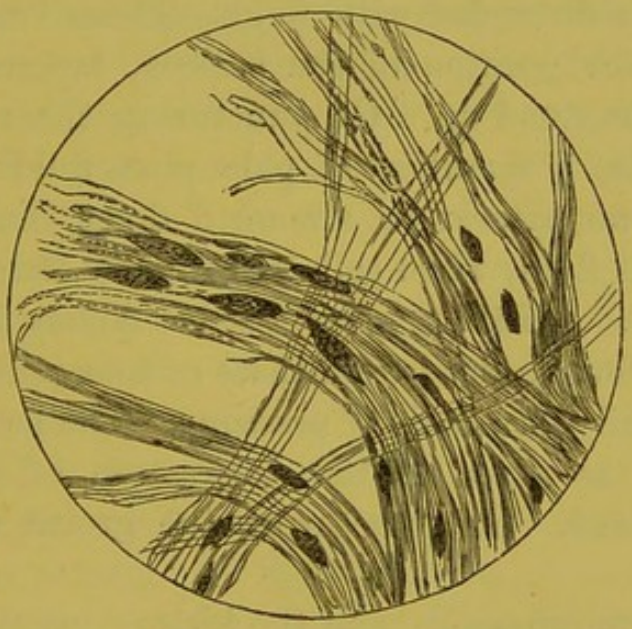


FIG. 2.

Appearance of another fragment stained in a solution of aniline and glycerine, dilute acetic acid being subsequently added. In the midst of the fibrous tissue the more or less transversely cut fibres of non-striated muscle are seen. Magnified 500 times.

Muscle: The fragment (of the pectoralis major) forwarded appears to be healthy. Vessels: So far as I have hitherto been able to judge, the two samples present a normal appearance; but as yet they are scarcely sufficiently cleared up by the glycerine to be able to pronounce more definitely. Should subsequent observation show that they are diseased, I will let you know."

4.—*Note on a peculiar form of Elephantiasis.*

In "Clinical Surgery in India," page 352, date 1866, I described a form of elephantiasis of a different character to

that generally met with, thus: "It conveyed the impression of being a cellular structure distended with blood or serum. The prepuce partook of the same pathological condition, though to a less extent. The integument over the inguinal canal and in the groins presented a swollen varicose appearance, and communicated a sensation of fluctuation on pressure, as though under it there lay a number of large and tortuous vessels distended with fluid. These varied in fulness according to the position of the patient, becoming more distended when he stood up. On puncturing the scrotum with a grooved needle, a quantity of pale pink fluid jetted out, as though from an artery, or streamed down the surface of the scrotum. This fluid, when collected rapidly, formed a pale but firm coagulum. Its sp. gr. was 1020. About 16 ounces were collected in a few minutes from three or four punctures, but the oozing was easily arrested by pressure. The loss of it seemed to affect him as much as the abstraction of so much blood would have done. On puncturing the groins a similar fluid exuded."

The structure otherwise, and the history, were those of ordinary elephantiasis. To this form of the disease I then suggested that the name "nævoid elephantiasis" should be given.

Since my return to England I have had the pleasure and advantage of making the acquaintance of Dr. Vandyke Carter, of the Bombay Medical Service—a pathologist whose name is as well known in Europe as in India for the importance and value of his researches in various interesting forms of Indian disease —and have learned from him that he described this form of elephantiasis in the Bombay Med. and Phys. Society's Transactions, new series, vol. vii., 1861, vol. viii., 1862, under the designation of "Varix Lymphaticus;" and for a most able and interesting account of that disease in connection with elephantiasis and chylous urine, I would refer to that periodical.

Dr. Carter describes it as a varicose state of the lymphatics, which are not necessarily inflamed, the scrotum being a frequent seat, but it may occur elsewhere. "A milk-like

fluid oozes in considerable quantities from the hypertrophied papillæ of the skin, and coagulates spontaneously into a gelatinous mass." The fluid bears all the marks of pure lymph, Dr. Carter thinks. He considers that the scrotal appearance is only part of a deep-seated and probably extensive enlargement of the lumbar and iliac lymphatics.

Dr. Carter gives a drawing (vol. vii. p. 205) of a case of enlargement of the scrotum and groins, which exactly corresponds to the cases I described, and says: "In this instance, the urine was chylous, and had there been no peculiar external appearances, the case would have been regarded as one of ordinary chylous urine. In reality, it differed only in the circumstance that the varicose condition of the lymphatics (which it is argued is common to all cases of that disease) was developed in so marked a manner, extending to the groins and scrotum, as to become apparent to the eye." The cases that have come under my observation, though answering to Dr. Carter's description, differ in this, that they have not been complicated by the presence of chylous urine.

Dr. Carter, however, remarks that "the urine in some cases is unaffected." In describing the chyle-like discharge, he says:—"The fluid is pure chyle; it assumes a rosy tint, coagulates in eight or ten minutes, changes to blood-red on exposure to air, and that it contains molecular granules, red corpuscles, granular corpuscles—some oval, some irregular in form, mulberry in appearance, colourless and clear." He regarded the condition as "part of a deep-seated affection of the lymphatics, placed along the iliac vessels and abdominal aorta as far as the root of the mesentery." The chyle in one case finding its way to the mucous membrane of the urinary tract, gives rise to chylous urine; and making its appearance in the dilated and varicose lymphatics, it causes the peculiar modification of elephantiasis alluded to. Such are Dr. Carter's views, but I have never seen an example of the combination of the two conditions of scrotal enlargement of this peculiar form with chylous urine in one person. I think they are most ingenious,

and that they may throw considerable light upon the pathology of the constitutional disorder, of which elephantiasis is a local expression. It certainly never occurred to me until I became acquainted with Dr. Carter's views, that there was any connection between the pathological conditions, known respectively as elephantiasis and chyluria, nor am I now convinced that such is the case. It will be very interesting to know if the *filaria sanguinis hominis*, recently discovered by Mr. T. Lewis in India, in the blood, as well as the urine of those affected with the latter disease, also infests the blood of those affected by elephantiasis. So far as I can gather from his researches, there is nothing to suggest the identity or similarity of the two diseases.

ILIAC ABSCESS.

I HAVE on a former occasion* noticed the not unfrequent occurrence of iliac abscess in natives of India, as well as in Europeans, describing also the symptoms, and treatment most appropriate. I would further observe that in well-marked cases, where pus has formed in considerable quantity, with prominent symptoms of fever, there is little or no difficulty in deciding on the nature of the case or the necessary treatment; but in the early stage, and before the symptoms of deep-seated suppuration are pronounced, diagnosis is sometimes obscure and difficult. It is exceedingly important, however, that the true state of the case should be detected early, as its recognition diminishes not only present risk, but if promptly followed by treatment, renders recovery more rapid and certain.

The pathology of these iliac abscesses is simple enough—a collection of pus under the iliac fascia, either on, in, or beneath the iliac muscle. The causes, however, are not always so apparent, but they seem to be referable to either fever (when no doubt they are the result of capillary embolism due to the hyperinotic condition of the blood) or to such other conditions as induce suppuration in septicæmic states; to external violence, strains, or over-exertion; to sudden and perhaps inordinate muscular efforts, in which a muscular fibre, being wrenched from its attachment, tears away a fragment of periosteum, and thus induces superficial necrosis and suppuration in that area, which

* Clinical Surgery in India, p. 602.

becomes the nucleus of the abscess. I have never detected any loose bone in these cases, but the fragment may have been so minute as to escape detection, or, indeed, the suppurative action may have been a result of the disruption of a small portion of periosteum without any exfoliation or death of bone. A combination of these conditions may take place in certain cases, occurring in persons who are afflicted by a malarious state of climate.

The treatment is simple, although it is heroic. Exit must be given to the deep-seated matter, or it will find its own way out either through the intestines, the bladder, or the groin, or through the loins, causing caries and all its consequent dangers and suffering; or it may enter the peritoneum and rapidly destroy life by peritonitis—if, indeed, blood-poisoning from septic absorption do not terminate life before these events occur. The earlier, therefore, that an opening be made, the better are the patient's chances of recovery. The depth at which the pus is situated, and the nature and position of the superjacent structures, render it impossible that marked pointing should indicate its presence. In the earlier stage—the period which should not be allowed to pass without interference—a certain amount of tension, hardness, and fulness of the iliac region takes its place. This, in conjunction with the history, the presence of fever (not always preceded by well-marked rigors, but sometimes by symptoms that simulate low form of slight remittent malarious fever), pain of a constant and wearing character, with contraction of the thigh upon or towards the abdomen (in the commencement but slight), the general appearance of suffering, and that peculiar feeling, communicated to the educated finger only, of pus lying deeply seated under tissues, with a certain amount of œdema of the surface, proclaim the necessity of immediate surgical interference; and I know of no case in which this gives greater or more signal relief. As to the operation, an incision through the abdominal wall dividing the integument, the aponeurosis of the external oblique, the internal oblique, and transversalis muscles, must be carefully made. The transversalis fascia having been carefully

divided, and the peritoneum, which is generally thickened, pushed aside, the finger being gently and carefully introduced, the iliac fascia is scratched through with the nail or with a director, and the pus is reached either immediately under the fascia, in the substance of the muscle, or on the bone. The subsequent treatment is that of any other abscess that has been opened, and, as I have said, the earlier this opening is made the less the risk, and the greater the chance of speedy recovery.

I may add that I have found the use of carbolic acid of service in diminishing suppuration, and favouring the granulation and cicatrization of the cavity.

The following short abstracts of a few cases illustrate the disease I have endeavoured to describe :—

Case 1.—H. D., a Hindoo, aged 20 years, admitted September 14th, 1868, with a hard tense swelling in the left iliac region, of twenty days' duration, and with the thigh rigidly flexed. It came on after a long and fatiguing walk. Had fever every third or fourth day ; says he has had rigors four or five times during the last three weeks. Patient weak and anæmic. He was brought under the influence of chloroform, and an incision made through the abdominal wall just over the iliac artery. The peritoneum was thickened and indurated. The finger being carefully insinuated down towards the iliac fossa, a collection of one pint and four ounces of pus was evacuated. The tissues were found to be œdematous. He was much relieved by the operation, and there was no return of fever; but after a time diarrhœa set in, and this, combined with the exhaustion from profuse suppuration, proved fatal November 14th. Had this patient come under observation at an earlier period, before suppuration had become so extensive, it is very probable that he would have recovered. Death resulted from the exhaustion of diarrhœa, due most probably to absorption from the large suppurating cavity in the iliac region.

Case 2.—P., a Hindoo, aged 55 years, admitted July 15th, 1868, with an elongated, indurated swelling in the left iliac

region, which he stated to have been of a month's duration, and to have come on after a long and fatiguing walk, taken about six weeks ago. After the fatigue there was some glandular enlargement in the groin, which subsiding, was followed by this swelling. There is no positive evidence of rigors having occurred at any time, but the temperature was higher and the pulse quicker than natural when he was admitted. It appears that he had been treated by the internal use of iodide of potassium, and the application of tincture of iodine to the swelling.

On the 22nd he was placed under the influence of chloroform and an incision made through the abdominal wall down to the transversalis fascia, which having been divided, and the finger carefully insinuated into the iliac fossa, a quantity of pus was evacuated. He was immediately relieved, and was discharged cured November 10th. A small sinus remained, but his health was restored, and he could walk without pain, the motion of the limb, which was contracted, being quite restored.

Case 3.—K. C., a Hindoo boy, aged 11 years, admitted April 26th, 1868, with an oval-shaped swelling in the right iliac region. It made its appearance fifteen days after an attack of fever; its formation was attended with fever, and probably rigors, but no very distinct account is given by the boy. As it was evident that a deep-seated collection of pus had formed, he was put under chloroform, and an incision made down to the peritoneum, which was pushed aside, the finger insinuated into the iliac cavity, and a quantity of pus evacuated. He was immediately relieved. The contraction of the thigh relaxed, the feverish condition subsided, he gained strength and health, and was discharged cured July 20th.

In this case, as in others, the cavity of the abscess was washed out with carbolic acid lotion, ʒj. to Oj., and the treatment was according to the antiseptic method.

Case 4.—An English girl, aged 14, stout, well-developed, and healthy, complained of pain in the right iliac region, attended with a low febrile condition, loss of appetite, and want of rest. On examination, these symptoms having continued

some days, the thigh was found to be flexed, extension causing great pain; induration and tenderness in iliac region, pulse quickened, tongue coated, and a low febrile condition present. There certainly in this case had been no distinct rigors. There was no history that satisfactorily accounted for her condition, but she referred it to over-exertion or a strain some weeks previously. Her general health had been good, and menstruation regular. As it appeared to me evident that an iliac abscess had formed, I made an incision through the abdominal wall just above Poupart's ligament, and carefully protecting the deep-seated parts by insinuating the finger, a collection of about an ounce of pus was evacuated. She began to improve immediately; in a few days the leg was restored to its power of extension, the wound healed, and she rapidly recovered her health and strength. I saw her some months later, and she was perfectly well.

Case 5.—I was asked to see, in 1871, an English officer of about twenty years' service, who hitherto in good health, had been suffering for some days, if not weeks, from a low form of fever, attended with great prostration, debility, and wasting. There had been severe abdominal pains, which had been referred to the probable passage of either biliary or renal calculus, or to some cæcal mischief. I found him depressed and low, pulse quickened, with that peculiar look of suffering so often present when deep-seated suppuration has occurred, and a temperature higher than normal; no very satisfactory evidence that any positive rigor had taken place; the febrile symptoms nearly always present. I examined the abdomen carefully, and found tension and fulness in the iliac region, with considerable pain on pressure. He was not able thoroughly to extend the thigh. As it appeared to me that a deep-seated collection of pus was forming in the right iliac fossa, I proposed an incision, which was assented to. Chloroform being administered, I divided the structures of the abdominal wall, opposite to, but rather lower than, the anterior spinous process of the ilium, and, carefully protecting the abdominal viscera with my finger, intro-

duced a director into the iliac fossa, and gave exit to a collection of a few drachms of pus. This afforded him complete relief; he rapidly recovered, and in two months was able to resume his duties, which were of an onerous and important nature. The only explanation he could give (and he was a physician) was that he had caught cold in playing croquet on damp ground.

INJURIES OF THE HEAD.

I HAVE been furnished with notes of forty-seven cases of injury of the head that were treated in my wards between 1860 and 1870. A case of much interest not treated in the hospital is also detailed. They are all of clinical interest, and some of them illustrate important points in the pathology and phenomena of injury of the cranium and its contents.

It appears that six of the cases occurred in European males, one in an East Indian male, twenty-six in Hindoo or Mahomedan males, and fifteen in Hindoo or Mahomedan females.

The ages varied from 3 to 67 years.

There were seven between 3 and 12 years.

Eight between 12 and 20 years.

Twenty-two between 20 and 40 years.

Eight between 40 and 60 years.

Three above 60 years of age.

The injuries may be grouped into—

1. Those affecting the scalp only, *i.e.*, wounds or contusions of the scalp and pericranium.

2. Those affecting the cranial bones with the scalp and pericranium, comprising scalp injuries, and simple or compound fractures with or without depression, but uncomplicated by intra-cranial mischief.

3. Those in which, with or without, injury to the scalp or bones, the encephalon was affected, viz., simple cases of concussion or stunning; more severe cases, in which the brain was probably not only violently disturbed by the shock, but also

contused and ecchymosed; cases of compression from intra-cranial hæmorrhage or suppuration; simple or compound fractures of the vault with depression, or of the base involving injury to the membranes or substance of the brain—as indicated by discharges from the ear, ecchymosis of the orbit, rigors, coma, stupor, stertor, convulsions, paralysis—and cases in which trephining was necessary for the relief of any of the above symptoms.

Although these forty-eight cases do not represent all the injuries of the head that have come under notice during the period mentioned, they are, however, those that have presented points of most clinical interest.

Of the first group there were eight cases, four of which terminated fatally, two from tetanus, and two from blood-poisoning. Of the second group there were seven cases, one only fatal, and that from pneumonia.

Of the third group there were thirty-four cases, of which twenty-five proved fatal, the greater proportion from intra-cranial hæmorrhage, or from that combined with laceration of the substance of the brain, and the remainder from intra-cranial suppuration, pyæmia, and tetanus.

The total number of deaths was thirty out of forty-eight cases.

The operation of trephining was resorted to in seven cases. In some it certainly ameliorated the condition of the patient. In one (Case 46) it seemed at first to have conferred great benefit, but cerebral mischief recurred, and proved fatal. From the circumstances under which the necessity for this operation generally arises, it can only be regarded as a measure of extreme, though often, urgent necessity, but one which, though seldom successful, should not be withheld, as it may be the only hope of saving life.

The most interesting of the symptoms—pathognomonic, of lesion of certain parts of the cranium and encephalon—are illustrated in one or other of the following cases. For example:—1. The temporary suspension of the cerebral functions

from the shock of an injury; the so-called concussion accompanied, where the violence has been great, it may be by contusion or ecchymosis of the substance of the brain. 2. The extension of mischief from the exterior to the interior of the cranium as when suppuration occurs under the pericranium, in the diploe, or between the cranial bones and dura mater, or it may be under the membranes and in the very substance of the brain itself (as well seen in Case 46). 3. The constitutional evidence of the formation of pus within the cranium and diploe, and the pyæmic mischief to which this may give rise. 4. The symptoms due to compression either from depressed bone, or collections of blood or pus, and the relief (though perhaps only of a transient character) afforded by elevation of the depressed bone, or evacuation of the pus or blood. 5. The existence of fracture of the petrous portion of the temporal bone or through the base of the cranium, as indicated by continued hæmorrhage, or discharge of cerebro-spinal fluid from the nostrils or ears, or by ecchymosis of the orbit or occipital region. 6. The injury to certain of the cranial nerves, as shown in facial paralysis or ptosis (case 27). 7. The effects of lesion of certain portions of the brain, as paralysis, indicating compression, convulsions, or chronic rigidity and spasmodic flexion of the limbs, symptomatic of laceration, and of the inflammatory softening that the brain had suffered. 8. The chronic hypertrophy and eburnation with which the cranial bones are sometimes affected, though by inflammatory changes (Case 22). 9. The general blood-poisoning which may result from suppuration, whether in the scalp, the diploe, or within the cranium.

There is little to be said on the subject of treatment. In cases of scalp wound the ordinary principles of treatment, having regard to subduing inflammatory action and the free and early evacuation of pus when formed, were observed. In erysipelas active purgation and the application of nitrate of silver, with the internal use of iron and quinine, and a certain amount of wine and nutrients, were the means employed. In cases of intra-cranial suppuration exit had to be given to the pus

by perforating the skull with a trephine, and, if necessary, penetrating the dura mater, or even the substance of the brain itself. Such cases are, however, of extremely unfavourable prognosis.

In compression from intra-cranial hæmorrhage, if nature prove unequal to the removal of the clot, trephining is indicated; and here it becomes purely a matter of clinical experience and judgment when such interference is to be had recourse to—a due discretion, with regard to the circumstances of the case and the age of the patient, having to be exercised.

In simple fractures with depression, early operative interference is to be deprecated. This should be delayed until it is evident that unaided nature is unequal to the task, as in such cases the alternative of converting the fracture into a compound one is unavoidable, for the bone must be exposed and raised. In compound fractures with depression of bone and symptoms of compression, the bone should be raised, even although the trephine be needed to effect this. It may be a point for grave consideration in compound fractures of the skull, with depression, even where there are no present symptoms of compression of the brain, whether it may not be better to remove the depressed and fractured pieces at once, with the view of obviating as much as possible the chances of inflammatory mischief arising from their presence.

In the treatment of simple cases of concussion or contusion, I believe that the less we do, beyond placing the patient in a state of complete rest and quiet, the better, giving due attention to any symptoms of excitement that may attend the subsequent stage of reaction. Careful attention to procure the free but not excessive action of the bowels, the application of ice to the head if during reaction it becomes heated, and careful avoidance of improper diet or exposure to over-stimulation, whether mental or physical, are the chief therapeutic indications.

In case of inflammation supervening, the local abstraction of blood, the application of cold, and free purgation are desirable.

I have no reason to believe that excessive depletion or the use of mercury, except as an aperient, is desirable. In the more severe symptoms that arise from compression, laceration, and the subsequent inflammatory changes that result, I believe that we should be guided by the same principles.

In one case (No. 2), where painful cerebral symptoms might have been mistaken for those of inflammation or congestion, but which were probably due to quite an opposite condition, the use of opium was of great benefit, and gave considerable relief.

The conditions which in injury of the head may render the use of the trephine necessary are—1st, those in which it is impossible to raise a depressed portion of bone without the operation; 2nd, to give exit to collections of pus within the skull; or 3rd, of blood, when it is evident that it cannot be absorbed, and that its pressure is a source of danger to life.

It is well known that injuries of the head, even when trifling, are to be regarded as of serious importance, and not to be considered merely according to their magnitude. The slightest scalp wound may take on an unhealthy action, which, being transmitted to the interior of the skull, becomes a matter of the greatest gravity. Even after the wound has healed it is well that the patient should be cautious—indiscretion in diet or drink, exposure to heat, and excitement of any kind, may give rise to intra-cranial mischief, which may prove rapidly fatal. On the other hand, it is remarkable from what severe injuries, involving not only the scalp or the bones, but even the brain itself, recovery may, under favourable circumstances, occur. Case 31 illustrates this, for not only was there in it fracture and loss of bone, but also laceration of the membranes and of the brain itself, and yet complete recovery followed.

Fractures of the base of the cranium are, no doubt, frequently fatal, but recoveries do occur, and the issue of cerebro-spinal fluid or the continuous flow of blood from the ear, which, with other grave symptoms, indicate this accident, though most serious, are not necessarily fatal symptoms.

CASE 1.—*Contused Wound and Compound Comminuted Fracture of Skull, with Depression—Symptoms of Compression—Trephining—Death.*

D., a Hindoo woman, aged 25, was admitted at 2 p.m. on the 9th January, 1860, for a severe injury of the head, caused by a fall from a height of about three feet. Besides minor injuries there was a large contused wound on the right frontal region, communicating with an extensive fracture of the right side of the frontal and parietal bones, which were depressed. On admission she was quite comatose, but was said to have been partially sensible just after the accident. The symptoms of compression rapidly supervened, and there were some convulsive fits two hours after the accident.

It was necessary to trephine in two places, and to remove two portions of bone with the aid of Hey's saw, in order to elevate the depressed portion. A considerable quantity of clot was removed from between the skull and dura mater, and it was found that the longitudinal sinus had been punctured by a spicula of bone. She rallied a little after the operation; the bleeding was arrested by the application of ice and lint. But the improvement did not continue more than twelve hours; she again became quite unconscious, the coma deepened, and she gradually sank; large quantities of brain substance came away, and she died at 10 p.m., 11th January. No post-mortem is recorded; but death was evidently due to extensive intracranial hæmorrhage and injury of the brain.

CASE 2.—*Contused Wounds of Scalp—Erysipelas—Cerebral Irritation—Recovery.*

J. M., an English sailor, aged 39, admitted on 17th October, 1860, at 11.30 p.m., in a state of intoxication, with six small contused wounds on different parts of the head, and a few contusions about the limbs and body—said to have been

received in a drunken quarrel with another sailor. He was also suffering from syphilis. The wounds of the scalp extended to the bone.

On the second day after admission symptoms of erysipelas made their appearance in the scalp. Aperients and citrate of ammonia draughts were ordered, and he was apparently doing well. On the 23rd cerebral symptoms appeared; he did not sleep, complained of severe headache, and sharp fever set in. Salines and aperients were ordered with cold to the head, and a few leeches to the temples. This gave him considerable relief. On the 2nd November there were sharp shooting pains in the head, with fever and intolerance of light.

A mercurial purgative was given, ice applied to the head, and some more blood abstracted. This somewhat relieved the pain, but nausea and vomiting became troublesome, and again increased headache. The erysipelas had disappeared. A dose of opium (tr. opii 3ss.) was prescribed, and a blister applied to the nape of the neck. This giving him great relief, another dose of tr. opii was given after the bowels had been well cleared out, which gave him more relief, and a good night.

On the 7th he was observed to be somewhat drowsy and languid. The opium was discontinued; after this he improved steadily, and the wounds did well. One or two small portions of bone exfoliated, the wounds cicatrized, and he was discharged perfectly cured on the 23rd January, 1861. During the continuance of the cephalic pain and nausea the pulse remained soft and full. There was probably in this case merely a state of cerebral irritability, without inflammatory action, and the great relief afforded by opiates seems to confirm this view.

CASE 3.—*Compound Fracture of Vault of the Skull—No Symptoms of Intra-cranial Mischief—Recovery.*

S. R., a Mahomedan, aged 30, admitted on 5th February, 1862, with a compound fracture of the left parietal bone, said

to have been caused by a blow in a quarrel. He was quite sensible. The bone, though fractured, was not depressed. He did perfectly well, a portion of the outer table of the bone exfoliating. After this the wound cicatrized, and he was discharged quite cured on the 10th April.

CASE 4.—*Fracture of Base of Skull—Symptoms of Compression and Intra-cranial Hæmorrhage—Bleeding also from Ear, Nose, and Mouth—Death.*

S. S., a Mahomedan, aged 60, was admitted on the 20th April, 1863, in a state of complete insensibility, with bleeding from the mouth, nostrils, and ears; stertorous breathing and convulsive fits. The pupils were of natural size, but insensible to light. There were no external wounds of the head. The pulse was feeble and irregular—flickering. He was picked up in this condition, and no account obtained of how the injury occurred. Nutrient enemata were administered, and he was closely watched. A mercurial aperient was given. He remained unconscious; the distended bladder was relieved; the pulse soft and feeble. He gradually sank, and died on the 26th April, at 1.30 p.m. No post-mortem is recorded; but no doubt there had been a fracture of the base of the skull and severe cerebral injury.

CASE 5.—*Fracture of Base of Skull—Bleeding from Nose and Ears—Scalp Wounds—Symptoms of Intra-cranial Injury—Death.*

A Mahomedan, aged 19, was admitted on the 19th June, 1863, at 6 p.m., in a state of complete unconsciousness, with bleeding from the nose and left ear, and also from some scalp wounds on the right side of the head, said to have been caused by a fall from a height of about sixteen feet. The pupils were

dilated, and the pulse quick. The hæmorrhage from the external wounds was arrested, and ice applied after the head had been shaved. A cathartic enema was administered. There was neither fracture nor depression of the skull. He rapidly became worse; breathing stertorous, and pulse irregular. He died on the following day. No post-mortem was allowed. The base of the skull was doubtless fractured.

CASE 6.—*Compound Fracture of Vault of the Skull—Death from Intra-cranial Hæmorrhage and Exhaustion.*

A Mahomedan, aged 35, was admitted on June 10th, 1863, at 4.30 p.m., with two contused wounds, and a large hæmatoma on the right side of the forehead, with fracture of the right radius and ulna, and left clavicle, and dislocation of the left wrist, said to have been caused by a fall from a height of about twenty feet. He was very low from shock, but not perfectly insensible; was said to have lost much blood from the wounds. The frontal bone was fractured. The wounds were dressed, and ice applied. During the night convulsions set in, with vomiting and great restlessness. He died rather suddenly, at 4.30 a.m. I had been sent for, with the view of trephining, but the patient died before I arrived. There is no post-mortem recorded, but there is little doubt that there was compression from extravasated blood, and the partial unconsciousness caused by the shock of the same injury speedily passed into coma, death taking place from intra-cranial hæmorrhage.

CASE 7.—*Fracture of the Base of the Skull—Bleeding from Ears, Nostrils, and Orbit—No Scalp Wound—Respiration Tranquil—No Stertor—Great Prostration—Partial Consciousness—Death in a few hours.*

A Hindoo boy, aged 12 years, was admitted on the 20th December, 1863, at 2.30 p.m., with a severe contusion of the

right side of the face and forehead, and bleeding from the ears and nostrils. The right eyeball was prominent from ecchymosis in the orbit, and the right pupil dilated. His respiration was tranquil; pulse feeble. No fracture of the vault of the cranium could be detected, nor any other injury; he was not perfectly unconscious, but he was cold and depressed. Hot bottles were applied to the extremities, an enema given, and he was carefully watched. He sank about two hours after admission. No post-mortem was obtained, but it is evident that there was fracture of the base of the skull.

CASE 8.—*Wounds of Scalp—Unhealthy Action—Tetanus—Death in eight days.*

A Mahomedan woman, aged 30, admitted 7th September, 1864, with two contused wounds in the occipital region (but no fracture), one of which was about five inches long. The wounds took on an unhealthy action on the 11th, and symptoms of trismus set in on the 14th. She was treated with tr. cannabis, chloroform, and opium smoking, which seemed for a time to control the paroxysms of opisthotonos. These after the 14th became severe, and she died on the 19th.

CASE 9.—*Wound of Scalp—No Fracture Detected—Death from Intra-cranial Hæmorrhage and Shock within six hours.*

A Mahomedan male, aged 50, was admitted at 8 p.m. on the 5th October, 1864, with a deep and contused wound on the left parieto-temporal region (but no fracture) caused by the fall of a house, under the ruins of which he lay for about five hours. He was brought to the hospital perfectly unconscious, and collapsed, there being no pulse perceptible at the wrist. He died some four and a-half hours after admission. No post-mortem was obtained. He evidently died of intra-cranial hæmorrhage and shock.

CASE 10.—*Abrasion of Scalp—Coma and Hæmorrhage from Ear—No History—Partial Return of Consciousness—Delirium—Paralysis of Right Side—Pyrexia—Irregular Dilatation of Pupils—Ptosis—Death—Probable Fracture of Base of Cranium and Laceration of Brain.*

A European, a middle-aged man, was admitted without any history at 8.30 p.m., 24th October, 1864, in a state of perfect coma. He had been picked up in the streets, no wound at the time being observed. He was admitted on the suspicion of having been poisoned by opium, but some bleeding having been observed from the right ear, with a slight scratch or abrasion, he was transferred to my wards. The following morning he was partially conscious, and the pupils were dilated. He opened his eyes, and seemed to hear and partially comprehend what was said to him. His pulse was fair. The head had been shaved, and cold applied, and aperient enemata administered. He was rather better the following day, and showed evident signs of consciousness, and spoke a few words, though I am not aware that he explained the cause of his condition. During the day he was delirious and restless, tossing about in bed, and became quite unconscious. The breathing was quiet. Ptosis of the left eyelid, paralysis of the right side of the face, and irregular dilatation of the pupils. Pyrexia and twitching of the lower extremities supervened, and he died perfectly comatose at 5 a.m. on the morning of the 28th October. No post-mortem was obtained. In this case, most probably there had been fracture of the base of the skull, with intra-cranial hæmorrhage, and probably laceration of the brain.

CASE 11.—*Wound of Scalp—No Apparent Fracture—Complete Coma — Dilated Pupils — Delirium — Restlessness — Feeble Pulse—Rigidity of Muscles—Gradual Recovery—Probable Contusion and Slight Laceration of Cerebral Substance.*

A Hindoo woman, aged 40, was admitted at 4.30 p.m., on 28th November, 1864, in a state of perfect insensibility, with slow respiration and dilated pupils. She had a deeply lacerated wound of the right parietal region, without any apparent fracture of the skull. She had been kicked by a horse. During the night she became restless, and delirious, with very feeble pulse. The wounds had been dressed and stimulants were very cautiously given, as she seemed to be sinking, cold being applied to the head and the bowels cleared by an enema. On the 29th the left side of the body and limbs became rigid. On the 30th the right side became even more rigid than the left. She improved slightly the next day. On the 3rd December she was better: was quite conscious, and answered questions intelligently, but the rigidity of the limbs, which was extreme, continued. On the 6th she was worse, but towards the evening improved again. The following day she improved, the rigidity of the limbs diminished, and she went on favourably until the 13th, when she became delirious again, and continued so until the 21st, after which she steadily improved. The wound healed, and she was discharged, at her own request, on the 29th December.

In this case no doubt there had been violent concussion or contusion of the brain, with probably some slight laceration of its substance, and effusion of blood, from which she gradually recovered, repair taking place. The symptoms were probably exaggerated by a complication of hysteria and the debility due to the loss of blood and shock to the brain.

CASE 12.—*Contused Wound of Scalp, with Depression of Bone—Bleeding from Ear—No Cerebral Symptoms—Recovery.*

A Mahomedan, aged 26, admitted at 9.30 of 3rd February, 1865, with a contused wound of the soft parts, and a depression of the mastoid process, and hæmorrhage from the ear. It was said to have been caused by his being knocked down by a carriage about an hour before admission. He was quite sensible, but had been unconscious for a short time after the accident. The depression of bone was considerable. He had no untoward symptoms. The wound healed, the hæmorrhage from the ear ceased, and the depression gradually disappeared. He was discharged, apparently quite recovered, on the 15th July.

CASE 13.—*Concussion of Brain—Bleeding from the Ear—No Wound—Insensibility—Recovery.*

A Hindoo boy, aged 9 years, was admitted at 2 p.m., on the 24th April, 1865, the day after he had been knocked down by a carriage. He had been insensible for three hours after the accident, and there was bleeding from the left ear, which had continued since the accident. On admission no wound could be discovered, and he was quite conscious. The bleeding from the ear ceased on the following day, and was followed by a serous and then by a purulent discharge. An abscess formed in the left temporal region on the 3rd May, which was opened on the 5th. He did well, and was discharged quite recovered on the 16th. This appears to have been a simple case of concussion. The bleeding from the ear, and the subsequent abscess, were probably the result of superficial local injury.

CASE 14.—*Contused Wounds of Scalp and Pericranium—Mischief extended to the Contents of the Cranium—Paralysis and Coma—Intra-cranial Suppuration—Death.*

A Hindoo boy, aged 14, admitted at 6 p.m. of the 12th May, 1865, with two contused wounds on the left parietal region, each about five inches long, and situated parallel to each other. They were deep, and exposed the bone. He was much depressed, and had a feeble pulse, but was quite conscious. Bleeding from the wounds had ceased. A portion of the scalp between the wounds sloughed, but he was doing well until the 23rd, when fever set in, which continued for three days, and was followed by severe cephalic pain. The granulating wound looked pale and flabby. The face and scalp became œdematous. The pulse was very feeble, and he became unconscious. On the 2nd June the right side was paralyzed. He was excessively depressed and feeble. Nutrients and a certain quantity of stimulants were given, but he gradually sank, and died on the 3rd. It was observed that a large portion of the bone died, and no doubt intra-cranial suppuration had occurred. Trephining, in this case, would probably have discovered pus beneath the bone, and probably in its diploe, but the prospects of benefit were not hopeful in his wretched condition of debility and blood-poisoning.

CASE 15.—*Wound of Scalp—Rapid Supervention of Unconsciousness—Stertorous and Laboured Breathing—Intra-cranial Hæmorrhage—Death.*

A Mahomedan, aged 30, admitted at 1 p.m., 2nd June, 1865, with an extensive lacerated wound of the scalp, 2½ inches long, nearly over the coronal suture, said to have been caused by falling from a ship's mast, a height of thirty feet. He had been completely stunned by the fall, but regained consciousness

after some time. His pulse and respiration were good, and the case was not thought at the time to be serious. At 4 p.m. of the same day he was found to be unconscious, with stertorous and laboured breathing; from this condition he became rapidly worse, and died at 9 p.m. of the same day. No post-mortem was obtained. The head was most carefully examined, but neither fracture nor depression of the skull could be found. In all probability he had laceration of some intra-cranial vessel, the hæmorrhage from which, combined with fracture of the base of the skull, caused rapid compression and death.

CASE 16.—*Injury to the Head by a Fall—Bleeding from Ear and Nostrils—Vomiting of Blood—Coma and Death—Fracture of the Base of Cranium.*

An American sailor, aged 22, was admitted at 2 p.m. on the 16th October, 1865, in a state of complete insensibility, with bleeding from the left ear and both nostrils. The injury said to have been caused by a fall from the upper to the lower deck. His pulse was very weak. Half an hour after admission he began to vomit, and blood was ejected with other matters. His pupils became dilated, and he sank, without any symptoms of improvement, at noon the same day. Though no fracture of the vault was discovered, there was most probably fracture of the base of the skull, and intra-cranial laceration. No post-mortem is recorded.

CASE 17.—*Scalp Wound and Fractured Skull, followed by Fever and Intra-cranial Suppuration—Trephining—Death from Pyæmia.*

A young Hindoo female was admitted on 21st August, 1865, with a scalp wound over the left parietal eminence, caused, it was said, by falling from the second storey of a house. There were

no constitutional symptoms, and she was apparently doing well until the 3rd September, when she had fever, with rigors. The fever assumed a remittent form, and was accompanied by severe pain in the head, nausea, delirium, drowsiness, and a feeble pulse. She continued in this state up to the 12th when she became comatose. Trephining was now had recourse to at the seat of injury. The pericranium was denuded, and a depressed fracture was observed after the necessary crucial incision had been made. On removing the piece of bone with the trephine, some thick pus was given exit to from between the skull and dura mater. Another piece of bone being removed with the trephine it was found that it was infiltrated with pus. The dura mater was not injured. There was slight improvement. She became partially conscious, but she soon relapsed into her former condition, and died on the 15th, with all the symptoms of blood-poisoning. It was found after death that the bone around the injury was denuded and partially infiltrated with pus; pus was also seen beneath as well as above the dura mater for some distance around the seat of injury. The brain was not otherwise injured.

In the thorax it was found that the lungs were deeply affected, there being large gangrenous patches on the posterior surfaces of both, and aplastic deposits in the pleural cavities. The right ventricle of the heart contained a firm white clot plugging the pulmonary artery.

No pyæmic changes in the liver or other viscera. The causes of death in this case were overwhelming. Intra-cranial suppuration, blood-poisoning, causing rapid pyæmic destruction of the lungs, and plugging of the pulmonary artery.

CASE 18.—*Injury of the Head by a Fall—Bleeding from Ear—Convulsions—Rigidity of Muscles of One Side—Neither Fracture nor Wound discovered before Death, which occurred with Symptoms of Compression and Laceration of Brain—Petrous Portion found to be Fractured, and Brain Lacerated on Opposite Side from Contre-coup.*

A Hindoo female, aged 25, was admitted on the 22nd October, 1865. She had been picked up by the police in a state of unconsciousness, and was said to have fallen, when intoxicated, from the verandah of a house. There was bleeding from the left ear, and a puffy swelling in the left temporal region. The pupils were natural and respiration tranquil. The limbs of the left side were flexed and rigidly contracted, but she tossed those of the right side about incessantly. Neither wound nor fracture could be discovered. She remained in the same condition, with the left side rigid, the right occasionally convulsed, and the head drawn to the left side. Pulse gradually became rapid and feeble and pupils were dilated; she continued to be quite unconscious, and death occurred on the 26th, in the evening.

Post-mortem.—The petrous portion of the left temporal bone was fractured, the fracture extending from the carotid canal to the upper margin of the squamous portion. The brain-substance was lacerated on the opposite side, the right, at a point corresponding to the parietal eminence, and a clot of blood of about the size of a walnut was extravasated into the substance of the cerebrum.

There was no injury of the brain on the left side. On the right there was neither fracture of the parietal bone nor perceptible injury of the scalp. The other organs were healthy. The brain-substance was lacerated on the side opposite to that where the injury had been inflicted, as the force had been transmitted across the skull. The *contre-coup* had not, however, taken effect on the bone. It was evident that the injury had been inflicted (she had fallen) on the left side of the head,

as there was a contusion corresponding to the subjacent fracture.

CASE 19.—*Contused Wound of Scalp — Fracture — Erysipelas — Extensive Suppuration — No Intra-cranial Mischief — Recovery.*

A young Hindoo female, admitted on 31st December, 1865, with a large contused wound about 3½ inches long on the vertex of the head, caused by a blow with a brass lota (drinking vessel). The bone was fissured to a considerable extent. The pulse was feeble, probably from loss of blood. She complained of severe pain, and was so weak that she was unable to sit up.

On the 4th January erysipelas attacked the face, and by the 12th had spread over the scalp, attended with much depression and vomiting. It continued to spread to the trunk, and having left the head, returned to it again. There was extensive suppuration and incisions were required. Under the influence of good food, moderate stimulants, and tinct. of iron, she did well. The wounds healed, two portions of bone having exfoliated, and she was ultimately discharged cured on the 11th April.

CASE 20.—*Contused Wound of Scalp and Depressed Fracture of Frontal Bone over Frontal Sinus, caused by a Blow—Recovery.*

A Rajpoot peon, aged 30, was admitted on 6th January, 1866, with a contused wound about two inches long on his forehead, just above the nose, and leading to a depressed fracture of the outer table of the frontal bone, over the frontal sinus. The fractured piece of bone was about the size of a sixpence. The injury had been inflicted with a *lattee*, a bamboo bound with iron. He recovered without any unfavourable symptom, and was discharged on 21st January.

CASE 21.—*Injury of Head from violent Compression—Unconsciousness—Hæmorrhage from Left Ear followed by profuse Watery Discharge—Recovery—Petrous Portion probably Fractured.*

An English sailor, aged 24, admitted 25th March, 1866, four days after having had his head violently squeezed between two boats when overtaken by the bore on the River Hooghly. He became insensible immediately, and was found to have hæmorrhage from the left ear. On recovering consciousness some hours afterwards, he remained in a dull apathetic state, in which condition he was when admitted.

26th.—Complains of pain in the head. Pulse, 80, soft and weak; temperature, 100°. The left pupil dilated and inactive, the right contracted; tongue coated and dry; he is dull and heavy; answers questions reluctantly in one or two words; very quiet all day. There is no paralysis. There is a clear serous discharge from the left ear.

29th.—Pulse, 98; temperature 100°; vomited twice to-day; pupil still dilated. A few drops of the fluid from the ear examined contained some albumen; it is becoming thicker. Is still dull and apathetic; partially deaf on the left side.

April 3rd.—Pulse 80; temperature 98°. Discharge from the ear has nearly ceased; difference in the pupils still continues. He is improving in health, gaining strength and has a good appetite.

He continued to improve, yet, though his intellect seemed to regain its clearness, he remained dull and apathetic. The discharge from the ear ceased, but partial deafness remained. He left the hospital on 30th May, and we heard no more of him. It appears probable that in this case there was a fracture of the petrous portion of the temporal bone. There was deafness and hæmorrhage, followed by a tolerably profuse watery discharge, which was only slightly albuminous.

CASE 22. — *Contusion and Abrasion of Scalp — Death from Pneumonia — Left Parietal and Frontal Bones found thickened and eburnated. This probably was of antecedent existence, and may have caused an Epileptic Fit, in which he fell and met with the Accident — The Pneumonia probably Accidental.*

A Mahomedan, aged 20, was admitted on 22nd April, 1866, in a semi-comatose state, with a contusion and abrasion on the forehead, and swollen eyelids. No clear account of the cause could be obtained. Aperients were given, and cold applied to the head. The next day he had fever, which assumed the continued type, and it was discovered that he had pneumonia; of this he died on the 28th. The left lung was hepatized; the right was normal. The other viscera healthy. On examining the head, it was found that there was no injury of the frontal bone, but that the left parietal and temporal bones were much thickened and eburnated. The dura mater underneath firmly adherent and thickened to an extraordinary extent, the thickening appearing to depend on organized lymph. The brain-substance and arachnoid were found somewhat adherent, for they separated with difficulty from the dura mater.

No history of the previous condition of this patient was obtained, but it seems probable that the thickening of the bone and membrane was of old standing.

CASE 23. — *Contused Wound of Scalp and Fracture, with Depression of Bone — Insensibility, with Stertor — Trephining — Intra-cranial hæmorrhage — Relief — Recurrence of Symptoms of Compression and Laceration of Brain — Death — Fracture extending through Base — Intra-cranial Hæmorrhage — Substance of Brain Lacerated and Ecchymosed.*

A Hindoo, aged 30, was admitted 21st April, 1866, having received a blow on the left side of the head from a heavy

bamboo, which caused a contused wound over the anterior margin of the parietal bone, about two inches in length, fracturing the bone and depressing a portion of the size of half a florin, the pericranium not being divided. He was insensible, with stertorous breathing, feeble pulse, dilated pupils, extremities cold and rigid, with occasional convulsive extension, more marked on the right than the left side. Pulse, 76; respiration, 39; temperature, 100°. As the depressed portion of bone could not be otherwise raised, he was trephined. It was then elevated, and considerable hæmorrhage resulted; clots of blood were removed, the pulsation of the brain was very marked, and after the operation the stertor ceased; he groaned, and had occasional convulsions of the right side. The fits became less frequent, but complete consciousness was not restored. Pulse rose to 90. Reflex movements of legs when the feet were irritated.

23*rd*.—Pulse, 70; temperature, 99°; respiration tranquil; left pupil dilated; right pupil normal; more conscious; opens his mouth when told to put out his tongue; occasional tossing of the right hand. Both upper extremities become rigid when fits occur.

24*th*.—Pulse, 130; temperature, 102°. Constant jactitation of the right limbs; stertorous breathing; profound coma; fits recurring; head drawn to the left side. Died at midnight.

Post-mortem.—There was fracture extending through the temporal and across the body of the sphenoid. Between the bone and dura mater there was a layer of clotted blood, extending for five or six inches beyond the wound. The brain underneath was softened, its substance lacerated and ecchymosed over a surface of the size of a sixpence. The other organs were healthy.

CASE 24.—*Fractured Skull and Contused Wound of Scalp—Denudation of a Portion of Bone—Removal of Fractured Bone—Hernia Cerebri—Separation of Bone—Intellect affected—Recovery.*

A Hindoo woman, aged 45, was admitted on 30th April, 1866, with fracture of the skull, caused by the fall of a heavy brick six days before admission. There was a contused wound of the scalp of the vertex, the frontal and parietal bones being denuded of periosteum to the extent of the size of a shilling. She continued up to the 25th May in a feeble state, complaining of pain in the head, and occasional fever. The pain becoming more severe, a crucial incision was then made for more perfect exploration. The fracture was thoroughly exposed, and cerebral pulsation could be seen through the fissure. On further examination it was discovered that a piece of the parietal bone was loose, and on removing it pus welled up through the fracture.

June 6th.—A piece of bone, two inches long and one inch broad, was removed from the posterior angle of the wound. This left the dura mater exposed, and pulsation was observed. The dura mater is granulating healthily; she complains of giddiness, but of no other head symptoms.

10*th.*—Continues in the same condition; a fragment of bone, an inch and a half long and three-quarters of an inch broad, was removed from the anterior angle of the wound.

25*th.*—She is feverish at times, but on the whole is doing well. Cerebral pulsation distinct, but the wound is granulating healthily and cicatrizing. No head symptoms.

July 3rd.—Wound all but cicatrized. No pulsation now visible. It is painful when exposed during the dressing.

14*th.*—The wound has healed. Cicatrix contracting and becoming more dense; pressure on it causes no inconvenience.

21*st.*—The house-surgeon has the following remarks:—"Symptoms of nymphomania to such an extent as to render

restraint and seclusion necessary. Sings and talks incoherently to herself, but is perfectly coherent and rational when spoken to." In other respects doing well; eats and sleeps well.

August 5th.—Cicatrix much contracted. She is quiet and rational now, neither excitement nor delirium being present.

On the 9th, a small fragment of bone having made its way to the surface, was removed, and she continued to improve; though quiet, she seems unable to take care of herself.

On the 21st she managed to get away from the hospital, and was brought back again on the 27th. There was then a slight discharge from the cicatrizing wound, whence the fragment had come away. After her return she had occasional attacks of fever, and abscesses formed in the axillæ. These finally healed; a puffy swelling formed on the right side of the head, but it disappeared spontaneously. Gradually, under the influence of nutrients and tonics, she regained her health and strength—mental and physical—and was discharged on 20th November.

CASE 25.—*Wound of Scalp—Fracture of Skull—No Cerebral Symptoms at first—Subsequent Symptoms of Intra-cranial Suppuration — Trephining — Osteo-myelitis of Diploe and Intra-cranial Suppuration—Death.*

A Hindoo man, aged 20, admitted 4th June, 1866, having received a blow on the left side of the head from a heavy stick. The scalp wound was about four inches long, directed obliquely over the left supra-ciliary ridge and parietal bone. The frontal bone was fractured, the injury involving both tables. No cerebral symptoms, pupils natural, pulse fair.

6th.—Slight pain in the head, swelling of left eyelid; pulse, 78; temperature, 101°. No head symptoms.

8th.—Pulse, 84; temperature, 103°. Complaining of severe pain in the head; vomited; no rigors.

10th.—Pulse, 96; temperature, 103°; eyelids swollen; free purulent discharge from the wound. Pain in the head continues. He has had aperients and cold to the head.

11*th*.—Pulse and temperature the same; had rigors in the night; pain in the head increases; no delirium; wound looks healthy; perfectly sensible; had some hæmorrhage from the wound during the night.

12*th*.—Pulse, 104; temperature, 102°. Is very restless—sometimes delirious; ecchymosis of left conjunctiva.

13*th*.—Pulse, 104; temperature, 102°. Is drowsy, but can be easily roused; has severe pain in the head; left eyeball protruding; very restless.

14*th*.—Pulse, 130; temperature, 103°. Tries to sit up; delirous; both eyelids much swollen; cornea of left eyeball sloughing.

15*th*.—Pulse, 130; very weak. Can still be roused to speak, and he answers, though slowly.

Trephining performed. The elevator was first introduced under the fractured portion, but failed to raise the depressed bone. A piece was then removed by the trephine. There was suppuration in the diploe, but none under the bone corresponding to the trephine. There was no relief. He remained in the same condition; got gradually weaker and died that night (16th).

On post-mortem examination it was found that there was a thin layer of pus between the bone and dura mater corresponding to the posterior portion of the wound. There was also a separate thin layer of pus similarly situated in the orbit.

CASE 26.—*Injury of Head by a Fall—No Wound or Fracture detected—Stupor—Slight Rigidity of Limbs—Normal Pupils—Stertor and Coma—Death from Intra-cranial Mischief.*

A Hindoo woman, aged 45, was admitted on the 17th June, 1866, in a state of stupor with slight rigidity of the limbs, dry, coated tongue, full pulse, and laboured respiration. Temperature of body natural, pupils natural, no fracture could be dis-

covered. The friends stated that four days previously she had fallen from a height of about fifteen feet, since when she had become insensible. No vomiting; could not be roused. There were slight bruises on different parts of the body, but no marks of violence on the head. The head was shaved, ice applied, and a cathartic enema given. These seemed to arouse her a little. She put out her tongue when desired to do so, but evinced no further signs of intelligence. The pulse gradually diminished in force. The temperature rose to 103°. The urine was found to be ammoniacal and albuminous. Stertorous breathing with complete coma came on, and she died at 3 a.m. of the 18th June. On examination of the body the vessels of the brain were found to be much congested. There was serous fluid in the arachnoid and sub-arachnoid spaces, and a layer of lymph at the base of the brain. The cerebral substance was healthy. The lungs were congested, and the cavities of the heart full of blood.

CASE 27.—*Lacerated Wound of Scalp—Unconsciousness—Stertorous Breathing and Low Pulse—Hæmorrhage from Left Ear—Continued Discharge of Sanguinolent Fluid—Facial Paralysis—Neither Paralysis nor Rigidity of other Muscles—Recovery—Probably Fracture of Petrous Portion.*

A Hindoo male, aged 25, admitted 21st July, 1866. Fell thirteen feet from a tree, and was shortly after brought in quite insensible. There was a lacerated wound on the scalp, on the left side. Pupils were normal; breathing stertorous and slow; pulse only 60 and feeble; hæmorrhage from the left ear. 7 a.m.: Pulse 56, weak; pupils natural, contract on exposure to light. Bleeding from ear continues. About two ounces of sanguinolent fluid collected since early morning. It has not coagulated. Is still drowsy, but on being loudly called to, opens his eyes, as though he would speak, but is unable to do so.

26*th.*—Improving; pulse, 60; temperature, 98°; pupils slightly dilated; is more conscious, and answers slowly, but relapses into drowsiness; right corner of the mouth drawn up; left eyelid cannot be closed; neither paralysis nor rigidity of extremities.

27*th.*—Gradually improving. Pulse, 58; temperature, 97°; less drowsy; answers questions rationally but slowly, and in a dreamy way. Facial paralysis continues.

He rallied slowly from this time, and became stronger. The facial paralysis continued, but gradually diminished. He was nearly well, though weak, could almost close his eyelids, and form a proper cone with his lips in blowing, when he left the hospital, at his own request, on the 11th October.

CASE 28.—*Injury to the Head from a Fall—Concussion of Brain and Fracture of Spine of a Cervical Vertebra—Recovered Slowly, but Completely.*

A Malay serang, aged 40, admitted 10th September, 1866, in a state of semi-consciousness. He had fallen from the topmast of his ship on his head, and had sustained not only concussion of the brain, but an injury of the neck. The spinous process of the sixth cervical vertebra was fractured. There was, however, no paralysis, no bleeding from the ears; no external wound. His pulse was very feeble, 81. He could be roused if spoken to loudly, but relapsed into a drowsy condition. Aperients and cold to the head; perfect rest; neck supported with bandage and pad.

11*th.*—In a drowsy state; tongue dry and furred; draws up the legs slowly, the right most, when told to do so; pulse, 76.

13*th.*—Pulse, 70. Is now quite conscious, but is dull and dreamy.

15*th.*—Pulse, 68. Cannot sit up; legs seem weak, as though he has no power over them.

18*th*.—Pulse, 60. More power over his legs. This morning his lower jaw was found to be dislocated on one side (probably in yawning) and reduced. He continued in a feeble state, dull, and dreamy, for some time, but gradually improved. The power of his legs returned, and he finally left the hospital cured, though weak, on the 5th November.

He was re-admitted into hospital eighteen months later for stricture. No traces of the injury to his head or spine remained.

CASE 29.—*Contused Wound of Scalp—Fracture of Skull—No Depression—Coma—Stertor—Extremities Flexed and Rigid—Death from Intra-cranial Hæmorrhage and Laceration of Substance of the Brain.*

A Hindoo woman, aged 40 years, admitted 23rd September, 1866, was picked up by the police in the street with a contused wound of the occiput, left side. She was unconscious, pupils natural, but appeared to feel when pinched. Pulse, 120, small; upper extremities flexed and somewhat rigid. 6 p.m.: Rather more conscious, opens her eyes when loudly spoken to, but is unable to speak.

24*th*.—Pulse, 120, weak; temperature, 101°; respiration, 32; more comatose; no stertor; extremities still flexed and rigid; cannot be made to swallow; bowels relieved by enema. 6 p.m.: Pulse, 120, weak; temperature, 102°; mucous *râles;* rigidity continues; no convulsions. Died the following morning.

On examination it was found that the scalp, in the vicinity of the injury, was much ecchymosed. There was a fracture of the skull extending from the posterior aspect of the left parietal bone through the occipital. A large clot of blood three inches long lay between the bone and dura mater under the fracture. The brain was compressed on the right side, and anteriorly it was lacerated, and the substance about the laceration softened and ecchymosed. There was a smaller patch of softening of the

anterior lobe of the brain on the right side. The pia mater was congested; other organs healthy.

CASE 30.—*Contused Wound of Scalp in a boy of* 12 *caused by a fall—Stupor—Subsequently Delirious—Recovery.*

A Hindoo boy, aged 12, admitted 24th September, 1866, with a contused wound of the scalp, said to have been caused by a fall from a house. He was in a state of stupor, occasionally becoming noisy and delirious, rolling his head violently, and burying it in the pillow. No fracture detected. The head was dressed with cold applications; aperients given. Delirium continued for two days, after which he began to improve, and steadily progressed until he was discharged cured on the 7th October.

CASE 31.—*Wound of Scalp in a girl* 4 *years old — Fracture and Depression of Frontal Bone—Laceration and Escape of Brain-substance—No Rigidity of Muscles, but complete Coma with Stertor—Rapid Pulse—Exfoliation of Bone—Complete Recovery.*

A Hindoo girl, aged 4, admitted 28th September, 1866, having fallen from the roof of a two-storied house and received a wound on the forehead. The wound was of a semi-circular form, about two inches in extent. The bone beneath was fractured and partially depressed. The integument had been driven in between the fractured edges of the bone, and brain-substance was oozing out in considerable quantities. She was quite unconscious; breathing stertorous and laboured; pulse imperceptible; extremities not rigid.

29th.—Pulse, 140; conscious; no rigidity of muscles; talks little, but rationally.

October 2nd.—Pulse, 128; temperature, 101°; free suppuration from the wound; bone about it denuded to some extent.

4*th.*—Fever every evening; pulse rises to 132; temperature, 102°; no rigors; frequently shrieks violently; great tenderness all over the scalp; eyelids puffy; no erysipelas.

7*th.*—Pulse, 140; temperature, 105°; left eyeball protruding; much chemosis of conjunctiva; is restless, and at intervals shrieks loudly; is quite sensible; wound discharging freely.

9*th.*—Pulse, 132; temperature, 103°; protrusion of eyeball continues; cornea beginning to perish at the lower margin; no convulsions on probing or examining the wound; is drowsy.

11*th.*—Sloughing of cornea has ceased; exophthalmos much diminished; no drowsiness; no cerebral symptoms; pulse, 132; temperature, 101°. From this date she began to improve steadily. The eye completely recovered. Several portions of the frontal bone exfoliated, and the wound gradually healed, except two small sinuses, no doubt connected with a fragment of dead bone. She was discharged in sound health on the 12th February, 1867, and ultimately quite recovered, with a considerable frontal depression corresponding to the lost bone. Her intellect seemed unaffected.

CASE 32.—*Injury of the Head from a Fall—Unconsciousness—Stertor—No Wound or Fracture Detected—Death from Intra-cranial Hæmorrhage.*

A Mahomedan lascar, aged 25, admitted 16th November, 1866, in a state of complete insensibility and great restlessness, with dilated pupils. There was no external sign of injury, but his friends said that he had fallen about sixteen feet. An aperient was given, and cold applied to the head. The coma deepened, and he gradually sank. There was no stertor. He died on the 22nd. No post-mortem examination is recorded.

CASE 33.—*Lacerated Wound of Scalp, a large portion of which was separated from the Skull—Bone denuded of Periosteum—Violent Pain in Head—Vomiting—Profuse Suppuration and Sloughing of Scalp—Exfoliation of Bone—Complete Recovery.*

A Hindoo woman, aged 67, admitted 25th February, 1867, three days after the accident, with a lacerated wound on the scalp, caused by falling down a deep well. The wound was much inflamed. Half of the scalp was separated from the anterior part of the cranium, and fell forward as a flap. The bone was exposed, and partially denuded of periosteum. She had severe pain in the head and vomiting. Pulse very weak; profuse suppuration, and some sloughing of tissue followed, exposing a considerable amount of bone. She, however, did well, the discharge became healthy, granulations sprang up, the denuded bone became red and granulating, the reflected scalp being kept in apposition adhered, and in all respects she did well.

On the 31st March a scale of bone exfoliated. The surface granulated healthily, and cicatrization closed in the wound. She was discharged cured on the 29th May. The surface of bone at one time exposed measured four inches in length and two in breadth. She never had a bad symptom, and the progress of repair was steady and uninterrupted.

CASE 34.—*Contused Wound of Scalp from Kick of a Horse—Coma—Stertor—Extremities Flexed and Rigid—Trephining over Seat of Injury—Partial Restoration of Consciousness—Return of Coma—Death from Intra-cranial Hæmorrhage and Laceration of Brain.*

A Hindoo female, aged 65, admitted 1st April, 1867, insensible, from the kick of a horse, which had caused a contused wound about an inch in length over the right parietal eminence.

There was no bleeding either from the ear or nose. The respiration tranquil; pupils slightly contracted; pulse slow and quiet.

2nd.—Breathing stertorous; complete coma; the left pupil dilated, the right contracted; face paralyzed on the right side; pulse, 60; extremities slightly flexed and rigid. 10 a.m.: Trephined over the seat of injury; the dura mater opened; there was a clot between it and the brain which was removed. The breathing became less stertorous; pulse varied from 60 to 100; partial consciousness returned; but soon after she again became quite comatose, breathing was stertorous, and she died at 4 p.m.

On post-mortem examination the brain-substance was found to be lacerated to the extent of three inches near the seat of injury in the scalp, and there were clots around the laceration beneath the dura mater.

CASE 35.—*Contused Wound of Scalp and Depression of Bone—Partial Stupor and Aphasia—No Paralysis—Erysipelas—Complete Recovery.*

A Mahomedan, aged 29, was admitted 15th August, 1867. He had received a blow on the left side of the head from a stick, which had caused a contused wound of the left temporal region about an inch in length; a circular portion of bone about two inches in diameter was depressed.

The patient was sensible, but somewhat dull and stupid, and there was partial aphasia. The pupils dilated; no paralysis.

18th.—Has slight fever; is restless; drowsy; does not answer questions properly. Aperients; cold to the head.

21st.—Has erysipelas of the scalp, affecting chiefly the back of the head and the left ear; pulse, 108; temperature, 104°; is conscious, but does not reply correctly; speaks very slowly; has neither paralysis nor convulsions. Aperients; nitrate of silver to the scalp, with tinct. ferri sesqui-chlorid. internally.

22*nd*.—Erysipelas subsiding; no fever; discharge less; sits up, but does not answer when spoken to.

24*th*.—Erysipelas gone; is much the same otherwise; begins to reply rationally when spoken to.

The wound gradually cicatrized, leaving for some time a sinus leading to roughened and depressed bone; a fragment of bone also exfoliated. He was finally discharged, perfectly recovered.

CASE 36.—*Contused Wound of Scalp and Fissure, with Depression of Bone, caused by a Fall from a House—Gradual Supervention of Coma and Stertor—Trephining—Removal of Intracranial Clots—Stupor Relieved, and Transient Improvement—Symptoms of Compression Recurred—Death from Intracranial Hæmorrhage and Laceration of Substance of the Brain.*

A Hindoo, aged 40, admitted on the 21st February, 1868, at 10 p.m., with a large contused wound, four or five inches in length, over the right side of the head, leading to a longitudinal fissure, with depressed margins, of the right parietal and frontal bones—said to have been caused by a fall from a one-storied house. There were a second small wound of the right ear, and comminuted fracture of both bones of the middle of the left forearm. He was quite sensible, and rather restless. The left pupil slightly contracted, and the pulse feeble; the breathing was natural. The patient soon became quite unconscious; both the pupils more contracted; the breathing stertorous. The wound was enlarged, and the fracture thoroughly exposed; trephining was performed, and from under the portions of bone removed several clots were taken away. The stupor immediately disappeared, and the pulse improved. But the improvement did not last long; hæmorrhage from a meningeal branch continued, and stupor again supervened. He remained partially comatose, when on the morning of the 24th he was attacked with hurried respiration, and died on that day, at 1.15 p.m.

Post-mortem examination revealed a large clot between the dura mater and the bone near the seat of the fracture. The orbital plate of the frontal and the lesser wing of the sphenoid were also broken. The brain was also lacerated in the anterior and middle lobes. Its substance was more than usually congested. The meningeal artery of the right side was torn. The other organs were not examined, but probably he had fibrinous coagula in the right side of the heart.

CASE 37.—*Contused Wound and Separation of Scalp—No Injury to the Bone—Recovery.*

A Hindoo woman, aged 35, was admitted 24th June, 1868, with a contused wound, five inches long, on the right side of her head. A semi-circular flap of scalp was also raised, the bone beneath it being exposed. There was a second, rather smaller wound, of the vertex of the scalp. They were caused by falling into a well. A considerable portion of the detached flaps sloughed, but healthy granulations soon closed in the wounds, and she was discharged well on the 1st August.

CASE 38.—*Contused Wound of Scalp—Fracture of Skull, with Depression of Bone, and Laceration and Exudation of Brain-substance—Removal of Bone—Did well for three weeks, when symptoms of grave Cerebral Mischief supervened—Rigors—Squinting—Rapid Pulse—High Temperature—Hernia Cerebri—Unconsciousness again returned—Rigidity and Tremor of Muscles—Death in the Seventh Week.*

A Hindoo woman, aged 20, was admitted on the 19th July, 1868, in a state of partial insensibility, with a contused wound on the left side of her head, about an inch in length, just above the ear; it led to a fracture of the skull, several pieces of bone being depressed and impacted, others loose. On removing

these, some brain-substance came away. There was another contused wound over the right parietal, exposing the bone. There was a compound fracture of the right fifth metacarpal bone. These injuries had been inflicted by blows with some blunt weapon.

She was conscious; her pupils were normal; pulse weak. The wounds were antiseptically dressed.

The next morning she was delirious; pulse feeble, 110. Temperature, 101°. Aperients; cathartic enema; cold to the head. As she seemed very low, brandy and beef tea were given as enemata. Her pulse became irregular; pupils dilated. Temperature rose to 104° and 105°; pulse, 128. She was unconscious, but had no stertor.

By the 24th she had improved: the symptoms had abated. A collection of pus, formed at the seat of injury on the right hand, was evacuated.

On the 27th she spoke rationally; on the 29th, she conversed as much as permitted (which was very little) with her friends.

On the 30th she again became very restless and delirious. On the 1st August a piece of bone, about an inch in length, which had become detached, was removed from the wound above the left ear. After this she again improved. She spoke rationally, and expressed her wants; washed her face with her own hands.

She appeared to be doing well until the 6th August, when she had a rigor, after which she became worse, with slight variations in her condition. The right eye squinted, and her intelligence was altogether lost. The temperature varied from 100° to 105°, and the pulse from 110 to 130. The wound on the right side of the head had healed by the 8th August, and on the 10th it was observed that a cerebral pulsating tumour was protruding from the wound on the left side, around which cicatrization was progressing. There was a serous discharge from about the cerebral protrusion. The cicatrization gradually compressed the hernia cerebri, until it sloughed away on the

23rd, leaving a healthy granulating surface. Before this had happened, on the 18th she had had another rigor; her intelligence, which had to some extent returned, again became more impaired, and she talked incoherently. She had another rigor on the 22nd, after which she became more dull and drowsy. Temperature rose to 106°; pulse, 130. The stomach became very irritable, rejecting everything, and her strength began to fail. After the 28th August her temperature fell to 99°. The wound looked healthy; but a protrusion was again forming, which furnished a constant serous discharge from a sinus, down which a probe could be passed its entire length, apparently going into the middle lobe or the ventricle. About this time general rigidity of the muscular system set in. The patient lay coiled up. The upper extremities were in a state of chronic tremor. On the 5th September convulsions set in. She was entirely unable to swallow. Nutrient enemata were administered, but she gradually succumbed; she became more profoundly comatose, the rigidity diminished, and the limbs were extended. The pupils at this time responded to light. The right cornea was observed to be perishing on the 7th. Hurried respiration set in, and she died on the morning of the 8th September.

On examination it was found that the dura mater was completely detached at the seat of injury. There was inflammatory mischief affecting all the membranes for about an inch around the margin of the seat of its detachment. A collection of matter was found at the base of the brain. A portion of the inner table of the fractured bone was impacted in the substance of the brain, which was gangrenous in its vicinity. One portion of bone was as large as a florin. The conditions of the portion of the brain corresponding to the hernia are not noted in the imperfect abstracts with which I have been furnished of the autopsy of this very interesting case.

CASE 39.—*Contused Wound of Eyebrow in a Boy—No Intra-cranial Mischief—Death from Tetanus.*

A Hindoo boy, aged 16, admitted on the 20th July, 1868, with a small incised wound of the left eyebrow, caused by a fall ten days previously. He was a healthy lad; the wound had nearly healed, but symptoms of trismus had set in three or four days before admission, and were then well marked.

There were frequent paroxysms of tetanic spasms, during which the right side of the face was most affected; these were induced by the least excitement. His pulse was good, but his bowels were, and had been confined for some days. An aperient and a cathartic enema were ordered, and to be repeated in six or eight hours. Chloroform, gtt. xv., and ext. cannabis, gr. j., were prescribed every second hour. The tetanus gradually involved the muscles of the trunk. Ice was applied to the spine, and the chloroform and hemp were administered in larger doses. He became quite incapable of swallowing anything. Nutrient enemata were administered, but to no avail; he sank, and died on the 24th, at 5 a.m. Just before death the pupils, which had been contracted, dilated freely. No post-mortem was obtained.

CASE 40.—*Lacerated Wound of Forehead—Fracture with Depression of Frontal Bone—Stertor—Convulsions—Feeble Pulse—Elevation of Bone—Relief of these Symptoms, but Death occurred from Exhaustion, Intra-cranial Hæmorrhage, and Laceration of Dura Mater.*

A Mahomedan woman, aged 46, was admitted at 5 a.m., 5th August, 1868, in a state of complete coma, with a large lacerated wound in the centre of the forehead, leading to a depressed fracture of the frontal bone. The depressed portion was of an ovoid form about an inch and a half in length, by three-quarters of an inch in breadth. There was not much bleeding,

but the pulse was very feeble, and the breathing stertorous. The pupils were slightly contracted, and she had occasional convulsions. There had been no vomiting. The depressed bone was elevated, and the wound dressed antiseptically, ice being applied to the head, and nutrient enemata administered. The convulsions and stertor disappeared, and the breathing became more natural after the bone was raised, but the pulse gradually failed, and she died at 7.5 a.m. next day. The pulse was 72, and the temperature 103·5° shortly before death.

Post-mortem.—A very large effusion of blood was found between the dura mater and brain. There was no apparent injury to the cerebrum, but the dura mater was torn just beneath the wound, near to which a very large clot had formed.

CASE 41.—*Lacerated Wounds of Scalp caused by the Bite of a Jackal—No Intra-cranial Mischief—Dysentery—Probable Pyæmia supervened—Death.*

A Hindoo boy, aged 3, was admitted on the 5th April, 1869, with three lacerated wounds on his head, said to have been caused ten days previously by the bite of a jackal. The wounds were suppurating. Two were on the left parietal bone, and one on the right of the occipital region. Had fever the day before admission, and had also been suffering from dysentery. This disease became aggravated, and carried him off on 13th April. It is very probable that pyæmic mischief, due to absorption from the wounds, may have had much to do with the fatal result. No post-mortem was obtained.

CASE 42.—*Injury to the Head from a Fall—Diffused Swelling of the Scalp—Coma—Rigid Contraction of Limbs—Stertor—Convulsions—Death in a few hours—Fracture through the Vault of the Skull and Base, and Laceration of Brain.*

A Mahomedan boy, aged 7, was admitted at 10 a.m. on the 26th November, 1869, in a state of complete coma, with fully dilated pupils, and bleeding from the left ear.

There was a diffused œdematous swelling of the scalp, and also a fluctuating tumour corresponding to the coronal suture. He was said to have fallen on the left side of his head from the first storey of a house about an hour before admission.

Pulse, 44; breathing quiet; temperature, normal. The right limbs were slightly rigid, but he moved the left tolerably freely. The head was shaved, ice applied, and an aperient enema given. Breathing gradually became stertorous; eyes closed, and great difficulty of swallowing. Convulsions set in, and he died at 9.42 p.m. of same day.

On examination it was found that the skull was fractured right through the vault and base. The brain was also lacerated to the length of two inches, and to a considerable depth.

CASE 43.—*Fracture of Skull without Wound of Scalp—Caused by a Fall—Coma—Stertor—Rigidity of Right Arm—Trephining—Elevation of Bone—Temporary Amelioration of Symptoms—Death.*

A Brahmin, aged 50, was admitted at 7 a.m. on 31st January, 1870, with stertorous and hurried breathing. Respiration, 48, and irregular, though there was a full pulse of 72; perfectly comatose; right arm rigid; pupils normal; bleeding from the nose and ear. He had fallen about an hour before admission on a stone floor, striking the left side of his head on the ground. The temporal bone was comminuted, but there was no wound. In

the hope of giving him relief an incision was made, and as the bone could not be otherwise elevated, the trephine was applied, which enabled us to remove several pieces of depressed bone.

There was some mitigation of the symptoms, and he appeared to evince some signs of consciousness after the operation, but he never rallied, and death occurred at 1 p.m.

No post-mortem was obtained.

CASE 44.—*Injury of Head by a Fall from a Height—Neither Wound nor Fracture Detected—Complete Insensibility, with Stertorous Breathing—Hæmorrhage from Left Ear—Contracted Pupils—Vomiting—Return of Consciousness same day, and subsequent Complete Recovery.*

R. H., an English sailor, aged 24, was admitted at 1 a.m. on 6th May, 1870, in a state of complete coma, with stertorous breathing. Respiration, 18; pulse, 80; hæmorrhage from the left ear; pupils slightly contracted. No other injury was detected. He had fallen from a height of seven feet. The head was shaved, and cold applied. Aperients were given, which acted. During the day he vomited several times. Hæmorrhage continued from the ear. Towards the evening he recovered consciousness, and his intellect became quite clear; pupils slightly dilated. He steadily improved after this, neither deafness nor lesion of the mental faculties apparently remaining. He was discharged well on the 11th May.

CASE 45.—*Injury to Head—Contused Wound of Scalp—Depressed Comminuted Fracture of Bone—No Loss of Consciousness—Subsequent Indication of Intra-cranial Mischief—Subsilence of these Symptoms—Recovery.*

A Mahomedan boy, aged 12, was admitted 9th May, 1870. A piece of iron had fallen on his head, and caused a large con-

tused wound on the left side of his forehead, with a depressed and comminuted fracture of the bone. There was no loss of consciousness—no symptoms indicative of either compression or concussion. Cold was applied to the head, his bowels were acted on by aperients, and he was placed at rest in a quiet place. On the following day he was dull, and it appeared as though intra-cranial mischief were setting in; free action of the bowels, however, being induced, this passed away. He began to improve, and was finally discharged from hospital quite recovered on the 25th November, his recovery having been retarded by exfoliation of the outer table of the depressed bone and healing of the wound. All this, however, occurred without any constitutional symptoms.

CASE 46.—*Contused Wound of Scalp—Extension of Mischief—Intra-cranial Suppuration—Trephining—Improvement—Subsequent Recurrence of Symptoms—Death.*

W. J. S., a European, aged 43, was admitted 18th July, 1870, with a small contused wound on the left parietal region. This was followed by symptoms of intra-cranial suppuration, for which he was trephined on two occasions. He died on the 22nd August from suppuration in the brain. His case is related in detail at a subsequent page.

CASE 47.—*Contusion of Temporal Region—Bleeding from Ear—Profound Coma—Consciousness Returned, but soon gave place to Symptoms of Compression and Death—Skull Fissured through its Base—Int a-cranial Hæmorrhage—Substance of the Brain Contused and Softened.*

A Hindoo, aged 50, was admitted at 9 a.m. 29th July, 1870, with a contusion on the right temporal region, with bleeding from the right ear, and in a state of profound coma. He had fallen

from a height of about thirty feet. The pulse and respiration were at the natural standard. The symptoms of concussion passed away, and he became sensible, but very soon he again became dull and then unconscious with involuntary micturition; pulse, 80; respiration, 20; left side paralyzed; restless. Cathartics, cold to the head, and nutrient enemata were ordered. The temperature, 98° to 100°. The pupils were contracted, and insensible to light.

He sank, and died rather rapidly on the night of 4th August, on the morning of which day he had appeared rather better and partially conscious.

On examination it was found that there was an extensive fissure of the skull commencing at the right temple, and crossing the petrous portions of the temporal bone and base of the skull to the opposite side. There was a clot between the dura mater and brain extending for about three inches. The middle lobe of the cerebrum corresponding to this was extensively contused and softened. The rest of the body and viscera healthy.

Case 48.—*Wound of the Eyebrow—Tetanoid Symptoms—Post-mortem Examination.*

P., an East Indian plumber, aged 27, was admitted 27th November, 1871, with an incised wound above the right eyebrow about an inch in length. It was deep enough to denude the bone of the periosteum. He did not become insensible after the fall, nor was there any bleeding from the nose or ears. He continued following his occupation until the fifth day after the accident, when he was seized by an attack of fever. To this succeeded paralysis of the right side of the face, together with spasmodic contraction of the muscles of the jaws and of the sterno-mastoid muscle of the same side. He was unable to close the eyelid, but the pupil was in a normal condition. There was no paralysis of the extremities. He could not take any solid food, and even the attempt to swallow liquids was

attended with a choking sensation, and which was also intensified by the accumulation of a thick, tenacious mucus in his throat. He was ordered gr. xx. of hydrate of chloral every four hours, and a fetid enema.

28*th*.—The contraction of the jaw continues unaltered. Pulse, 108; temperature, 100°. He had two convulsive fits while attempting to swallow the medicine.

29*th*.—Had convulsive fits during the night, the muscles contracting still more forcibly. Pulse and temperature the same. As he cannot drink, frequent enemata, containing port-wine, beef-tea, and two grains of cannabis indica, were ordered. The wound, too, was freely incised down to the bone, and covered with an opium poultice.

30*th*.—He continued in much the same state, and died suddenly this morning during a paroxysm of convulsions.

The post-mortem examination was performed by Professor McConnell twenty-four hours after death. "The bone at the site of the wound was found denuded of periosteum, and slightly injected. No fracture of the cranium was found, and the dura mater was in a normal condition. But the arachnoid and pia mater were injected for the space of a square inch at the anterior aspect of the anterior lobe to the right of the longitudinal fissure. The grey substance covering the convolutions was also in this locality hyperæmic, and with the medullary substance, softened and easily broken down. The upper surface of both hemispheres presented on either side of the longitudinal fissure an irregularly crescentic, blotchy, hyperæmic condition of the arachnoid and pia mater—in parts almost amounting to ecchymosis. The pia mater covering the inferior surface of the pons and medulla oblongata, thickened and injected, presented a very peculiar mottled, dark-greyish appearance, which extended downwards over the cord as far as the origin of the sixth cervical nerves. This remarkable discoloration was pigmentary in its character, and most pronounced on either side of the median fissure of the medulla and cord, and of the groove of the pons which lodges the basilar artery. Under the micro-

scope, this mottling of the pia mater was seen to follow intimately the course and distribution of the ramifications of the basilar and anterior spinal arteries as they pass off on either side of the parent trunks, and spread out into the mesh of the pia mater, and dip into the cerebral substance and cord.

"The consistency of the medulla and the upper portion of the cord was perhaps slightly softened. Below the origin of the sixth cervicals, the cord and its membranes were normal in appearance.

"The lungs were in a normal state, with the exception of two deposits of encysted calcareous substance. There was a considerable deposit of fat around the right ventricle of the heart, but the muscular structure was firm and healthy. Both ventricles were tolerably firmly contracted. The mucous membrane of the stomach was throughout vascular, and slightly thickened. The intestinal canal was in a normal condition, except at the lower portion of the ilium, where four lumbrici were found, and where it was intensely injected. The liver, normal in size, exhibited a 'patchy' congestion of the surface. Its substance was firm, but slightly fatty. The spleen was sound, but enlarged, and with its consistency unimpaired. Both kidneys were intensely congested, but otherwise healthy."

This is an interesting, but obscure case. The symptoms are those of tetanus, and incipient cerebral mischief, and they are also not wanting in some resemblance to hydrophobia.

The patient had been bitten by a dog when a boy, and his friends evidently attached some importance to this fact. Is it possible that the poison could have lain for so many years dormant in the system? and how far did the injury influence the determination of the conditions which proved fatal?

AMPUTATIONS.

I.—AMPUTATIONS AT THE HIP-JOINT.

The following eight cases of amputation at the hip-joint have occurred in my practice:—

Case 1.—*Immediate Amputation for Gunshot Wound—Death from Tetanus.*

M. S. M., a Burmese, aged 30, shot in the left thigh, 15th July, 1853, the head and neck of the femur being comminuted. Amputation was performed, by antero-posterior flaps, immediately after his admission, on the 16th. He was doing well, and the wound had nearly cicatrized, when he was seized with tetanus, of which he died a month after the operation.*

Case 2.—*Secondary Amputation for Osteo-myelitis—Recovery.*

S. A., a Mahomedan, aged 16 years, underwent 12th April, 1864, amputation at the lower part of the thigh, on account of some injuries inflicted on the knee and thigh by a horse. Severe symptoms of osteo-myelitis and pyæmia occurring,

* Case detailed in Clinical Surgery in India, p. 630.

amputation of the hip-joint was performed on the 26th. He recovered perfectly, and was discharged cured 31st July. He was long employed subsequently as a tailor in the hospital.*

CASE 3.—*Secondary Amputation for Osteo-myelitis—Death from Pyæmia.*

I. H., a Mahomedan sailor, had amputation of the thigh performed 25th October, 1865, for serious injuries to the knee and thigh; and as marked symptoms of osteo-myelitis and pyæmia supervened, amputation at the hip-joint was performed 9th November. He died of pyæmia on the 13th.†

CASE 4.—*Secondary Amputation for Osteo-myelitis—Death from Toxæmia and the Formation of Coagula in the Right Side of the Heart.*

P., aged 21; amputation of the thigh was performed 2nd July, 1867, and was followed by secondary hæmorrhage and osteo-myelitis. Amputation at the hip-joint was executed on the 4th, and he died twenty-six hours after.‡

CASE 5.—*Immediate Amputation for Shark-bite—Death from Shock.*

R. C., a Hindoo, aged 35, was admitted 13th May, 1868, with severe wounds of the hip and thigh, from the bite of a shark. Amputation was performed a few hours after the accident, and the patient died the same day.§

* Clinical Surgery in India, p. 609.
† Ibid., p. 666.
‡ The case detailed at p. 84 of the present work.
§ Ibid., p. 254.

CASE 6.—*Amputation for Cancerous Disease—Death from Exhaustion.*

B., aged 20, a Mahomedan, underwent amputation 2nd December, 1868, on account of a rapidly forming cancerous tumour of the right thigh, attended with much local and constitutional suffering. He died of exhaustion December 7th. Cancerous masses were found in the right lung.

CASE 7.—*Gunshot Fracture of the Neck of the Femur—Secondary Amputation—Death from Exhaustion.*

Lieutenant H., aged 21, was wounded in the hip, 12th September, 1867, and amputation was performed on the 25th. He died a few hours after the operation.*

CASE 8.—*Amputation for Cancer of the Thigh—Death from Exhaustion.*

M., a Hindoo, aged 25, a resident of Jorasanko, was admitted on October 6th, 1865, suffering from a swelling at the lower two-thirds of the thigh. He stated that the disease appeared about seven months before; and he attributed its commencement to the entrance of a thorn into his knee about five years ago, a portion of which he declared had never been extracted. The glands of the groin were slightly indurated, and the pulsation of the femoral was distinct. The circumference of the limb where the swelling was most marked was fifteen inches, and higher up thirteen and a-half inches. The growth continued to extend, and the patient had fever occasionally; the pulse at the wrist was very small, and almost

* The case detailed at p. 201 of the present work.

imperceptible—a condition which might have been congenital. When the operation was had recourse to less than one-third of the limb remained uninvolved, and there was evidence that the growth was spreading most rapidly. Still he had rallied during his stay in the hospital, and certainly appeared to have gained strength. In fact his constitutional state was better than when he first came under treatment; and though thin and emaciated he scarcely had the expression of a person suffering from advanced cancer.

January 15th, 1866.—This morning I amputated at the hip-joint. I made the antero-posterior flap, entering the knife midway between the antero-superior spinous process of the ilium and the tuberosity of the ischium, the point emerging at the root of the scrotum, and opening the capsule of the joint as it transfixed the limb. Dr. Ewart depressed the limb, when the ligament was further divided, and also the round ligament, with the point of the catlin. The head of the bone was now everted, and the knife passed behind the trochanter preparatory to cutting the posterior flap. The limb was disarticulated in thirty seconds. The bleeding points (including the femoral vein, which bled freely) were all secured, about a dozen ligatures being applied. His pulse—almost imperceptible at the wrist when he was placed upon the table—did not sink much lower during the operation. On the whole he bore it well, losing about sixteen ounces of blood, and that chiefly venous; but he did not lose any from the femoral artery. Brandy and ammonia were given freely, and he was put to bed with hot bottles; and when I left him a quarter of an hour later he was in bed, having rallied considerably. The patient was very feeble and emaciated, and, as remarked in the history, he had a peculiarly weak radial pulse. 5 p.m.: I found the patient with a feeble pulse, as before, and a look of languor, and half stupid, probably from the amount of brandy given during the day alternately with beef-tea. He is to be closely watched, and kept warm with hot bottles and blankets. On the whole, his condition is so far favourable. I

directed the same care to be taken throughout the night. Less brandy and more food to be administered— such as soup, milk, and sago.

The patient only rallied very imperfectly, and never regained any strength. His pulse varied between 120 and 140, and the temperature between 104° and 106°. The immediate cause of his death was an attack of secondary hæmorrhage, which occurred on the 29th, on which day he died.

Dr. Ewart furnished me with the following account of the tumour :—" On making a longitudinal section of the growth down to the periosteum, and in the mesial line, it was found to consist of soft brain-like material. The muscles and connective tissue had either been displaced or partially destroyed, by the development and extension of the disease. A thin lamina of muscle in process of cancerous degeneration was found overlying the body of the morbid mass; and only thinly expanded portions of connective tissue, giving support to the nutrient blood-vessels, surrounded the provinces of medullary growth into which the tumour was divided. The juice, composing by far the largest portion of the growth, was almost exclusively made up of cell-formations of a fusiform, angular, caudate, or irregular shape, with single or double nuclei and granular contents. Some of these nuclei, with their respective cells, were observed to be undergoing constriction in their centres preparatory to ultimate division and proliferation. Some were almost, but not quite divided, whilst others were inferred to have just undergone perfect separation from the apparent attachment or adhesion of their nuclei to the cell walls at the supposed point of division, and from the close apposition of the cells at this part. There were many small nuclei in the granular plasma."

Dr. Ewart also supplied me with the subjoined description of the post-mortem and microscopical appearances :—" Both lungs were hypostatically congested, and studded with nodules of brain-like substance, somewhat softer in consistence than that which constituted the growth on the thigh. The greater number of these varied from the size of a pea to that of a

kidney bean. A few were not larger than a pin's head, and two or three exceeded the size of a pigeon's egg. In the interior of the lungs these isolated growths were spherical or spheroidal in shape, from their having met with tolerably equal resistance to their expansion or reproduction on every side; whereas on the surface they were flattened or button-shaped, from the interrupted mechanical pressure they must have been subjected to during each rhythm of the respiration. Internally, the growths appeared to have originated between the pulmonary lobules, and as they increased in size to have pushed the contiguous air-cells aside in every direction, causing the complete destruction of those adjacent to the morbid mass, and compression and obliteration of those more distantly situated. Externally, the growths seemed to have commenced chiefly in the same manner, and also in the connective tissue interposed between the lungs and the visceral layer of the pleura. But here the production of new cancerous matter had been mainly directed towards the surface—away, in fact, as far as possible from the vitally important air-cells. This compensatory process is well illustrated in one mass as large as a pigeon's egg suspended from the inferior margin of the middle lobe of the right lung, and maintained in position by the investing pleura. Though the cancerous mass had manifestly commenced in the interlobular structure, at first displacing, then compressing, and ultimately causing absorption and destruction of the parietes of many cells, yet the subsequent or later reproduction of new cell-growing material had almost entirely taken place in a centrifugal direction from the lung—in that line of direction in which it doubtless met with the least vital resistance. The superficially situated nodules were covered with congested or inflamed pleura. The left pulmonary pleura was universally covered with a lamina of straw-coloured aplastic lymph. At the base of this lung a triangular portion, about two inches by three, was consolidated, and dead or dying from pyæmic capillary embolism. In the centre there was a small nodule of cancerous material, and a patch of pulmonary tissue, infiltrated

with sanies, and probably dead; whilst further outwards the exudation, though sanious, was less aplastic in character. Around the circumference of this there was an intensely congested areola. The bronchial glands examined were free from cancerous infiltration. The numerous brain-like growths consisted of nothing but a granular matrix, free proliferating nuclei, fusiform, ovoid, elongated, caudate, and a few endogenous cells with nuclei and more or less granular contents. There was no tendency to fibrillation. The pyæmic-looking patch at the margin of the base of the lung was infiltrated with putrid sanies, containing a great quantity of granules. The heart was small and fatty. The fat-granules and oil-globules occupied both the exterior and interior of the sarcolemma. The degenerative change was most advanced in the anterior wall of the right ventricle. There was a dark-coloured clot prolonged from the right ventricle into the pulmonary artery and its ramifications. A white dull-coloured ante-mortem clot existed in the left ventricle."

The recurrence of the carcinoma in the lungs is very interesting. Death was caused by exhaustion, due to the combination of pyæmia, of which there were evident signs, with the original disease, medullary cancer.

Of these eight cases three were re-amputations after amputation at the thigh; in all the system being affected more or less by toxæmia; one recovered. Four were immediate, so far as the operation was concerned. In one, a case of gunshot wound, the patient had all but recovered from the operation, when he was carried off by tetanus.* One was a case of secondary amputation after a gunshot wound, when the constitution had become much affected; being young (about 21 years), and otherwise healthy, it gave the patient a chance, but he died a few hours after the operation, of pulmonary obstruction by coagula.

* This can hardly be considered a fatal case of amputation, for the patient had really recovered from the operation.

The results were as follow :—

One recovery.

One death from tetanus a month after the operation.

One death from osteo-myelitis and pyæmia on the fifth day.

One death from pyæmia and pulmonary embolism on the second day.

One death from shock, a few hours after operation.

One death on the sixth day, from exhaustion.

One death in a few hours, from exhaustion and pulmonary embolism.

One death from pyæmia, cancerous deposits, and pulmonary embolism on the thirteenth day.

II.—AMPUTATION OF THE THIGH.

The following is a brief analysis of thirty-seven cases of amputation of the hip, thigh, and knee, performed in my wards of the Medical College Hospital, Calcutta, between the months of May, 1859, and June, 1870.

The operations were as follow :—Two through the knee by Carden's method; nineteen through the lower third of the thigh (seven of these being by the antero-posterior flap, and twelve by the modified circular operation); four were through the middle third (three being antero-posterior and one modified circular); six were through the upper third (three being antero-posterior and three modified circular).

There were six amputations at the hip-joint (three being re-amputations, after previous amputation of the thigh at the lower third). These have already been noticed in the abstract of eight hip-joint cases recorded above.

A few words on the mode of amputating. The antero-posterior flap operation, that usually performed, effected by transfixion, is easily and rapidly accomplished, and where time is an object is advantageous; but it has the disadvantage of leaving a redundancy of useless muscle in the covering of the bone, and increases the magnitude of the surface that has to heal.

The modified circular operation may be performed with an ordinary scalpel—by making an incision through the skin and fascia down to the muscles, in the form of anterior and posterior flaps. The skin and fascia are then allowed to retract to their utmost, retraction being aided with a few touches of the scalpel. The muscles are next divided obliquely upwards, from the line to which the skin has retracted to the bone, by one or more incisions or sweeps with the knife, according to the size of the limb; and finally, with one or two circular sweeps, the periosteum is divided. This, if properly done, makes an excellent covering—enough of muscle and abundance of integument and fascia, which are the essential coverings. It may be done either with an ordinary scalpel or a catlin. It takes more time than the flap operation, but that is unimportant when the patient is unconscious. This method of amputation is applicable in any part of the limb, but is perhaps especially adapted to the lower third of the thigh and to the leg below the knee.

The mortality was very high, and caused mainly by pyæmia, which in many instances was due to osteo-myelitis. Of the thirty-seven cases only three individuals recovered out of those operated on. Twenty-nine died in the hospital; two were removed by relatives when very low, their object being to take them to die on the banks of the sacred river.

There were two primary and sixteen secondary amputations for traumatic causes. Of pathological amputations there were nineteen.

Of the deaths, eighteen were due to septicæmia. In thirteen cases originating in osteo-myelitis, six deaths were either due to shock from combined effects of the injury and the amputation, or to exhaustion from debility produced by protracted disease, pain, and suppuration.

Two deaths were directly due to the formation of fibrinous coagula in the heart or pulmonary artery. One was caused by accidental opium-poisoning in a case that otherwise promised fairly. Two were removed by relatives when exceedingly weak.

It is not probable that they recovered, though they did not die in the hospital.

It is well known that in Calcutta amputation of the thigh is an operation hitherto seldom successful. The statistics, as far as I know, have been very unfavourable in all the hospitals. This is, no doubt, due to a combination of causes—such as a cachectic state of the patient; late treatment of the disease; an exhausting, malarious, and depressing state of climate, acting most prejudicially on the blood-elaborating organs, and diminishing the powers of resistance to shock and those of carrying on repair; a great tendency to suppuration, and with it to septic conditions of various forms; and added to these, I fear, must be defective hospital construction and hygiene, and (certainly during the period included in this return) an endemic tendency to osteo-myelitis—a most prolific originator and concomitant of pyæmia, and one of the most fatal of all surgical complications.

It is satisfactory to know that this particular evidence of septicæmia has greatly diminished during the past two or three years, owing probably to improved drainage, clearing out of space surrounding the hospital, better ventilation, reduction of the number of beds, to the free use of carbolic acid, and perhaps also to one of those mysterious changes of endemic constitution, which doubtless exist, though not understood. Bad as, at the best, are the statistics of thigh amputations, I believe they have never represented a higher death-rate than those I now record, and which I think it is well should be noted, suggesting as they do interesting matter for profitable reflection on the effects of climate, the nature of hospital construction and hygiene, and the existence of endemic tendencies to pyæmia in reference to the subject of surgical operations and treatment generally, in damp and hot climates like that of Bengal, where all the natural evils are intensified by the adventitious ones of a great city.

It will be observed that of the thirty-one deaths eighteen were from pyæmic conditions, two were from gangrene, six from exhaustion, and two from the formation of fibrinous

coagula in the right cavities of the heart, or obstruction of the pulmonary artery. All these forms of death point to conditions of the patients and of their surroundings that force on one the conclusion that they are to a certain extent due to preventable causes; whilst at the same time they confirm the exceedingly dangerous nature of the operation itself, and explain why it is that in Calcutta it is regarded as of a most fatal character, and therefore to be had recourse to as the last and only resource for saving life.

A glance at the abstract of cases will show, indeed, that such was the fact in those now recorded; and it shows, moreover, how very unsatisfactory are the resources of surgery when they can only be made available (as is so frequently the case in the Calcutta hospitals) after the best chances of saving life have nearly passed away, and blood-poisoning has already commenced its fatal work.

It is needless to repeat what I have already elsewhere said on the pathology of the various causes of death—osteo-myelitis, and pyæmia from that and other causes; the development of that condition of the blood which leads to the formation of fibrinous coagula in the heart or vessels, causing either death or local gangrene, or other important changes,—they and others being of special importance, in the damp, malarious climate of Calcutta, in reference to surgical operations, and meriting further study and observation.

Case 1.—M. R., aged 36, a Hindoo beggar, was admitted in a very low state on May 16th, 1859, with disease of the knee-joint and necrosis of the femur. Amputation of the right thigh at its lower third by modified circular operation was performed on June 12th. He became very low after the operation, and died of exhaustion on June 13th.

Case 2.—J., aged 40, a Hindoo coolie, was admitted in a bad state of health on October 24th, 1859, with gangrene of the left leg and foot. Amputation of the left thigh at its lower third by the modified circular operation was performed on October 29th. Died from the recurrence of gangrene.

Case 3.—D., aged 35, a Hindoo coolie, was admitted in a fair state of health on December 11th, 1859, with a severe injury of the left knee-joint. Amputation of the thigh at its middle third by antero-posterior flap was performed on December 20th. He was taken away by his friends December 21st, when very low.

Case 4.—J. C., aged 17, an English seaman, was admitted in a very bad state of health on February 15th, 1860, with an abscess in the left thigh and necrosis of the femur. Amputation of the thigh at its upper third by modified circular operation was performed on March 11th. Died of osteo-myelitis on March 15th.

Case 5.—J. P., aged 28, Hindoo male, was admitted in a cachectic condition on March 23rd, 1860, with osteo-cephaloma of the left knee. Amputation of the left thigh at its upper third by antero-posterior flap operation was performed on March 26th. Was taken away by his friends April 9th, when very low from exhaustion.

Case 6.—R. S., aged 35, a Hindoo shopkeeper, was admitted in a bad state of health on March 19th, 1860, with necrosis of the left tibia and fibula. Amputation of the left thigh at its lower third by antero-posterior flap operation was performed on March 31st. Took about thirty grains of opium, given to him by his brother to allay pain, and died of opium-poisoning April 3rd, otherwise doing well.

Case 7.—P., aged 13, a Hindoo boy, was admitted in a fair state of health on April 23rd, 1860, with compound fracture of the right femur in its middle third, four days after the accident. Amputation of the right thigh at its upper third by antero-posterior flap operation was performed on May 4th. Died of osteo-myelitis on the 9th.

Case 8.—J., aged 22, a Mahomedan syce, was admitted in a very low state of health on October 4th, 1861, with compound comminuted fracture of the left tibia and fibula at their middle third, which had led to gangrene of the whole leg and foot. Amputation of the thigh at its lower third by modified circular

operation was performed on October 5th. Died of osteo-myelitis on October 26th.

Case 9.—D., aged 30, a Hindoo sweatmeat-maker, was admitted in a bad state of health on August 3rd, 1862, with dry gangrene, probably from embolism of the arteries of the right leg. Amputation of the thigh at its lower third by antero-posterior flap operation was performed August 25th. Died of pyæmia October 1st.

Case 10.—M., aged 20, a Hindoo female, was admitted on August 26th, 1863, with extensive disease of the knee-joint. Amputation of the left thigh at its lower third by modified circular operation was performed on September 30th. Died of osteo-myelitis October 20th.

Case 11.—K., aged 20, a Hindoo farmer, was admitted in a very bad state of health on October 14th, 1863, with medullary cancer of the left femur. Amputation of the left thigh at its upper third by modified circular operation was performed on October 20th. Died of osteo-myelitis in a few days.

Cases 12, 13.—S. A., aged 16, a Mahomedan coachman, was admitted on April 10th, 1864, with an extensive lacerated wound opening into the knee. Amputation of the thigh at its lower third by modified circular operation was performed on April 12th. Secondary amputation of the hip-joint was performed for osteo-myelitis on April 24th. Was perfectly cured and discharged on August 1st—100 days after the operation—with a good stump and cicatrix; was then employed in the hospital, when he grew very stout.

Case 14.—R., aged 35, a Hindoo female, was admitted in a bad state of health on April 13th, 1864, with suppuration in the knee-joint, resulting from fracture of the left tibia. Amputation of the thigh at its lower third by modified circular operation was performed on May 9th. Died of osteo-myelitis May 10th.

Case 15.—B., aged 35, a Hindoo washerman, was admitted in an otherwise good state of health on September 24th, 1864, with severe compound fracture of the left leg. Amputation of

the thigh at its lower third by antero-posterior flap operation was performed on October 1st. Died of osteo-myelitis October 2nd.

Case 16.—H. D., aged 30, a Hindoo boatman, was admitted in a good state of health on February 27th, 1865, with his right foot cut off at the second row of tarsal bones by a ship's cable. Syme's amputation was performed on the same day. Pyæmia and osteo-myelitis set in, and amputation of the thigh at its lower third by modified circular operation was performed on March 15th. Died of pyæmia March 17th.

Case 17.—W., aged 25, a Mahomedan Khalasie, was admitted on July 13th, 1865, with compound comminuted fracture of the bones of the right leg and extensive laceration of the soft structures higher up the limb. General health had been good. Amputation of the thigh at upper third by antero-posterior flap operation was performed on July 13th at 8 p.m. Died of exhaustion four hours after the operation.

Cases 18, 19.—I. H., aged 36, a Mahomedan Khalasie, was admitted in a fair state of health on October 20th, 1865, with traumatic suppuration of the knee-joint. Amputation of the thigh at its lower third by modified circular operation was performed on October 26th. The hip-joint was amputated for osteo-myelitis, of which he died November 12th.

Case 20.—H., aged 25, a Mahomedan servant, was admitted in a bad state of health on August 20th, 1865, with compound comminuted fracture of the fibula of the right leg. The leg and foot became gangrenous, and amputation of the thigh at its lower third by modified circular operation was performed November 2nd. Died of exhaustion.

Case 21.—M., aged 25, a Hindoo man, was admitted in a low state of health on October 6th, 1865, with medullary cancer of the right femur. Amputation at the hip-joint was performed on January 15th, 1866, by antero-posterior flaps. Died of cancerous infiltration of the viscera and pyæmia January 27th.

Case 22.—S. C., aged 30, a Mahomedan mason, was admitted

in an otherwise very fair state of health on January 22nd, 1866, with compound comminuted fracture of the lower part of the femur and longitudinal fracture of the condyles. Amputation of the thigh at its lower third by antero-posterior flap operation was performed on February 5th. He would not submit earlier. Died of pyæmia February 8th.

Cases 23, 24.—E. D., aged 17, an English girl of very strumous constitution, was admitted in a bad state of health on February 25th, 1866, with scrofulous disorganization of the right knee-joint. Amputation of the thigh at its lower third by antero-posterior flaps was performed on February 27th. Was discharged cured March 25th. Eight months after the thigh was again amputated in the middle for re-appearance and extension of the ulceration. She died of osteo-myelitis.

Case 25.—M., aged 35, a Hindoo female, was admitted in a bad state of health on August 13th, 1866, with suppuration in the knee-joint. Amputation through the knee by Carden's method was performed on August 26th. Died of osteo-myelitis on September 3rd.

Case 26.—A., aged 30, a Mahomedan servant, was admitted in a fair state of health on October 1st, 1866, with popliteal aneurism of the right leg. Femoral artery tied. Amputation of the thigh at middle third by antero-posterior flaps was performed for gangrene on October 28th. Discharged cured on March 11th, 1867.

Case 27.—C. M., aged 40, a Mahomedan boatman, was admitted in a bad state of health on November 2nd, 1866, with compound fracture of the lower third of the left leg, leading to gangrene. Amputation of the thigh at its lower third by antero-posterior flaps was performed on November 4th. Died from extension of gangrene November 6th.

Case 28.—P. L., aged 50, an East Indian, was admitted into the hospital in a very low state, with suppuration in the knee-joint, on November 26th, 1866. Amputation through the knee by Carden's method was performed on December 22nd. Died of exhaustion and shock December 23rd.

Cases 29, 30.—P., aged 21, an Ooryah gardener, was admitted in a very low state on June 26th, 1867, with suppuration in the right knee. Amputation of the thigh at its lower third by the modified circular operation was performed on July 2nd. Amputation of the hip-joint was performed on July 4th for secondary hæmorrhage and symptoms of osteo-myelitis. Died of plugging of the pulmonary artery—date not mentioned, but within forty-eight hours.

Case 31.—R. C., aged 35, a Hindoo man, was admitted on May 13th, 1868, with a frightfully lacerated wound on the outer aspect of the left hip, inflicted by a shark-bite. Amputation at the hip-joint was performed by antero-posterior flaps on May 13th. Died of combined shock of the shark-bite and operation on the same day.

Case 32.—B., aged 20, a Mahomedan servant, was admitted on December 2nd, 1868, with a rapidly growing cancerous tumour on the middle of the left thigh. Amputation at the hip-joint was performed by flap operation on December 6th. Died of exhaustion December 7th.

Case 33.—A. P., aged 35, a Hindoo bearer, was admitted in a low state of health on December 22nd, 1868, with suppuration in the left knee. Amputation at the middle of the thigh by modified circular operation was performed on December 29th. Died of osteo-myelitis on January 8th, 1869.

Case 34.—B., aged 12, a Hindoo boy, was admitted in a low state of health on January 20th, 1869, with gangrene of the left leg supervening on compound fracture of tibia and fibula. Amputation of the thigh at its upper third by modified circular operation was performed on January 21st. Died of cardiac plugging and pyæmia January 25th.

Case 35.—B. K., aged 40, a Hindoo shopkeeper, was admitted in a bad state of health on June 14th, 1869, with an epithelioma of the right knee. Amputation of the thigh at its lower third by modified circular operation was performed on August 18th. Died of osteo-myelitis October 2nd.

Case 36.—S., aged 60, a Hindoo man, was admitted on

December 27th, 1869, with simple fracture of the middle of the right leg, which had led to gangrene. Amputation of the thigh at its lower third by modified circular operation was performed on January 8th, 1870. Died of pyæmia January 11th.

Case 37.—B., aged 26, an Ooryah bearer, was admitted in a bad state of health on June 5th, 1870, with disorganization of the left knee from compound fracture. Amputation of the thigh at its lower third by flap operation was performed on June 21st, 1870. Died of osteo-myelitis July 11th.

Abstract of Thirty-seven Cases of Amputation of the Hip, Thigh, and Knee.

Amputations.		Hip.			Upper Third.			Middle Third.			Lower Third.			Knee.			Grand Total.
		Death.	Recovery.	Total.	Death.	Recovery.	Total.	Death.	Recovery.	Total.	Death.	Recovery.	Total.	Death.	Recovery.	Total.	
Traumatic.	Primary ..	1	..	1	1	..	1	..	..	..	..	..	..	..	..	..	2
	Secondary ..	1	1	2	2	..	2	1	..	1	10	1*	11	..	..	..	16
Pathological ..		3	..	3	3	..	3	2	1	3	7	1	8	2	..	2	19
Totals		5	1	6	6	..	6	3	1	4	17	2	19	2	..	2	37

Causes of Death.—Gangrene, two; pyæmia, five; pyæmia of osteo-myelitis, fourteen; exhaustion and shock, six; pulmonary or cardiac plugging, two; removed by relatives in a dying state, two; accidental opium-poisoning, one.

There were eighteen deaths from pyæmic conditions, two from recurrence of gangrene, six from shock or exhaustion, two from plugging of the pulmonary artery, two removed in a very weak state by their relatives (both probably died), and one case of

* This case was re-amputated at the hip-joint, and recovered.

opium-poisoning. The return of six amputations at the hip-joint does not include those performed out of the hospital; they are noticed at p. 488 in an abstract of eight cases of amputation at the hip. There was one case of re-amputation of the thigh after amputation of the foot. Total amputations of thigh, including hip and knee, thirty-seven—of which three were re-amputations at hip after amputation of thigh, and one re-amputation of thigh after amputation of foot. Three individuals of the thirty-four recovered—viz., one of hip-joint after amputation of the thigh, one at the middle, and one at the lower third of the thigh.

III.—AMPUTATION OF THE LEG.

The following is a brief account of the results of amputation of the leg, including that at the ankle-joint, during a period of about twelve years, in my wards of the Medical College Hospital, Calcutta. It is unnecessary to enter into details of each case, as it is the general results only that are of interest. It is apparent that, although the statistical results of this operation are better than those of amputation of the thigh, they still represent a very high rate of mortality from causes similar to those which render the thigh amputations so unsuccessful in Calcutta hospitals. I would, however, remark that there has been an amendment within the last few years, coincident with the local and hygienic improvements in the hospital and its surroundings already referred to.

There is also reason to hope that the improved sanitary condition of Calcutta, due to the new water supply and underground drainage, and the recent improvements in the hospital for better conservancy, will all contribute towards a better state of things. Of this, indeed, there is already evidence in the comparative, if not total, absence of osteo-myelitis for the two years preceding 1872.

It appears from the extracts from the register, as furnished

by the house-surgeon, that between February, 1860, and November, 1871, sixty-one cases of amputation of the leg occurred in my wards; that of these, thirty-seven died and twenty-four recovered.

The site of amputation was—in forty-four at the upper third; in one at the middle third; and in sixteen cases at the lower third of the limb, including those at the ankle-joint.

Death occurred twenty-six times out of forty-four cases in the upper third operation, once in the middle, and ten times in sixteen in the lower third; and it was due in six instances to exhaustion or shock, in fifteen to pyæmia with or without osteo-myelitis (to which category three deaths from pulmonary or cardiac plugging may, as another evidence of blood-poisoning or degradation, be referred), in eight cases to gangrene, in three to tetanus, in one to phthisis, and in one to some cause not recorded, but probably to pyæmia. I would, in regard to osteo-myelitis, be understood to say that, although it has been for some time a most dangerous complication in accidents and operations, I do not consider that it is necessarily, even when a result of imperfect hospital hygiene, to be regarded as a permanent one; indeed, there has been every reason to believe that of late it has greatly diminished, and that although the tendency to pyæmia still obtains, it is less also than formerly. In short, this particular evidence (osteo-myelitis) of blood-poisoning, has passed away to a great extent; and it is one of many proofs that the causation of such diseases must be sought for not only in local and hygienic defects, but in influences whether of an aërial or telluric origin, of whose nature we are probably altogether, as yet, ignorant.

It is impossible that too much care or precaution can be exercised in constructing our hospitals and providing for the proper accommodation of the sick; but even when perfect as science and sanitation can make them, antiseptics included, there may be—there are, indeed—waves of disease which may come like osteo-myelitis in the Hôtel-Dieu in former years, or in the Medical College Hospital of Calcutta more recently, and

give striking proof that we have still much to learn on the subject of the etiology of disease.

With reference to the mode of operating, I would merely remark that in amputating the leg I most generally have recourse to the modified flap and circular operation described in "Clinical Surgery in India," p. 403.

		Recovered.	Died.	Total.
Traumatic.	Primary	13	22	35
	Secondary	1	6	7
	Pathological	10	9	19
		24	37	61

Causes of Death.—Shock or exhaustion, six cases; pyæmia, ten; pyæmia, with osteo-myelitis, five; pulmonary or cardiac plugging, three; gangrene, eight; tetanus, three; others, two —total deaths, thirty-seven.

One case was amputation, during collapse, of both legs in an Englishman — a railway accident; he did well. Another patient was re-amputated at the thigh, when symptoms of osteo-myelitis appeared; he died.

Amputation of the Foot and Toes.

Between the months of May, 1859, and October, 1871—nearly twelve years—twenty-six cases of amputation of the toes or portions of the foot are recorded. Of these, three were by Chopart's operation; ten, removal of one or more toes, with portions or the whole of the metatarsal bones; two, of several toes, in one or both feet; seven, of the great toe, in part or entirely; five, of single toes other than the great toe.

There were nineteen recoveries, and seven deaths from the following causes:—Pyæmia, in some cases with cardiac plugging, five; gangrene, one; and cholera, one case.

The operation was rendered necessary in six cases by in-

juries; in eight, by gangrene; in six, by necrosis or caries; in four, by ulceration; and in one, by epithelioma.

		Recovered.	Died.	Total.
Traumatic.	Primary	2	0	2
	Secondary	2	1	3
	Pathological	15	6	21
		19	7	26

Causes of Death.—Pyæmia, with cardiac plugging, five cases; gangrene, one case; cholera, one.

There were three cases of Chopart's amputation; all terminated fatally—one from pyæmia, two from gangrene. In one case the femoral artery was found to be plugged. One case of tetanus after amputation of the great toe recovered. The patients were—twenty-three Native males and three females; one European and two East Indians—all males.

IV.—AMPUTATION OF THE ARM AND AT THE SHOULDER-JOINT.

It appears from the register that between July 8th, 1861, and September 3rd, 1870—or in about nine years—twenty-five cases of amputation of the upper extremity above the elbow-joint occurred in my wards of the Medical College Hospital. Of these, eleven were at the shoulder-joints, six at the upper, two at the middle, and six at the lower third of the arm. There were eleven recoveries to fourteen deaths.

Of the eleven shoulder-joint cases seven died — two from shock, one from exhaustion, one from gangrene, three from pyæmia and osteo-myelitis and pulmonary plugging; that is, the formation of fibrinous coagula in the right side of the heart or in the pulmonary artery.

Of the fourteen amputations through the humerus, three died of pyæmia, two from shock or exhaustion, one from tetanus, and one from gangrene.

The operations were performed by the modified circular method in nine, and by the flap, including the shoulder-joint amputations, in sixteen instances. Sixteen of the cases are recorded as traumatic, primary and secondary; nine are noted as pathological.

The injury or disease by which the operation was rendered necessary was compound comminuted fracture, with laceration of soft parts, in fifteen cases; gangrene in two, osteo-myelitis two, malignant disease three, disease of joint two, and enchondroma in one case. In one of the shoulder-joint amputations, rendered necessary by a severe railway injury, and which proved fatal, the scapula also was removed.

Amputation at the Shoulder-Joint.

		Recovered.	Died.	Total.
Traumatic.	Primary	1	4	5
	Secondary	1	3	4
	Pathological	2	0	2
		4	7	11

Causes of Death.—Traumatic: Three from shock or exhaustion; three from pyæmia and osteo-myelitis, with pulmonary plugging; one from gangrene. Pathological: Epithelioma in one, medullary disease in the other. In both cases the disease would probably return. In one case of recovery, the arm was removed for rapidly spreading gangrene from the sting of a wasp. In one of the fatal cases, caused by a severe railway accident, the scapula was also removed. In one case, osteo-myelitis made its appearance in the scapula. The patients were—Native males, eight; Native females, two; East Indian male, one.

Amputation through the Humerus.

		Recovered.	Died.	Total.
Traumatic.	Primary	2	0	2
	Secondary	2	3	5
	Pathological	3	4	7
		7	7	14

Causes of Death.—Three died of pyæmia, with osteo-myelitis and pulmonary plugging; two died from shock or exhaustion; one from tetanus; one from gangrene.

One primary amputation was performed for shark-bite; the patient, a Hindoo, recovered. One amputation followed an unsuccessful excision of the elbow; one after an operation performed with the view of rectifying distorted union of a fracture. This case was fatal from gangrene. The patient was an English sailor. The patients were—English males, four; East Indian male, one; Native males, nine.

V.—AMPUTATION OF THE FOREARM.

Between October 12th, 1859, and December 18th, 1870—or about eleven years—fifteen cases of amputation of the forearm are recorded. Of these, eleven were necessitated by injury, such as compound and comminuted fracture, with extensive laceration of soft parts; and three by disease, such as necrosis, joint disease, gangrene. Of the eight deaths, three were from pyæmia and osteo-myelitis, three from tetanus, and two from exhaustion.

In one of the cases recorded as recovered, amputation of the arm was rendered necessary by osteo-myelitis. In one of the cases reported as fatal from tetanus, it is to be noted that the disease was present when amputation was performed in the hope of saving life. The patients were—Native males, twelve; Native female, one; European male, one (this was a case of gun-shot wound, in which amputation of the forearm was followed

by osteo-myelitis; he recovered after amputation of the arm); East Indian female, one (who recovered). The operations were —three through the upper third, four through the middle third, and seven through the lower third. Three were by the modified circular method, two being at the lower and one at the upper third. The remainder were by the anterior flap.

		Recovered.	Died.	Total.
Traumatic.	Primary	4	4	8
	Secondary	1	2	3
	Pathological	2	2	4
		7	8	15

Causes of Death.—Pyæmia and osteo-myelitis, three; tetanus, three; exhaustion, two cases.

In one case, that of a European, the arm was re-amputated for osteo-myelitis. In another case the amputation was performed in the hope of relieving tetanus, but without success.

VI.—AMPUTATION OF FINGERS AND PORTIONS OF THE HAND.

Between August 29th, 1859, and October 2nd, 1871—or about eleven years and a half—sixty-two cases of amputation of the fingers or portions of the hand are recorded. There were fifty-eight recoveries and four deaths—two being caused by pyæmia, one by tetanus, and one by cholera. The necessity for amputation arose in thirty-two cases from injury; in thirty from disease.

	Recovered.	Died.	Total.
Injury	25	2	27
Pathological	33	2	35
	58	4	62

Causes of Death.—Two cases died of pyæmia—in one diffused suppuration followed amputation for compound fracture of

the thumb; the other after amputation of the first and second metacarpal bones of the left hand. One of tetanus—had the disease when the operation was performed; it followed a wound on the finger. One case succumbed to cholera. Eleven of the sixty-two patients were European or East Indian; the remainder were Hindoos or Mahomedans. They were all males.

MALARIOUS ORIGIN OF HYDROCELE.

Hydrocele of the tunica vaginalis, testis, and of the spermatic cord, are of very frequent occurrence in Bengal, and I therefore think it well to make a few remarks on affections we are so often called upon to treat.

Hydrocele is commonly regarded as simply a local affection, and as it is seen in Europe, it probably is so. In India, however, it is one of the many forms in which the influence called "Malaria," expresses itself, and as such is of especial interest. It is frequently found associated with scrotal hypertrophy of a simple or elephantoid character—most generally the latter—and it is, I believe, one of the earliest symptoms in many, if not all of these cases. For, although in a large number of them it is lost sight of amidst the hypertrophy of the scrotum, in many it remains comparatively uncomplicated, and proceeds to an enormous development of the cystic growth—for such it really is—the tunica vaginalis not only being much distended, but also greatly thickened, while not unfrequently there is also chronic enlargement of the testis and epididymis, the veins of the cord being dilated and its tissues generally thickened.

This condition, though generally free from pain, and inconvenient chiefly from the size and weight, is occasionally the seat of an uneasy sensation of dragging and aching in the testis, cord and loins. At times, however, during which the activity of the malarious influence is predominant, the patient may suffer either from simple fever of the paroxysmal type, or some other indication of its presence; or he may have excessive pain

in the part attended by congestion, swelling, increase in the quantity of fluid, the pain and swelling extending to the thighs and groin. This may co-exist with an ordinary good state of health during the intervals, and it is the recurrence of these symptoms that makes known the abiding presence of the original cause of the disease.

The quantity of fluid that may collect, and the extent which the hypertrophy may attain are very variable, but in some instances they are such as hardly would be credited in Europe. From a few ounces to several pints are frequent quantities, and one or two gallons are not unknown, the fluid varying from a pale straw-coloured limpid serum to that of a colour as dark as coffee. This variety in both colour and density is due to the admixture of inflammatory products and blood, and in a large proportion of cases of old standing, of cholesterine in abundance, giving a peculiarly glistening appearance to the contents of the hydrocele.

The hypertrophy of the fibrous tunics of the testicle is sometimes very remarkable. I have seen the tunica vaginalis thickened to the extent of half or three-quarters of an inch, and the dense fibrous tissue is sometimes the seat of cartilaginous or even ossific deposits. With all this the gland itself may remain perfectly normal, although it is very possible that the extreme pressure to which it is subjected may in some cases interfere with the integrity of its functions—a danger which must be increased by the frequent recurrence of attacks of slow inflammation.

As to the actual size attained, I have not any measurements at hand to refer to, but I may say that I have frequently seen a hydrocele without elephantiasis—double, and even single—attain in the natives of Bengal to the size of a man's head, and even larger; that of a cocoa-nut is common. When complicated with scrotal hypertrophy there is almost no limit to the growth. In the very large hydroceles the stretching of the parts is so great as often to bury the penis in a deep sulcus; and it is worthy of note that in nearly all these cases there is more or less

thickening of the fibrous tissues, as well as of the integument and dartos, a condition which renders it essentially a variety of the elephantiasis scroti. Indeed, I cannot but regard the thickened scrotum accompanying hydrocele as merely a variety of that disease; and hydrocele as it occurs in Bengal may generally be considered as an early symptom of incipient elephantiasis. In Europeans in India the disease seldom attains so great a size, though it becomes much larger than it is usually met with in Europe; but although it is accompanied by thickening it is seldom complicated by the presence of true elephantiasis. I have, however, seen rare cases of this. The remarks which I have made as to its constitutional origin in connection with malaria apply equally to the European as to the Native, though in a lesser degree. In many cases unattended or not preceded by constitutional symptoms, it may be regarded as a purely local affection.

The condition of hydrocele occasionally passes into that of hæmatocele, either as the result of spontaneous hæmorrhage, the consequence of hyperæmia, or after an injury, as from a blow, or from tapping, which has caused hæmorrhage into the cavity. In an ordinary case of hæmatocele, when the tissues are normal, and it has been preceded by a hydrocele, the diagnosis of the presence of blood is not difficult, owing to the greater weight and density, and the diminished resiliency and translucency. But in cases of old hydrocele, accompanied by hypertrophy of the scrotum and tunica vaginalis, whether of a simple or of an elephantoid character, the diagnosis is more difficult, though happily this is not of much importance, as the treatment is much the same in either case.

The collections of fluid sometimes are accompanied by solid contents which are often of a remarkable appearance, and owe this, no doubt, to the presence of changed blood or the products of inflammation. Layers of dark-coloured fibrillated lymph of a leathery consistency, the remains of blood coagula, are frequently found adhering to the surface of the tunica vaginalis and epididymis, from which they are peeled off with some

difficulty; while the semi-fluid contents consist of a grumous fluid of a dark coffee-coloured appearance. Such is the condition of things in old hæmatoceles, while in hydroceles the contents may vary in appearance from a pale straw-coloured limpid fluid—usually found only in the early and recent cases—to a milky, or turbid, or coffee-coloured, or greenish fluid of various hues, sparkling with numerous scales or crystals of cholesterine. There are often also shreds of flocculent lymph, especially in cases of old standing, accompanied by structural changes in the tunics.

Thus a large proportion of cases of hydrocele appear to owe their origin and subsequent growth to malarious influences, and are frequently attended by accessions of febrile disturbance, especially at the commencement; many of them, also, are the precursors of elephantoid growth of the scrotum; others are so, although in a less degree, the fluid increasing to a great extent, while the tunics become only comparatively slightly thickened. There are many other cases, however, that commence and continue to increase without any evidence of being influenced by malaria; and in such, although the quantity of fluid is often large, the thickening of the tissues does not become so marked, and these cases are perhaps more amenable to treatment.

A hydrocele is seldom, if ever, I believe, cured without surgical interference. The quantity of fluid varies under different circumstances, occasionally diminishing so much as to excite hope in the patient that he is going to get well; but the refilling of the sac soon assures him of his mistake. Diarrhœa, the action of an aperient, rest and support of the part, often produce a marked though temporary diminution in the quantity of fluid; and I believe it is possible that early removal to another climate may in the outset effect its complete disappearance. I have seen large collections much and permanently reduced by this means; but I must say they have never been entirely removed.

The results of treatment are, as a general rule, exceedingly

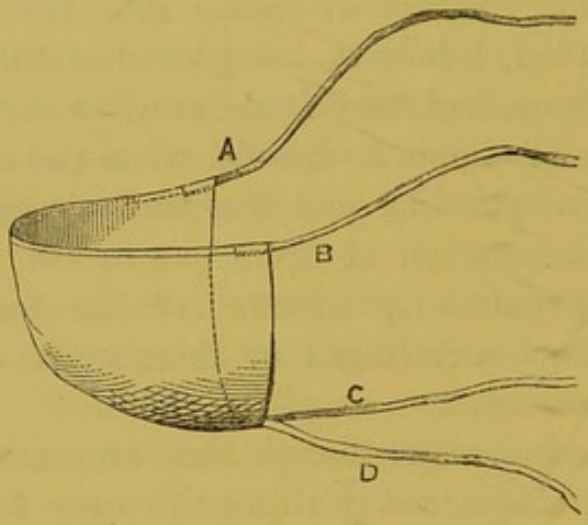
satisfactory if it be early had recourse to; and it is quite possible to effect a complete and permanent removal of the disease. We are indebted to Sir Ranald Martin for our knowledge of the most effective management of hydrocele by the injection of the tincture of iodine into the tunica vaginalis. No other method, I believe, has proved so efficacious. I have tried many others, and have found none so certain as this. In ordinary cases of simple hydrocele, when the collection of fluid is moderate in quantity and the tunica vaginalis not much thickened, the injection of from one to two drams of strong tincture, after entire withdrawal of the fluid, is generally followed in about a fortnight or three weeks by complete and permanent recovery.

It may, in some cases, though they are rare, be necessary to repeat the injection; but I think this only happens when the disease is of long standing and the fibrous coverings are much thickened. In cases where there is much thickening, a large collection of fluid and sarcocele, the better plan, I believe, is to make a free incision, evacuate the fluid, excise a considerable portion of the thickened tunica vaginalis, stuff the cavity with lint, and allow the wound to close by granulation. The proceeding is not, of course, altogether free from danger, as excessive suppuration may follow, and pyæmia result; but, under favourable circumstances, where the person's health has been good and the hygienic surroundings are favourable, there is comparatively little risk, and the operation should be resorted to if a second or third injection of tincture of iodine have failed.

The induration and chronic thickening that remain about the testis, epididymis, and cord, may be diminished, if not removed by pressure, continuously and judiciously applied by means of adhesive strapping.

In all cases of hydrocele, whether incipient or advanced, a suspensory bandage should be worn, for the purpose of removing all tension of the cord, and taking off the weight of the testis. The best form of suspender is one made of ordinary towelling,

and is of the following shape:—It has four soft tapes, one at each corner; two of these (A B) go round the waist, and two (C D) having passed around the thighs, meet the two surrounding the body.



The bandage thus applied gives support without causing any constriction of the posterior part of the scrotum or of the cord. It not only gives relief, but it tends to arrest the progress of the disease, and to prevent the thickening which results from continued congestion and slow inflammation.

In the treatment of a hydrocele, attention to the general health, and at the outset especially, the free use of quinine, together with the removal of the patient to another, and, if possible, a better climate, may sometimes bring about absorption and prevent any increase or recurrence of the disease. But generally, the fluid steadily, though sometimes interruptedly, increases, and the sooner, therefore, that it is removed and the iodine injected the better. It is very desirable, indeed, that the procedure should not be too long postponed,—until thickening of the tunica vaginalis has taken place,—for this condition renders success less certain, and leaves, when absorption has been effected, an amount of induration which is inconvenient. External applications are useless, as they have no effect in causing absorption.

With reference to what is called the palliative treatment

by simply tapping, I would remark that it is unobjectionable, if not too often repeated, in which case the radical procedure becomes more uncertain, and more likely to require repetition. I believe, however, that simple tapping may in some cases be often repeated without inducing any such result. Each case should be judged of on its own merits, but as a general rule the sooner the radical operation is adopted the better. It is always to be understood, also, that there are weak, delicate, sickly, or aged persons, in whom it may not be desirable to excite the irritation or shock caused by the injection of iodine.

The strongest tincture of iodine is the best, and in an ordinary case about two drams are sufficient, though in older and larger hydroceles twice or thrice as much may be required. The fluid having been completely removed through an ordinary small canula, the tincture is to be injected at once, and left in the sac, bringing it in contact with the whole surface of the cavity by gently pressing the parts from side to side after the canula has been withdrawn. We are indebted, I believe, to Professor Syme for this modification, and it is a very important one, in the mode of treatment, viz., the substitution of the strongest tincture and its retention in the sac, in place of a diluted solution removed soon after its injection.

In older and more aggravated cases, it may be desirable to inject a larger quantity, and, perhaps, to repeat it; and if after this absorption does not take place, the more radical operation of opening and removing a portion of the sac may be required. In the native of India frequently, and in the European very rarely, hydrocele is associated with hypertrophy, of either an elephantoid, or of a simple character. In such cases, the only method of giving relief (except in the very earliest stages, when, perhaps, iodine, quinine, or arsenic, and change of climate may arrest the mischief, and I have known them do so) is to remove the growth by a surgical operation.

As to the treatment by injection of other fluids—solutions of sulphate and chloride of zinc, bichloride of mercury, carbolic acid—or the insertion of wire setons, I have tried

them all, and have found them inferior in every respect to the iodine (as to the bichloride of mercury, I have known it produce profuse salivation), originally proposed by Sir Ranald Martin, at the Native Hospital, in Calcutta, and for which, had he never done anything else, he is entitled to the gratitude of thousands in India and elsewhere.

It is not uncommon to find hydrocele not only complicated with sarcocele or hypertrophy of the scrotum, but with scrotal hernia. This need not interfere with the radical treatment of the hydrocele, for the iodine may be injected just the same, care being taken to retain the hernia carefully by means of a truss, both at the time and during the after-treatment. Nor, indeed, need hernia prevent the more radical operation of removal of the hypertrophied portion of the scrotum. I have done this with success, but the danger is considerable, and should be well considered before the operation is undertaken.

One or two other points in relation to the treatment of hydrocele may be noticed. In an ordinary case, but especially when complicated by the actual occurrence of fever, it is well to prepare the patient by a day or two of rest and an aperient —a few grains of quinine will also be desirable. There should be no congestion or pain of the scrotum, epididymis, or cord, and if any of these are present, the operation should be postponed until they have passed away. After the injection the patient should remain in the recumbent posture for a few days, and if the inflammatory action is at all excessive, it should be restrained by aperients and lotions. The swelling, which is at first tense and painful, soon subsides, and complete absorption takes place. In double hydroceles both may be treated at the same time, but unless the patient be vigorous it may be as well to treat one at a time. Suppuration following the operation is very rare, and is only likely to occur in persons who have very irritable constitutions or who are in a bad state of health. Should it occur the pus must be evacuated by free incisions, and the case treated as an ordinary abscess.

If the injection of iodine produce, as it does occasionally, severe pain and constitutional disturbance, there is no objection to the free use of opium.

Collections of fluid are not unfrequently found in connection with the epididymis and in the tunica vaginalis of the spermatic cord. These have been observed as encysted hydroceles, hydrocele of the cord, and spermatocele — so called from the fact of containing spermatozoa in the fluid, evidently derived from some connection with the tubular structure of the testis. Combination of ordinary vaginal hydrocele with hydrocele of the cord which extends into and completely distends the inguinal canal, may give rise to the suspicion of hernia; but the true nature of the case is readily detected by the sense of fluctuation or by cautiously puncturing the tumour. Such a hydrocele is occasionally the result of some congenital peculiarity with protrusion of the peritoneum. In this case pressure would return the fluid into the abdominal cavity, and it is hardly likely to be confounded with the true hydrocele of the cord. The treatment of a hydrocele of the cord and of encysted hydrocele is the same as that for vaginal hydrocele.

Hydrocele sometimes commences in an acute form, accompanying orchitis or epididymitis, and may then be attended with very great pain and tension, and much constitutional disturbance. It is to be treated antiphlogistically; and after the acute symptoms have passed away, it assumes the condition I have described as that of the ordinary hydrocele, and is subject to the same treatment. When the pain is excessive, the evacuation of the fluid is attended with much relief.

MISCELLANEOUS CASES AND OBSERVATIONS.

I.—CASE OF INTRA-CAPSULAR FRACTURE OF THE CERVIX FEMORIS, WITH INVERSION OF THE LIMB.

S., a Mahomedan woman, of weak and emaciated frame, and about 60 years of age, was admitted March 15th, 1871, with symptoms of an intra-capsular fracture of the neck of the right femur, caused by a fall on her hip, in consequence of a false step, eight days before her admission. An abrasion showed that in falling the hip had sustained violence by contact with the ground. She was unable to stand. The limb was shortened about an inch. On extension and rotation crepitus was perceptible. There was eversion of the foot. The limb was extended and placed on the long splint, and opium was given to allay pain and constitutional irritation; but she could not bear the restraint, and, after more than one trial, the splint was discontinued.

On April 2nd, the double inclined plane was substituted. Her health failed, she became very low, and the foot gradually assumed a completely inverted position; so much so, that attempts to place it in the natural position caused so much restlessness and constitutional disturbance that they were relinquished, and she lay with the limb somewhat flexed at the hip and knee, much shortened, and with the toes resting against the tendo Achillis of the left leg.

Good food and stimulants were given, but she made no improvement; her appetite and strength gradually failed.

Diarrhœa supervened, and at last she sank from exhaustion, July 12th, four months after the accident.

At the post-mortem examination it was found that the neck of the femur had been comminuted, the head only remaining lodged in the cotyloid cavity. The entire neck, from the articular cartilage to the trochanters, had disappeared, a few small detached fragments of bone only remaining. The capsular ligament was disorganized, especially in front. The femur was drawn up, the fractured surface of its upper end being above the cotyloid cavity. The articular surface of the head of the bone remained lodged in the cavity, but the round ligament was gone. The fractured surface was hollowed out and rough, showing a degenerate and oily state of the cancellated tissue. The fractured surface of the other portion was in a similar state. No effort at repair had been made; indeed, the edge of the acetabulum and the upper surface of the femur between the trochanters were in an incipient condition of necrosis. The thigh was completely inverted, the toes of the affected limb pointing behind the opposite heel. The muscles of the hip and thigh were all much wasted and degenerated. The external were apparently neither better nor worse than the internal rotators of the limb.

Remarks.—The chief point of interest in this case, which otherwise presents no remarkable peculiarity to distinguish it from others of a similar nature, is the inversion of the foot, which gradually came on soon after the accident, when the restraint of the long splint was withdrawn, on account of the intolerance of the patient of its application.

The natural position assumed by the foot in intra-capsular fractures of the thigh-bone is that of eversion, inversion being very rare, and even yet, I believe, not satisfactorily explained. Why the comparatively feeble action of the internal rotators should have been so predominant in this case does not seem clear. Possibly it may have been due to a changed direction of the fibres of some of the muscles, owing to the drawing up of the shaft of the femur, and the absence of its neck, which,

when present, is a mechanical obstacle to internal rotation. There could be no doubt, I think, that in this case inversion was mainly due to muscular action, and not to the mere accident of position as a result of violence; for it is to be remarked that the position of inversion, gradually assumed, became permanent, and that when the limb was adjusted it returned to the inverted position, no other being tolerated by the patient. It is possible that, in the great wasting of all the muscles that rapidly resulted in the patient's feeble and emaciated condition, the external rotators, having suffered in the accident, may have become more degenerated than the other muscles of the thigh; and that to the ordinary action of the recognised internal rotators was perhaps added that of the adductors, which thus aided in the inversion of the limb. Such, indeed, seems to correspond with the explanation given by Mr. Erichsen,* and I am much inclined to think that it was so in the case in question.

The explanation of inversion of the limb in such cases given by Mr. Holthouse,† in which he concurs with Professor Smith, that the influence of the muscles in producing inversion is but secondary, the lower fragment being probably thrown, by the violence which produced the fracture, into a position favourable for the action of the internal rotators, is hardly borne out by this case, in which muscular action seemed to play a prominent part in inversion.

Professor Hamilton,‡ speaking on this subject, says, "But those rare examples of fracture of the neck of the femur, both within and without the capsule, accompanied with a permanent or a temporary inversion of the foot, are of more difficult explanation; and, indeed, a complete solution of this phenomenon does not yet seem to have been satisfactorily reached." Without venturing to offer an absolute opinion on the subject, I

* Science and Art of Surgery, 6th ed., vol. i. p. 333.

† Holmes's System of Surgery, 1870, vol. ii. p. 849.

‡ Fractures and Dislocations, 2nd ed., 1871, p. 358.

would suggest that the following causes may have been potential in causing inversion in the present case :—Total absence of the cervix femoris ; shortening and flexion of the thigh, the femur being much drawn upwards and forwards ; injury and wasting of all the muscles of the thigh, but more especially of the external rotators, which probably suffered more than the internal ; increased action of the internal rotators, and probably altered direction of the action of other muscles, especially the adductors. The share due to each of these causes I do not venture to apportion, though I believe that combined they offer the best explanation of the position.

All who have noticed the subject speak of it as one of great rarity. Professor Hamilton says of it, "In sixty cases of fracture of the neck seen by Cloquet, the foot was never turned in, and Boyer never met with such an example in all of his immense experience ; but Langstaff, Guthrie, Stanley, and Cruveilhier have each seen one example, and Robert Smith has seen two. I have myself seen one."

I have therefore thought it may be well to place these few notes on record, especially as the case appears to differ in some particulars from others that have been described.

II.—COMPOUND FRACTURE OF THE LEG : DEATH FROM DISTURBED INNERVATION INDUCING JAUNDICE AND ISCHURIA.

Mr. S., a Swiss gentleman, aged 27, of stout frame and rather pallid and anæmic complexion, who had been only a few years in Bengal, during which time he had enjoyed fair health, met with a serious accident on the 9th October, 1869.

He was driving in a buggy with a friend, when, observing that one of the reins had become detached from the bit, he jumped out, without putting his foot on the step, to stop the horse, which was starting off at speed. He fell as he alighted, and was immediately afterward picked up with a severe com-

pound fracture of both bones of the leg a few inches above the ankle-joint. There was a lacerated wound about two inches above the internal malleolus, through which the tibia protruded. The protruding bone was stripped of its periosteum for about two inches. The fibula was also fractured, but did not protrude.

On examining the wound it was found that the lower fragment of the tibia was comminuted, and the joint opened. There was considerable hæmorrhage, but no large arterial branch appeared to be wounded. The anterior tibial artery could be felt on the dorsum of the foot, but the posterior tibial did not pulsate. The saphena vein had been torn across, and was hanging out of the wound. He was much depressed by the shock, and his pulse was small, feeble, and rapid.

I was unable to reduce the protruding bone, and as it was much injured, and denuded of the periosteum, I removed the most seriously damaged portion, about an inch and a-half in length, and then, increasing the opening by a small vertical incision, I returned the bone, dressed the wound, and placed the limb in a splint applied on the fibular side. There was no further hæmorrhage. Stimulants were given to rouse him, and warmth applied. Chloroform was administered during the operation.

Vespere.—He is still depressed, but is free from pain; he looks tolerably well, but his pulse is feeble and rapid, showing that the effect of the shock still continues; stimulants and beef-tea had been administered during the day. Very careful examination had been made, but no injury of any other part of his body could be detected. He was perfectly conscious, and said he knew there was no other injury, and described the accident as having been caused by his ankle twisting just as his foot touched the ground. A sedative draught was ordered at bed-time.

10*th*, 8 a.m.: He slept at intervals; there has been no hæmorrhage; there is no pain of any consequence; iced water has been applied frequently to prevent bleeding. His pulse is

still feeble; the surface of his body cold; there is no proper reaction. He looks fairly; says he feels weak and depressed, but talks readily. Bowels to be relieved by a simple enema; stimulants to be given, and warmth applied.

Vespere.—He has been restless during the day, vomiting frequently, but he is free from pain, and is rational and collected. There is some tympanites, and jaundice is setting in; the conjunctivæ are already tinged with yellow; pulse is still depressed and rapid.

11*th.*—A restless night; perfectly conscious; jaundice well marked; the whole body, but especially the upper part, is discoloured; pulse rapid, but somewhat fuller. There is an attempt at reaction. The wound looks as it did when first dressed. Ordered an aperient, as the bowels have not acted. Stimulants to be continued in moderation. He is restless; abdomen tympanitic, and the breathing rapid. I expressed my fears to his friends that he would not live long. 5 p.m.: Much worse; nearly collapsed; breathing very hurried; skin cold and clammy; deeply jaundiced; foot and leg of a deadly cold; great toe apparently on the point of becoming gangrenous. Stimulants, hot bottles, sinapisms over the heart.

The jaundice rapidly deepened, and the condition of collapse became more complete. He retained his consciousness almost to the last moment, and died at 8 p.m., that is, forty-eight hours after the accident.

No post-mortem examination was made, but the cause of death was evidently the shock. This was most intense, and, acting on the nerve centres, caused such suspension of innervation as to induce jaundice and ischuria (I should have noted that no urine was voided or secreted after the accident), and probably the formation of coagula in the right cardiac cavities.

Remarks.—The rapid supervention of jaundice is a somewhat unusual result of shock to the nerve centres in accidents of this nature, and I am not aware that it has been much alluded to by surgical authorities; but I have seen it before, and also after

capital operations, and I regard it as a most fatal symptom. The rapidity and intensity with which it comes on show that it is not due to congestion of the liver or to obstruction of the ducts, and point to disordered innervation, by which the natural metamorphic processes that should go on in the blood are seriously compromised, if not suspended. The condition of the patient in such cases as this is clearly one in which the nervous system is seriously injured, and those portions of it which govern the hepatic functions seem most of all to suffer. It is more than probable that had this fatal shock not supervened, amputation would have been ultimately necessary. As it was, his condition was never such as to admit of the operation.

III.—CASE OF RAPID UNION OF FRACTURE IN AN OLD MAN.

A very old man, a Hindoo, said to be 96 years of age, was admitted on September 11th, with a fracture of both tibia and fibula a little above the left ankle-joint. The accident was caused by a carriage, which knocked him down and passed over the limb. The foot was also bruised and excoriated. The fracture was simple, and nearly transverse. He was a very old wrinkled man, almost blind from cataract, but wonderfully active for his age, and healthy-looking. The fracture was put up in ordinary side splints, and the abraded foot was dressed.

On September 20th, ten days after the accident, the splints were removed, and the limb examined; the union was found to have taken place, but not firmly. The splints were reapplied, and on the 25th they were again removed, and union was found to be complete. On the 29th he was able to bear his weight on the leg; a starched bandage was applied a day or two later, and on October 11th, exactly one month from admission, he left the hospital perfectly well. He had been walking about the ward for several days, and became impatient, so I discharged him.

Remarks.—The only point of interest in this case is the rapidity with which union took place in the fractured bones of the lower extremity at this great age. The accident was unattended with any symptoms of inflammation or constitutional disturbance, and repair seemed to be effected well and rapidly, notwithstanding his age and the distance of the part from the centre of circulation, just as it might have been in a young and vigorous person.

IV.—TWO CASES OF BADLY-UNITED FRACTURE OF THE FEMUR RE-FRACTURED.

Case 1.—M., aged 14 years, a healthy English sailor boy, admitted 30th November, 1871, with a badly-united fracture of the left femur, causing great distortion of the limb, the thigh being fixed at an obtuse angle, having its apex outward, and much shortened.

It appears that he fell from a height of about eight feet on to the deck of the ship, about six weeks ago, and sustained a double fracture—one in the middle of the shaft of the bone, and the other in the lower third. There was much thickening from callus, the union was firm, and the curvature of the thigh outwards excessive, with shortening of the limb by four inches. He was put under the influence of chloroform, and the bone forcibly straightened; and during the pressure necessarily exerted for the purpose, the bone was felt to give way, as if partially fractured and extended. After the operation, the limb having been restored to its normal length, was placed on a long straight splint. Rapid consolidation took place, without a single unfavourable symptom. He was able to walk with a stick in twelve days, and was discharged cured on the 21st December. The callus was becoming rapidly absorbed, and the strength of the limb was daily increasing.

Case 2.—A healthy Hindoo boy, aged 10 years, was admitted

22nd December, 1871, with a badly-united fracture of the right femur, at its upper third, caused by falling from a height of a few feet about a month ago. Union had taken place, and the limb was much shortened and distorted, at an obtuse angle, having its apex directed outwards, with a shortening of about two inches. He was placed under the influence of chloroform, and the limb forcibly straightened by pressure made at the seat of union. The bone was heard to give way with an audible snap at the site of the former fracture; and the limb was then extended, and placed on the long thigh splint. Slight fever followed the operation, but it soon passed away, and he had no other unfavourable symptoms. Union rapidly took place. On the 4th January he was able to stand and bear his weight on the limb, and on the 18th he walked freely about, and was discharged. Some thickening remained about the seat of union, but it was rapidly disappearing. There was no shortening.

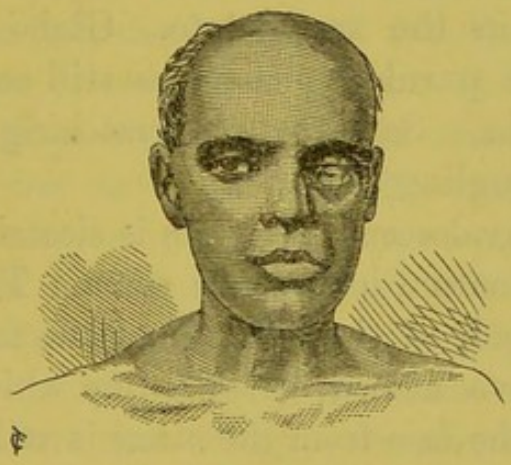
V.—TWO CASES OF IMPETIGINOUS ERUPTION OF THE FACE CAUSED BY PERIPHERAL IRRITATION OF THE FIFTH NERVE.

Case 1.—*Destruction of the Eyeball and Impetiginous Eruption of the Face.*

N. C., aged 60 years, a Hindoo goldsmith, was admitted on the 13th February, 1867, with an impetiginous eruption on one-half of the face. He stated that about eight days ago, whilst blowing a fire through a bamboo tube, a spark flew into the external corner of his left eye. Next morning the face swelled, and two days later its left side was covered with an eruption, but he could not say whether pustular or vesicular.

On admission, the left half of his face was covered with an impetiginous eruption and small patches of ulceration, com-

mencing at the vertex of the forehead and extending to a line drawn outwards from the angle of the mouth. The skin generally of that side of the face had an erythematous blush, which exactly divided the face by a marked line of demarcation extending from the forehead to the upper lip down the centre of the nose, forming a distinct contrast with the skin of the healthy side. A similar eruption and discoloration occupied the left half of the cavity of mouth from the gums to the uvula, and formed an equally marked contrast with the opposite side of the palate. Sensation was perfect on both sides, and there was no paralysis



of the muscles. He is said to have had impaired sense of taste. The tongue was more coated on the affected side, and an equally distinct line of demarcation on the dorsum indicated the difference. Cataract in both eyes. The left ocular and palpebral conjunctivæ were much congested, but not painful. Ulceration was commencing at the lower and external part of the cornea. The pupils were natural. The posterior molar tooth of the upper jaw had been painful and loose for the last twelve days.

The loose tooth was extracted. The bowels were cleared out by a dose of castor oil. The eruption was dressed with soda ointment, and tinct. ferri muriat. was ordered.

February 24th.—The eruption healing rapidly; small patches on the forehead and below the eye still unhealed. The ulcer of the cornea extending. Continue medicine. Alum and zinc lotion for the eye, atropine drops, and frequent fomentation.

28*th*.—Eruption in the face and mouth healed. Skin of the face still discoloured. The lower part of the cornea melting away, and its upper half hazy; pupils natural. Continue medicine and atropine drops. Argent. nitr. gr. iv. ad ℥j. for the eye.

March 2nd.—Lower part of the cornea has perished; lens with a portion of the vitreous humour escaped; iris prolapsed. Continue medicine.

4*th*.—Cornea destroyed; eyeball distended; on gentle pressure, some thick pus and a patch of slough came away from the interior of the globe.

15*th*.—Much in the same state. Globe of the eye partly collapsed. Some purulent discharge still continuing from the cavity of the globe. Says that on scratching the left half of his head he feels a tingling sensation.

He is now convalescent; the eye is cicatrizing, and the conjunctival inflammation has nearly gone. There is still a discoloured dark shade of the left half of the face; the ulceration and eruption have healed, but the line which divides the discoloured side of the face from the other is still very remarkable, and points to the distribution of the two upper divisions of the trigeminal nerve.

Remarks.—The primary source of irritation in this case appears to have been the spark which injured the eye, though that injury was but a trifling one. The apparent result of this peripheral irritation of certain nerve filaments was serious and rapid disturbance of the functions of a great portion of the fifth pair, on that side of the face; and the evidence of this was seen the marked discoloration of the face on one side, exactly divided, as though by a line drawn with a pencil down the centre of the nose and face, and by a profuse pustular eruption marking the upper two-thirds of the left side of the face and of the hard and soft palate. Also a rapidly destructive process of disease in the left eye itself, which no treatment was efficacious in arresting before the eyeball, as an optical instrument, had perished.

The limits of this lesion of nutrition corresponded with the distribution of the two upper branches of the fifth nerve. What is the explanation of this pathological process? Why did so trifling an injury to the eye cause not only rapid destruction of that organ, but a peculiar eruption in the integument of the face and palate, corresponding to the distribution of a large portion of the trigeminal nerve, and why did merely peripheral irritation induce these remarkable changes?

As the man was in good health when the accident happened, and as there was no sign of any lesion of nutrition in the parts supplied by these nerves, until afterwards, it is impossible to avoid the conclusion that the injury and the disease stood to each other in the relation of cause and effect. It is true that one molar tooth was diseased, and that its removal appeared to expedite recovery; but as it had been diseased for some time, and no such symptoms had appeared, one cannot attribute the affection of the face to the influence of this tooth. Beyond saying that it was due to irritation of the trigeminal nerve, I am unable to offer a more precise explanation of this condition. The case seems to prove that injury, pressure, or irritation may not only cause interference with the functions of a sensitive nerve by its effects being reflected to all parts where the branches of the latter are distributed; but that the nutritive plastic force over which the nerve to a certain extent presides from its connection with certain sections of the ganglionic system, may also be seriously compromised, and that not only pain or anæsthesia, but alterations of structure, changes in the nutritive movement, such as eczema, impetigo, ulcer, abscess, swelling, simple inflammation, or even gangrene, may be the result.

That such is the case in a simpler degree we know, for we frequently see that irritation of one branch of the fifth nerve at its periphery, as in a carious tooth, may induce an abscess in some other part to which other branches of the same nerve are distributed. We also not unfrequently find neuralgia (as in facial tic), congestion of the conjunctiva, or a discharge from the ear, due to similar causes. We know that pressure on the trunk

of the nerve near the Gasserian ganglion within the skull, or near its origin from the nerve-centre, may produce destructive changes in the nutrition of the eye, causing loss of vision and disorganization of the globe itself.

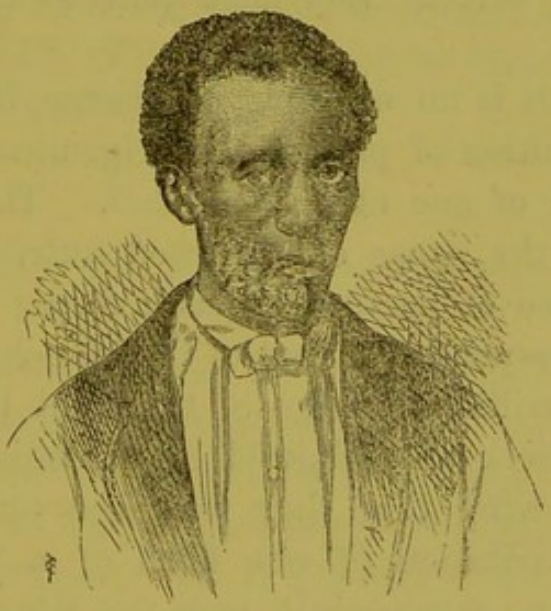
But it is not so easy to understand why the mere peripheral irritation of a filament of the lachrymal nerve should involve, in so serious a manner, the entire territory of distribution of at least two of the principal branches of the trigeminal nerve. It is a proof how completely inter-dependent the various parts and organs of the body are on each other, and is an excellent example of what is meant by the somewhat vague expression of sympathetic irritation. The mutual relations to each other of the sentient and the ganglionic nerves are here well illustrated; and it is shown how both are concerned in regulating not only the forces by which selection is governed, but also the movements of the vascular tubes which minister to the nutritive changes.

It is possible that the accident to the eye may have been a mere coincidence, and that it occurred just about the time when some internal change, *i.e.*, within the skull, was causing interference with, or disturbance of, the main trunk of the fifth nerve; but as there is nothing to show that such was the case, and as the patient is recovering, and the functions of the fifth nerve in the affected parts are being gradually restored, I think the conclusion is, at all events, probable that the changes described are due—though how we are unable to explain—to the peripheral irritation of the filaments of the nerve distributed to the conjunctiva which sustained the first injury from the contact of the spark.

Case 2.—*Impetiginous Eruption of the Face caused by Peripheral Irritation of Branches of the Trigeminal Nerve.*

G. S., aged 43 years, a West Indian negro, steward of a ship, was admitted on the 9th of May, 1870, suffering from great

pain in the right side of the face and jaws, owing to a severe impetiginous eruption which occupied half of the lower lip, the upper lip, the cheek, inside and out, and the anterior aspect of the ear. The face was considerably swollen; the lymphatic glands were engorged; there was a profuse sero-purulent discharge from the eruption, and some deafness owing to partial occlusion of the meatus auditorius. Two teeth, canine and bicuspid, in the upper jaw were carious and painful; the gums were spongy and tender; two or three teeth in the lower jaw were also decayed, but not painful. He had suffered from toothache more or less for the last ten years, and he had a molar tooth extracted some time ago; he has had facial neuralgia, but no eruption previously. He was otherwise in fair health, and of temperate habits.



The eruption extended from the right half of the lower lip (where it commenced abruptly as though a line were drawn dividing the lip into a sound and a diseased part) to the upper lip, to the inside of the cheek, and from the angle of the mouth, to the anterior surface of the ear, being much less developed as it ascended. The tongue was coated, but not more so on one side than the other. The discharge was profuse, and the swelling and pain were considerable. It appears that, on the 5th of May, he exposed himself, when heated, to a current of

air, and caught cold. Neuralgia came on, and, on the following day, a severe fever ushered in the eruption, which came out suddenly.

Simple treatment by salines and quinine, and the application of soda ointment relieved him, but the eruption continued to increase. On the 11th May, the two painful teeth in the upper jaw were extracted. This operation was followed not only by immediate relief from all neuralgia and toothache, but by the rapid drying up of the eruption, which in three days had almost completely disappeared. He was discharged on the 23rd, perfectly relieved; the eruption had been cured for several days, but he remained until his mouth was well. It should be noted that, within the area of the eruption, on the part of the skin not involved in the impetigo, several very dark patches of pigment were deposited.

Remarks.—This is an example of disease induced over the region of distribution of part of the trigeminal nerve, by peripheral irritation of one of its branches. The diseased teeth were, no doubt, the cause of disturbed nutrition, through the reflex transference of perverted plastic force; and the area of the eruption corresponded to that of the branches of the superior and inferior maxillary division of the right fifth nerve. The removal of the teeth was followed by immediate subsidence of the disease; showing that they were the proximate cause of the mischief. Irritation of one fibril of a nerve constantly gives rise to pain, or neuralgia, over the site of distribution of other filaments of the same trunk, and there is no more frequent example of it than in facial tic. Disturbance of the formative or plastic force is also not uncommon, as is seen in many cases of the same disease where congestion accompanies pain. But we less frequently see examples of this pathological law illustrated by actual lesions, such as impetigo or eczema. In the preceding case, the superior division of the fifth nerve was the seat of the irritation; whereas in the present example the middle and lower divisions, judging from the area of the

impetigo, were involved; and the fact of the removal of two upper teeth being sufficient to cure the disease seems to point to the branches of the superior maxillary as being mainly concerned; whilst the eruption on the lower lip, the side of the face, and the anterior surface of the ear, shows that the inferior maxillary was also implicated.

That irritation of the peripheral distribution of a dental branch of the fifth nerve should give rise to disturbed innervation or nutrition in the tissues supplied by another branch of the same nerve, is easily understood: but the reason why this particular form of disease should be induced is not so apparent, and is as difficult of solution as are the numerous examples of different diseases being originated by the same causes that come under our daily observation—as for example, why should malaria give rise to fever in one, neuralgia in a second, convulsions in a third? The explanation no doubt is to be sought in some peculiarity of the individual.

VI.—CASE OF HYPERTROPHY OF THE TONGUE.

A Bengal Brahmin, aged 20 years, admitted the 20th of August, 1866, with hypertrophy of the tongue. The organ is enlarged, not protruding beyond the lips, but the mouth cannot be closed as the jaws are separated, and the lower teeth everted by the pressure. He is a healthy-looking young man. He states that about ten years ago he had a severe attack of fever, and immediately after it the tongue began to swell, and rapidly increased in size until it protruded from the mouth. He applied for treatment at a neighbouring dispensary, and the swelling subsided, but the amendment was only temporary; for in another month it again began to increase in size, and from that time it has remained much in its present condition—occasionally subsiding a little, and again increasing with symptoms of inflammation. He says that he never had syphilis and never took mercury; indeed, he is a remarkably healthy-

looking person. The lower jaw is pushed downwards, and the upper and lower teeth are separated by an interval of nearly an inch. The tongue is much enlarged, round, and not compressed; it has several patches of enlarged papillary growth, not unlike the commencement of epithelioma; it is increased in length about two inches, and is smooth, red, and cylindrical towards its apex. A portion of the enlarged papillary growth, having been snipped off and examined under the microscope, exhibited only fibrous structure. The tongue is slightly painful on pressure, but it is the inconvenience, rather than the pain, that he complains of. He has difficulty in masticating, and his speech is much affected. Some slight increase of the growth has brought him to Calcutta to see if there be any remedy.

August 25th.—I bandaged the tongue with a small roller, having first applied a solution of sulphate of copper, and ordered five grains of iodide of potassium three times a day.

26*th.*—The tongue is somewhat smaller. Continue the bandage and medicine.

28*th.*—The tongue is considerably reduced in size by the pressure. Continue the bandage and the potass. iodid. I also applied pressure to the jaw by a bandage round the head, with the view of remedying the distortion of the bone.

September 10*th.*—The tongue is diminishing, but not so rapidly as it did at first. It is now retained easily within the mouth, and his speech is more articulate.

October 2nd.—The tongue is nearly reduced to the normal dimensions, and the hypertrophied papillæ have almost disappeared. He left the hospital on the 12th, the tongue nearly natural in size, and his speech much improved, but the distortion of the lower jaw remains, and I fear is permanent. The distance between the upper and lower incisors, when the molar teeth are in apposition, is nearly an inch.

Remarks.—This affection, occurring independently of acute inflammation of the organ, is so rare in this country that I only remember to have seen this one case. The disease is considered by some authorities to be usually, if not always, conge-

nital, and cases are recorded where it was observed in young infants, who were born with their tongues hanging out of their mouths. In other instances it made its appearance in early life, or at all events was first noticed then, and may perhaps have been congenital, as a slight amount of hypertrophy might escape observation in infancy. In the present case, there is nothing to show that the patient had any abnormal condition of the tongue for the first ten years of his life. Its condition can hardly be called one of true hypertrophy; for had the increase in size been due to textural changes of that nature, it would not have yielded so readily to the simple treatment by pressure that was adopted. It must rather be regarded in the light of a swelling or infiltration of the soft vascular tissue of the tongue, combined, no doubt, with a certain amount of tissue change, the result of textural irritation depending on some obscure cause.

It is to be regretted that the patient could not be detained in the hospital long enough to observe whether complete restoration to the natural dimensions could be accomplished, and also whether any improvement could be effected in the distorted lower jaw; but he was so much pleased and satisfied with the progress that he had made during his stay, that he could not be induced to remain longer. It is probable that the removal of a triangular portion, including the apex of the tongue, would have relieved him more speedily and effectually, but he would not submit to any operative proceeding. The separation of the upper from the lower teeth—the result of pressure by the enlarged tongue—was very remarkable, and not only interfered with his articulation, but also prevented him from biting his food. This, perhaps, to a Hindoo who lives chiefly on rice, was of comparatively little importance, and he seemed quite contented that it should remain in that condition. Pressure exercised for some time had not produced the least change, and it is doubtful if it ever would have done so at his age.

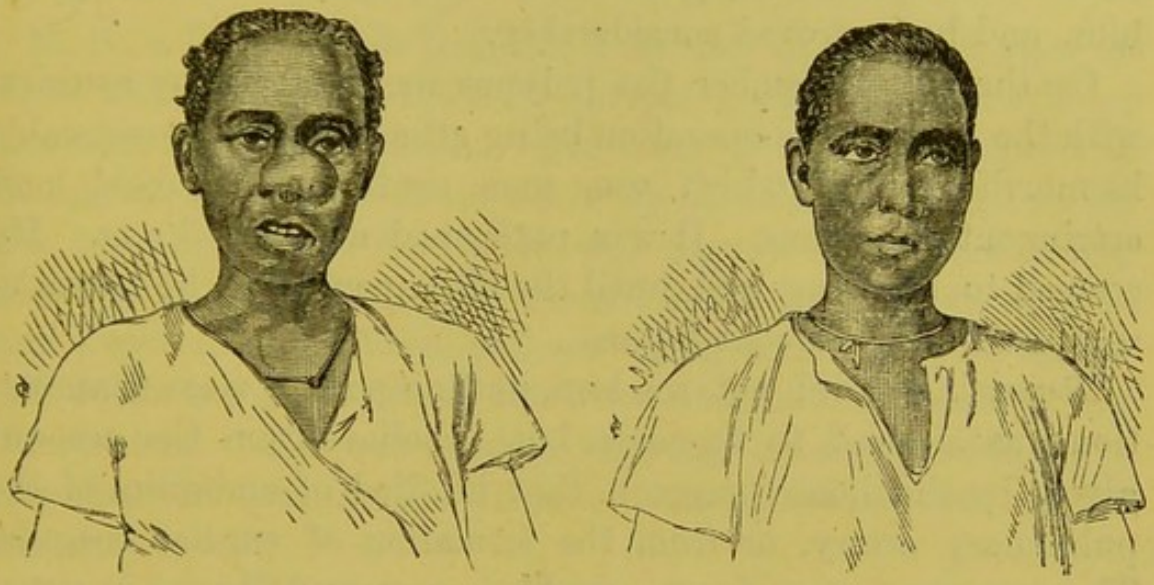
VII.—REMOVAL OF A TUMOUR FROM THE NOSTRIL.

A Mahomedan woman, aged 30 years, was admitted February 19th, 1868, with her face much disfigured by a tumour which distended the left nostril. She stated that it began to make its appearance about three years ago, and steadily increased for two years, when it ceased to grow rapidly, and remained almost stationary.

The ala nasi was pushed aside, the nostril completely closed, and the nasal and part of the superior maxillary bones were expanded and stretched over the growth, which was about the size of a small orange. She appeared to be in fair health, and complained of discomfort rather than pain. The tumour, where visible, had a pinkish appearance, and was smooth on the surface. There was neither fetor nor discharge from the nostril. I removed it on the 24th, by laying open the cheek from the nostril. On turning the parts aside the tumour was easily isolated, and removed by avulsion from the septum nasi, to which it was attached by a pedicle. The bleeding was profuse for a few moments, but was easily controlled by pressure. The edges of the wound were stitched with horsehair, and a light dressing of carbolic acid applied. The tumour, which was somewhat lobulated, occupied the distended nostril, but had no connection with the antrum. It was examined by Professor Colles, who reported it to be composed chiefly of rapidly growing cells full of germinal matter, and most probably malignant. The wound healed rapidly, and, by carefully adjusted pressure, the expanded bones were soon restored almost to their natural condition. On March 24th she was discharged, apparently cured, and without any sign of recurrence of the disease.

It is to be noted that she had no glandular enlargements in the vicinity of the growth, nor was there any constitutional cachexia. The family history is always a difficult subject of investigation with such people, and nothing was elicited as

to any hereditary tendency to cancer. The accompanying sketches taken before and after the operation, illustrate the appearance caused by the morbid growth.



The microscopical appearances of this rapidly growing tumour, which consisted mainly of large cells filled with nuclei or germinal matter, together with its attachment to the septum nasi, render it probable that the disease was of a malignant character, and that, therefore, relief can only be temporary. As the patient's general health was good, and the tumour was entirely removed, there can be no doubt that, even though the relief be only temporary, the operation has done good.

VIII.—POLYPUS NASI.

P. A., a native convert boy, aged 16 years, was admitted on the 20th August, 1868, with a tumour distending the left nasal cavity, and bulging the palate into the mouth, and which could be seen protruding from behind the soft palate. It began, according to his account, about eight months previously, after a severe attack of catarrh. During the early part of its growth it bled often and freely. It had bled less frequently and severely of late, but he was anæmic and weak from the

frequent losses of blood. The polypus completely distended the nostril, distorting the face. It was firm and vascular, and bled easily on being touched. The boy was kept under treatment until December; good food, beer, and tonics were given him, and he improved considerably.

On the 7th December the polypus was removed by evulsion with the forceps, the operation being attended with considerable hæmorrhage, but which was soon controlled by cold and astringent injections. It was performed at about 8 a.m. He seemed to be doing well until the afternoon, when he began to sink, and died at about 5 p.m.

Remarks.—I did not see him, and no post-mortem examination was allowed to be made, but I believe from the account given by the house surgeon that he died of embolism of the pulmonary artery, or from the formation of cardiac coagula. The tumour was as large as a hen's egg, and fibrous in structure.

The ordinary gelatinous polypus nasi attached to the turbinated bones is very common in India, and is readily removed by evulsion with the common polypus forceps. Small fragments are liable to be left behind in the first operation, explaining what appears to be return of the disease. It is necessary, therefore, to be careful to thoroughly sweep out the nasal cavity, and remove as much as possible in one operation. The more dense fibrous polypus, of which the present is a good example, is not so frequent, but occurs occasionally. Its removal is attended with some difficulty and even danger, especially if the attachments be deep, as they sometimes are, extending to the base of the skull, or into the antrum. Removal is, however, the only satisfactory and radical treatment. The malignant form of nasal polypus is not infrequent, but any treatment of this is but of a palliative nature. If removed, as it may be sometimes, to give temporary relief, it invariably returns, sooner or later proving fatal.

In any of these operations, especially in persons who are weak and anæmic from frequent losses of blood, it is well to

bear in mind the danger of embolism as exemplified in this case.

IX.—CASE OF FATAL SWORD WOUND.

M. S., a Bynswarrah Rajpoot, a durwan in Calcutta, aged 30 years, was admitted on the 29th July, at 1 a.m. His friends say that after the receipt of some news from home, he attempted to kill himself at 11 p.m. of the 28th, by thrusting a curved sword into his abdomen. The blade was narrow and about thirty inches in length; it had penetrated, entering at about half an inch above the umbilicus, and emerging about an inch and a-half below the junction of the outer and middle thirds of the left clavicle. He was seen struggling on the ground by a comrade, who came to his aid and drew the sword out of the wound.

The aperture of entrance was a cleanly incised wound, of about an inch and a-half in extent. It entered obliquely through the abdominal wall, making a valvular opening, through which a knuckle of uninjured small intestines protruded. There was slight oozing of blood from the wound. The wound in the chest was of about the same dimensions as that in the abdomen; the areolar tissue about it was somewhat emphysematous. The finger passed easily into the cavity of the thorax under the rib, and the movement of the lung was distinctly felt. There was neither hæmoptysis, cough, nor dyspnœa, and no air escaped through the wound. Percussion on the anterior aspect of the left side of thorax was slightly tympanitic, and in the axillary region somewhat dull; respiratory murmur on the left side almost inaudible; minute crepitation during inspiration around the wound; respiration on the right side puerile. The temperature of his body was not then, nor at any time subsequently, very high, 102° being the maximum on the 30th. Considerable dyspnœa. There was not much emphysema of the chest, but it extended over the whole abdominal surface. Vomiting was frequent, and the matter ejected was like coffee grounds. On the morning of the 29th the pulse was 94; respiration, 54;

there was no cough. No hæmorrhage from the wound; respiration on the left side very feeble; crepitation not heard; heart-sounds normal but weak. In the evening the pulse rose to 100; temperature, 98°; respiration, 54. Very little abdominal pain; vomiting ceased; urine voided freely.

To allay irritation he had a grain of opium every fourth hour, and stimulants were given occasionally.

On the morning of the 30th, pulse, 120; respiration, 60; temperature, 98°. Very little abdominal pain; vomits whenever he takes any nourishment. Decubitus on the left side. Respiration very painful; percussion of the right side of chest nearly natural; the left side is tympanitic all over, except in the axillary region, where it is rather dull; respiration on the right side harsh; inaudible at the front of the left side; metallic tinkling is heard with the inspiration; on the lateral and posterior aspects of the left side respiration is audible. In the evening the pulse rose to 152; respiration, 66; temperature, 102°. Abdomen still emphysematous; vomiting continues.

On the morning of the 31st pulse very weak, and about 140: respiration, 80; temperature, 100°. Vomits constantly black grumous fluid. Integument around the thoracic wound inflamed and swollen. Has less difficulty of breathing when sitting up. On measuring the thorax on the right side, it was found to be, from the spine to the nipple, sixteen inches, and on the left side seventeen inches. Percussion-note of the chest on the right side rather dull; on the left side in the sitting posture dull at the lower part; slightly resonant at the upper part; in the recumbent posture, clear anteriorly and dull posteriorly. Respiration on the right side puerile; on the left audible at the back, inaudible in front. Heart's action most audible at the right side of the sternum, where the impulse is also felt. Much dyspnœa; emphysema of the chest; countenance anxious. The patient became gradually worse, and sunk from exhaustion at 2.30 p.m. of the 31st.

The body was examined twenty-four hours after death. The abdominal wound, which was situated about half an inch above

the umbilicus, penetrated obliquely upwards for about two inches; through it, a portion of omentum was protruding. The sword had pierced the diaphragm, carrying before it the stomach, which lay in the thoracic cavity and slit open, with its contents extravasated into the left pleural cavity. The fluid was of a coffee-ground colour, like that he had vomited. The weapon had pierced the left lung, emerging about an inch and a-half below the clavicle. The large vessels were not wounded. The heart and pericardium had escaped, but the pericardium contained about two ounces of sero-sanguinolent fluid. The left lung was completely collapsed. The right side of the thorax was uninjured.

X.—CASE OF HYDROPHOBIA.

I received a note from Dr. Bird, asking me to see an urgent case with him. I arrived there about 9.30 a.m. The patient was a young man, aged 23 years; tall, slight, but muscular; complexion sallow, hair and eyes dark, of intelligent expression, but much excited. By vocation he was a mechanical engineer, and superintendent of some works in the vicinity. The history of the case is as follows:—His friends say he is a person of excitable temperament, and of a susceptible nervous character; he has been about two years in India, and has enjoyed fair health. His occupation is active, and occasionally he is considerably exposed to the sun. His temper is peculiar and very excitable; so much so, that he would occasionally separate himself from his friends for a time, and was wont to have violent fits of passion. I questioned the friends, but no insanity was admitted to have been known in the family.

About thirty days since he received a bite from a pet spaniel; he was caressing it, and the dog was jumping up towards his face, when it snapped at him and inflicted a slight wound on the left cheek, near the angle of the jaw. He applied some dilute nitric acid to the wound; it healed rapidly, and I observed a small cicatrix, which was neither painful nor irritable.

Shortly before this accident happened, he had read a story in "Chambers' Journal," entitled "The Longest Month in my Life." It was an account of a person bitten by a dog, and who was assured by a surgeon that he was not safe until thirty days had elapsed. This story appears to have made a great impression on his mind, and he had brooded deeply over it. His manner was changed, and though he did not say much, it was evident from his general bearing and from his casual remarks that the impression was permanently on his mind, and that his anxiety was great. He became more thoughtful, read his Bible much, and seemed to be out of health and depressed in spirits. His friends say that it was on the thirtieth day after the bite that he began to complain of pain and stiffness in the neck and jaw, but not in the cicatrix. This pain was attended by an attack of bilious vomiting, and he was much depressed. He had also suffered from more than usual exposure to the sun during the previous few days, and his eyes were congested, the skin much heated, and there were symptoms of a moderate attack of *insolatio*. For those symptoms Dr. Bird treated him in the usual manner. On the following day he observed to him that he did not like the idea of swallowing ice, which had been ordered for the nausea; and although he took his food and medicines fairly, he swallowed them with a sort of gasping effort. He did take them, however. He washed his hands and face in Dr. Bird's presence, and evinced no dread of water or fluids. Dr. Bird found that though he endeavoured to conceal it, the dread of hydrophobia and the incidents of the story which he had lately read were ever haunting him, and talked and reasoned with him on the subject. He said afterwards that he had now quite put away the idea, but it was evident, nevertheless, that it was still ever present in his mind. He became very much excited at times, and was most nervous and frightened,—constantly alluding to his approaching end, talking of his mother, and frequently praying. At times the efforts to swallow anything, especially if cold, caused spasm, as though he had been plunged into cold

water; and at times he would throw himself back on his pillow with spasmodic fixing of the chest, like that of hysteria, but unlike the true spasm of tetanus or of hydrophobia. His sleep was disturbed, and his physical exhaustion great. It is to be observed that the weather was most oppressive. The thermometer stood at above 90°, and the air was saturated with moisture.

This state continued until I saw him with Dr. Bird. When I went into his room he was sleeping quietly, having been restless and excited during the night. He awoke shortly and at first seemed confused, having difficulty in recognising Dr. Bird and others. This soon passed off, and he said, when introduced to me, that he knew my name, became quite coherent, and talked steadily. His pulse was feeble, 72, very irregular, and intermittent. I examined him closely during a long period, and the result of my interview was as follows:— I noticed that the eyes were congested, and that he had a startled, nervous, apprehensive look, his manner being excitable, but most cordial. He seemed glad to see me, and spoke gratefully of the attention of all about him. He said that he was very much afraid that he would not recover, and entreated us to tell him if there was any danger. He said he was willing to do anything and to take anything. He drank water and milk-and-water through a tube with ease, but when he attempted to drink iced water, it brought on spasms of the chest and occasional gasping; but he overcame this and drank whatever was offered to him. I was informed that he had less difficulty in drinking when he was not noticed, and when Dr. Bird was not there. There was no spitting or clearing of the throat, nor did there seem to be any collection of mucus in the mouth or fauces. I observed also that the contact of the air (a breeze was coming in through the window) did not cause him any trouble, and that he was perfectly indifferent to the sound of water poured out in his hearing. His sister stated that one of the first symptoms that caused his relatives great anxiety was (on the first or second day) his suddenly throwing

down a glass of water, saying that he could not drink it. This symptom appears to have been present at intervals throughout.

I had a long talk with him, when he admitted that his mind had been much troubled by what he called "the accident," and that he had thought much of "the story," but now that Dr. Bird had reasoned with him, he had discarded the idea altogether. He took milk-and-water and soup before me, with more or less of spasm. He quieted down remarkably, and when I had been there about an hour, he drank almost freely anything that was offered to him. As his bowels had not acted for some time, a castor-oil and turpentine enema was administered. This brought away a quantity of small dark *scybalæ*, and he said he felt much better after it. I then put him under the influence of chloroform, to which he yielded after inhaling about an ounce on a napkin. At first there were some struggles and attempts at spasm, but these subsided, and he was soon asleep. Whilst dozing another physician saw him, who recommended that the cicatrix should be excised. Dr. Bird and I did not think, under the circumstances, that this would better his chance of life. The symptoms indicated that, if the disease were a real hydrophobia, it had become thoroughly developed, and therefore no advantage was likely to be derived from excision of the cicatrix at that period of the case; whilst, on the other hand, if it were the result of great mental anxiety and fear in a nervous and excitable temperament, the admission on our part that he really was the subject of hydrophobia might have a very prejudicial effect. It appeared to us, that as after he had taken the chloroform, he was rather more tranquil, and his fears were to a certain extent allayed, if this state of quiescence could be kept up and his mind diverted from the object of his dread, we might hope for improvement; whereas to cut out the cicatrix would be a direct admission on our part that he had the disease, and would therefore be almost tantamount to a sentence of death. I suggested tinct. cannabis gtt. xv., tinct. valerian. fœtid. ʒss, æther chloric xx. ɱ.

every third hour. Also beef-tea, chloroform, perfect quiet, and rest.

When we left him at twelve o'clock he was very tranquil, and free from spasm. He took fluids readily, and his pulse was beating steadily at about 80.

I saw him again on the following morning; he had continued very quiet yesterday after I left him, and had a good night—*i.e.*, he had slept at intervals, and had taken food and wine. Dr. Bird had discontinued the medicine, as towards evening it had appeared to excite him. He had spoken calmly at times, but he now had hallucinations. He thought he had been having electric shocks, and begged that the machine might be taken away. He wandered at times on other subjects. Pulse 70, and very irregular; skin moist; no fever; no dryness of fauces; no expectoration of viscid mucus. The breeze had no effect on him. He came out and sat in the verandah, and said he liked the breeze. I drank water before him, and spilt some of it on the ground before him, some on his foot. He took no notice of it. I said the water had a peculiar taste; he tasted it and said, as it was iced and as he did not like it so cold, he would take the ice out; he did this, and held it in his hand whilst he tasted the water, gasping slightly as he did so. Afterwards he came and sat in another verandah overlooking a tank; we talked about bathing, and he said he should like to bathe, but that he could not swim. As a test I had water poured into a tub in his bath-room; the sound of splashing water had no effect upon him; in fact there was no dread of fluid. The cold he disliked, but he would suck iced water through a tube, and he expressed himself pleased with ice on his forehead.

When drinking a little wine, he started off the couch where he was sitting by my side, and, gasping, grasped my arm with a wild excited look; but he was easily calmed and sat down again. His mind was evidently for ever dwelling on "the accident" as he called it, but he did not like to speak about it. When addressed on the subject, he said he had quite discarded the idea of any harm resulting from the bite, since we had told

him to do so. A short time afterwards, however, he was very earnest in his inquiries as to danger, and his friends say that the idea of impending death is always present. He has read his Bible frequently, and made many allusions to his desire to ask God for help.

His sister told us that just before he took the chloroform, he whispered in her ear, "Are they going to cut it out?" He said not a word to us on the subject. The impressions of the fatal effect of the bite seemed to have overwhelmed his mind. We left him at about 11.30 a.m., weak but better. He was sitting in the verandah; the hallucination was present that he was to have the galvanic battery applied. It turned out that he had a magnetico-electric box in his room, the sight of which had doubtless suggested the thought. He maintained that certain marks on the walls were wires, and that the air of his bedroom was full of electric vapour. We ordered beef-tea to be given frequently, and that he should be kept as quiet and tranquil as possible. Dr. Bird afterwards gave him a morphia injection.

I saw him again the following morning at 10.30 a.m. with Dr. Bird, and found him in a complete state of exhaustion, the pulse barely perceptible, and the eyes turned upwards; but he was still perfectly sensible. On my entering, he mentioned my name in an audible voice. His head was hot, but the body was bathed in perspiration, and cool. He appears to have been tolerably tranquil yesterday after I saw him; at times the spasms made their appearance, and the hallucinations as to electricity strongly occupied his mind. He slept during the night. This morning, an hour before we came, his relatives say he was talking very rationally and asking to see his friends. One of them said—"To hear him and not see him, you would have thought it was a minister praying." He had still occasional spasms in the chest, with sudden gasping; a mucous *râle* was commencing in the bronchial tubes, and there was a quantity of froth at the mouth—not viscid. I gave him brandy and a brandy enema. His sister was then allowed to come in

and see him; he recognised her, spoke to her by name, and asked her to kiss him; he was perfectly conscious. The depression had come on this morning. I left him still alive, but it did not seem possible that he could last much longer. He died soon after.

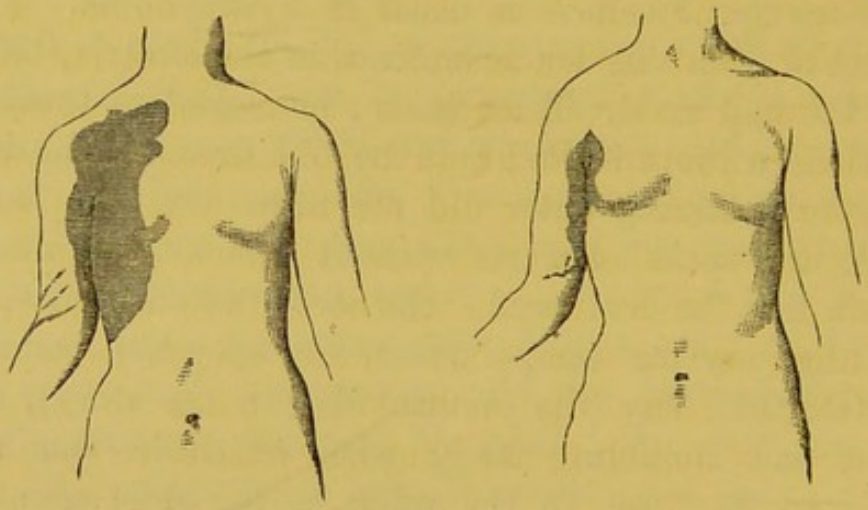
Remarks.—This is an extraordinary and interesting case. Was it real hydrophobia, or was it the effect of strong mental impression on an excitable person of a highly nervous and susceptible temperament? There is no evidence that the dog was mad; no one suspected it; nothing had led any one to suppose that it was so. It bit the patient as it were by accident, when he was playing with it. He unfortunately killed the dog directly afterwards.

There is no doubt that the spasm in drinking, although it occurred only at times and chiefly when Dr. Bird was there, is very suspicious; but he knew that to be a symptom of the disease. There was neither hawking nor spitting of tenacious mucus. There was not that morbid sensibility to external impressions that I believe is usual in hydrophobia. The first symptom of pain did not commence in the cicatrix, but in the neck. He had no dread of fluids; he looked at, touched, and drank them without terror; cold he did dread. The sound of pouring or splashing water did not affect him; he looked at, touched, and spoke of water without difficulty or uneasiness. The fact that he had read "the story about hydrophobia," his peculiar nervous temperament, the symptom commencing on the thirtieth day (the eventful day in the story), and the constant and trembling terror with which he was affected, seem to me to point to the mind as the chief agent in the mischief.

XI.—CICATRICES AFTER BURNS TREATED BY SURGICAL OPERATION.

Case 1.—*Removal of a Cicatrix connecting the Arm to the Thorax.*

K., a Hindoo girl, aged 5 years, was admitted November 26th, 1866, with an extensive cicatrix, the result of a burn two years before. The cicatrix is situated on the upper and anterior part of the right side of the thorax and on the right arm, which is drawn down and tied to the chest to within two inches of the elbow. The contraction is said to have taken place very gradually, and the arm is now all but useless. The forearm is also somewhat contracted on the arm by part of the same cicatrix, which occupies the aspect of flexion. The burn was caused by the child's clothes catching fire. She is in good health in all other respects.



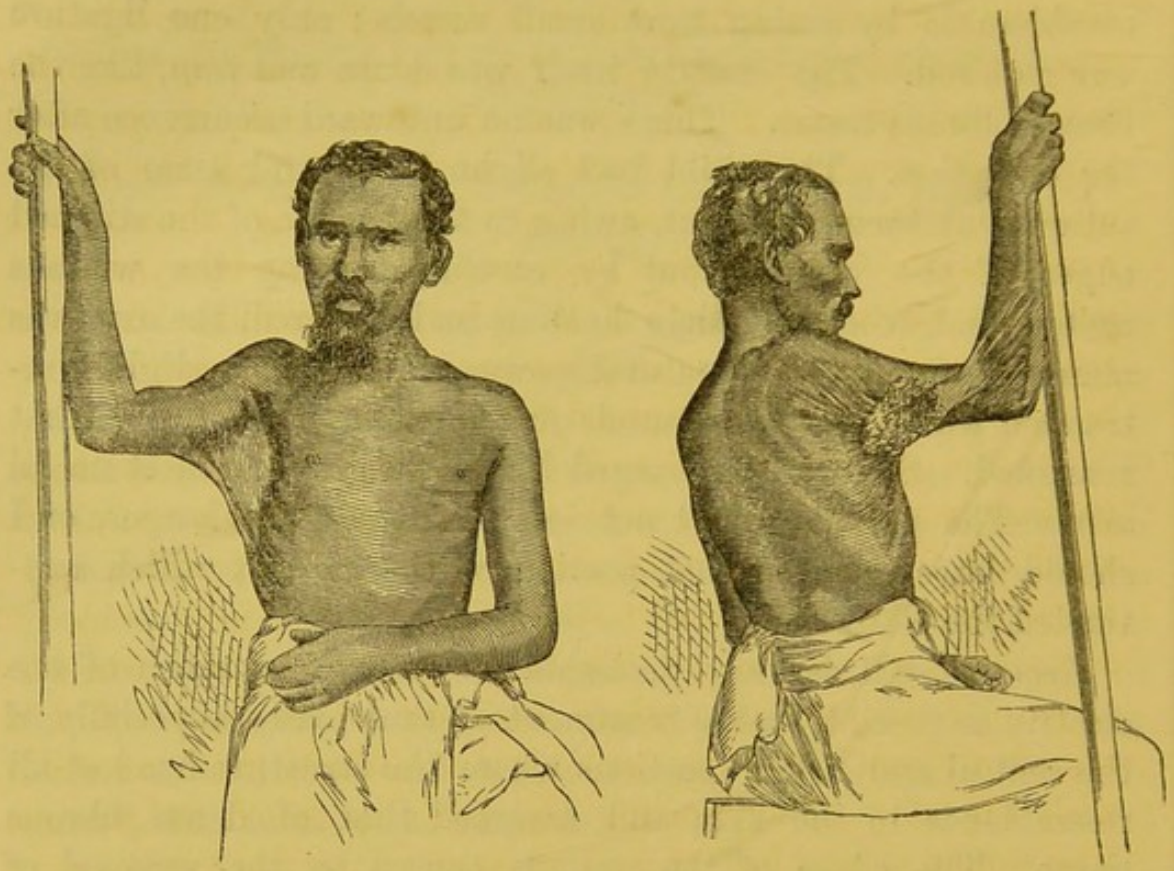
On December 12th I removed the cicatrix. It was divided up to the axilla, and the arm drawn away from the side. Great part of the cicatrix-tissue on the arm and thorax was dissected away, and the edges brought together on the inner side of the arm and on the thorax. Horsehair sutures were used for this purpose. The wound was very large, and the loss of blood

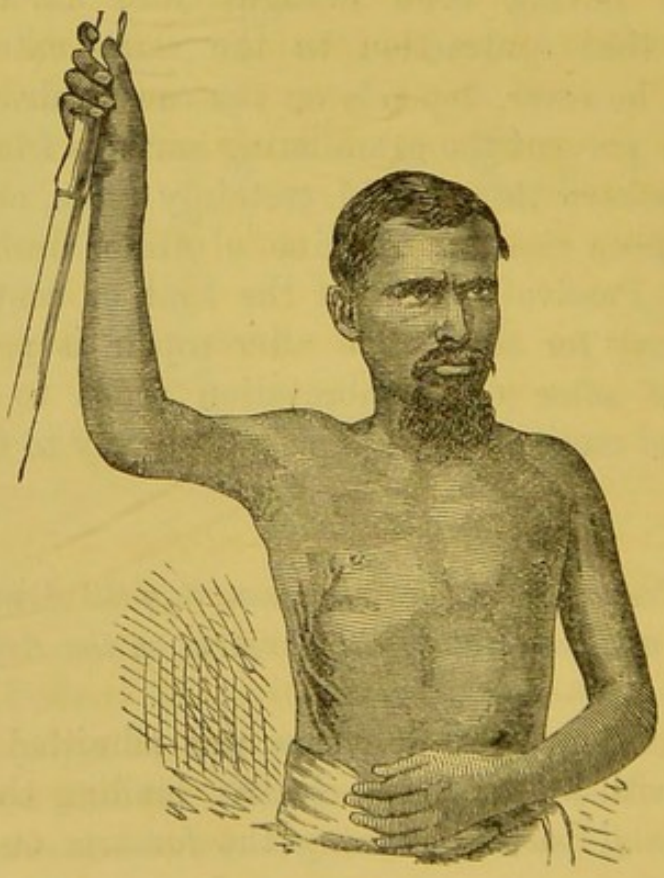
considerable by oozing from small vessels; only one ligature was required. The cicatrix itself was dense and firm, like the firmest fibrous tissue. There was no untoward occurrence after the operation. The child had slight fever, and some of the sutures cut themselves out, owing to the tension of the stitched edges of the wound; but by careful dressing the wounds united, and, when complete healing had occurred, the arm was almost restored to its natural power of motion, a slight contraction where the two wounds met in the axilla being all that remained. She was discharged March 20th with a most useful arm. The parents would not let her remain any longer, or I should have removed that portion of the cicatrix which contracted the elbow-joint.

Remarks.—It is very desirable to remove as much of the cicatrix as possible in the treatment of these cases, especially of the central and firmer portions where the structure has lost all resemblance to the skin and assumed that of dense fibrous tissue. The edges of the wounds caused by the removal of the cicatrix having been brought into union, it is very improbable that contraction to the same extent can recur. Everything, however, depends on the careful dressing after the operation to prevent the granulating surfaces from coming into apposition, where they would certainly unite, and to prevent contraction from altering the line of union during the process of healing. Passive motion of the limb or contracted joint is very necessary for some time after repair is perfect, and the inunction of some oily embrocation tends to expedite the restoration of motion to the joint and pliancy to the tissues.

CASE 2.—*Removal of a Cicatrix connecting the Arm to the Thorax and contracting the Forearm on the Arm.*

A Mahomedan, aged 36 years, was admitted on September 5th, 1867, with an extensive cicatrix binding the right arm to the thorax and partially flexing the forearm on the arm. It





was the result of a burn from the dress catching fire when he was an infant of a year old. The cicatrix was very rigid and tense, and prevented the use of the arm. On its posterior surface, it presented an ulcerated surface, with all the appearance of epithelioma, which was confirmed by microscopical examination. The ulceration commenced about two years ago, and has never healed, but is slowly spreading. In other respects the patient was in good health, and expressed anxiety to have an operation performed for his relief.

On September 16th, I dissected the cicatrix and the epitheliomatous growth entirely away—that is to say, I removed all the rigid and fibrous portions of the cicatrix. The operation was a formidable one, and about twenty-five ligatures were needed to control the hæmorrhage. The raw surface exposed was very large. I brought the edges together where they could be united without excessive tension, and dressed them carefully, with the view of supporting the parts as much as possible. The wound slowly healed, and as soon as passive motion could safely be resorted to, it was practised with the view of keeping the new cicatrix from contracting. He was discharged on January 15th, 1868, vastly improved and much pleased with the result of the operation. The motion of the limb was almost perfectly restored.

The sketches represent the state of the limb and the epithelioma before and after the operation. The new cicatrix is linear, and has not the slightest indication of any recurrence of the epithelial growth.

Case 3.—*Contraction of the Knee-joint caused by the Cicatrix of a Burn—Removal of the Cicatrix and Extension of the Limb.*

On April 17th, 1867, a Bengalee lad, about 18 years of age, was admitted with his right leg much contracted at the knee-joint, the result of cicatrization of a burn inflicted when he was a child. The limb was wasted, both leg and thigh being

smaller than the left leg and thigh. The femur, too, seemed smaller, and the knee was more pointed than the other. He walked with great difficulty, and was quite a cripple. From the middle of the posterior aspect of the thigh to the lower third of the leg there was a dense band of firm cicatrix-tissue, which was peculiarly hard and rigid; around it the cicatrix was soft, and more like true skin. The leg remained bent at right angles, beyond which it could not be extended. He was a melancholy, depressed-looking lad, and much out of health when admitted.

On May 6th, his health being much improved, I operated for the removal of the cicatrix. I made vertical incisions on either side of the cicatricial band, and dissected it entirely away, removing a considerable portion of the cicatrix-tissue on either side of it. I then raised the integument, and brought it together in the median line with sutures. He was under the influence o chloroform, and bore the operation well. The loss of blood was not very great, though the oozing was considerable. I found that I could extend the limb considerably after the operation, although not perfectly; but I kept it in a flexed position to allow the wound to heal more readily, and secured it in that position on an angular splint.

May 7th.—Has no fever; appears to be doing well. The wound gaping a little, I put in a few horsehair sutures between the wires.

10*th.*—The wound is healing. He has no fever, but he continues in a sullen and depressed condition.

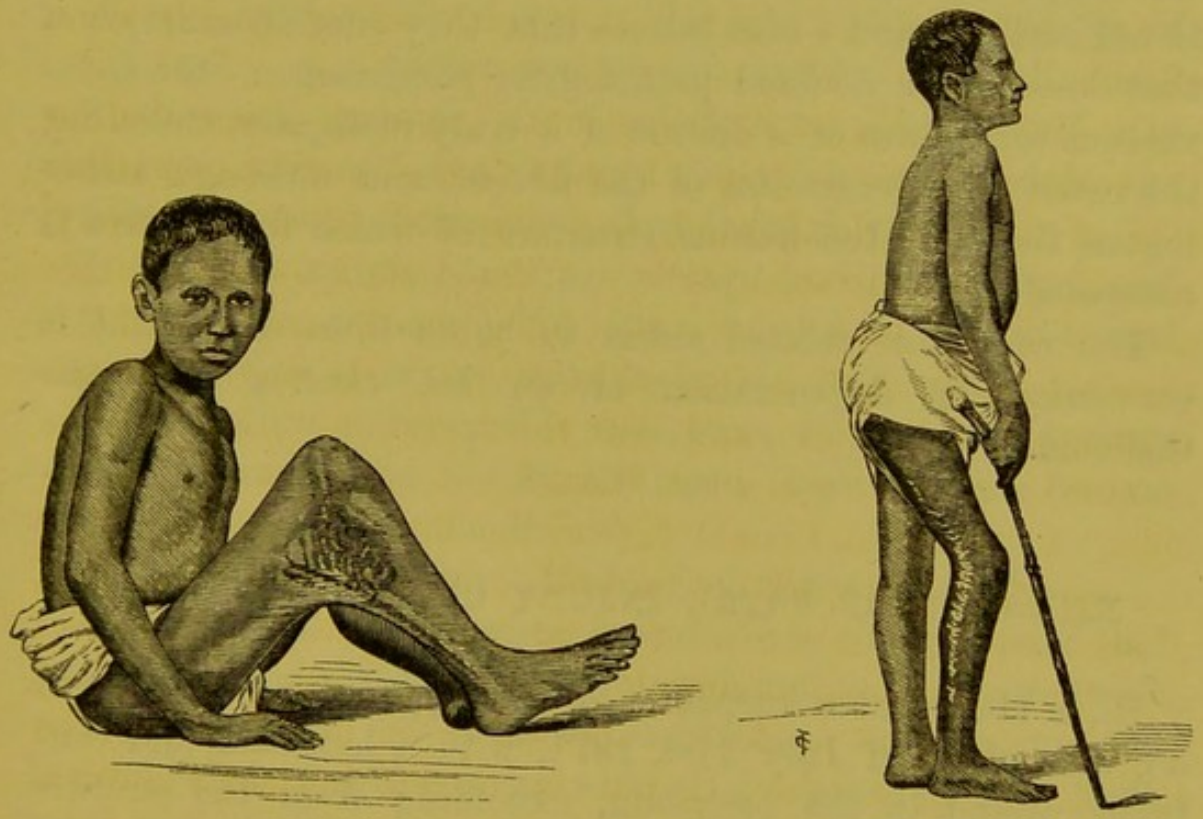
12*th.*—Doing well, in better spirits; wound healing to a great extent by first intention. In some places the sutures have cut themselves out, and the wound gapes, but is granulating healthily.

June 6th.—He is doing very well; wound nearly healed; he walks about; the leg much more extended. I have ordered daily extension on a M'Intyre's splint, and passive motion of the joint once in the day.

27*th.*—The wound has almost entirely healed, and his leg is

nearly straight. He is now in good health and spirits, walks with a stick, and is rapidly regaining the use of the limb. The atrophied muscles appear to be gradually regaining their vigour.

29*th*.—He was discharged at his own request, and the accompanying illustrations show the amount of benefit derived from the operation.



Remarks.—Deformities of this character, the result of burns from the clothes catching fire, are not at all unfrequent in this country, and often come under treatment in our hospitals. In cases like the present, where a limb is contracted and tied down by the cicatrix, it is satisfactory to know that a surgical operation may give great relief. It is necessary, I believe, to dissect away as much as possible of the most rigid part of the cicatricial band, and to bring together the edges of the wound. It is not to be expected that adhesion will result throughout the whole extent of the wound, but portions unite by granulation, and the remainder by adhesion. If the subsequent dressing be

carefully managed, the success is sometimes more than one could hope for, and if passive motion be carefully practised when the wound is healed, the movements of a limb, which has been contracted since infancy, may be in a great measure restored. I have in a subsequent case (p. 566) remarked on the tendency of these old cicatrices, when exposed to irritation, to degenerate into epitheliomata. I think there can be no doubt that they have this tendency at or after the middle period of life, if not earlier ; and I also believe that they offer an example of that doubtful or doubted pathological phenomenon—the spontaneous occurrence of a disease of a truly malignant character, the result of degeneration of the adventitious although homologous tissue of the fibrous structure of which the cicatrix is composed.

The case here related seems to be an illustration of this conversion or degeneration of an old cicatrix into epithelioma.

XII.—CASE OF FATAL INJURY OF THE PERINEUM.

R., a Mahomedan carpenter, a healthy, vigorous man, aged 35, was admitted July 21st, 1871, with a lacerated and contused wound in the perineum, extending from the scrotum backwards, and a little to the right of the raphe, to within half an inch of the anus.

The accident occurred at Ranaghat, about forty miles from Calcutta; he, with eleven other men, was raising a block of wood to be sawn, when it suddenly fell from off their shoulders, and crushed him violently against another log of wood, the sharp corner of which lacerated his perineum. The wound was externally about four inches long, and so deep as to expose the bulbous, membranous, and prostatic portions of the urethra, and the neck of the bladder, extending as far as—indeed, above—the symphysis pubis, through the pelvic cavity, without injuring either the urethra, the prostate, the bladder, the rectum, or

the peritoneum. The triangular ligament and levator ani were torn across, the anterior ligaments of the bladder ruptured, and the pelvic bones fractured. The symphysis pubis was separated, and its ligaments torn. The accident occurred at 7 a.m. He was brought down by rail, and admitted about eight hours afterwards. During the journey his companions say he lost much blood.

On admission he was much depressed, his pulse being quick and feeble. Blood was still oozing from the depths of the wound. A catheter was passed without difficulty, and some clear and normal urine withdrawn. The wound was filled with lint, and the catheter for a time retained in the bladder, the urine continuing to flow through it.

By the next morning the hæmorrhage had quite ceased, and he appeared to be much better, his condition having improved under the influence of rest, stimulants, and nutrients.

On July 23rd unfavourable symptoms set in. He became low; pulse rapid and feeble; the right thigh swelled, became cold, and rapidly gangrenous.

On the morning of July 24th he died rather suddenly.

On making a post-mortem examination, the posterior and inner aspects of the right thigh were found to be covered with bullæ; the limb was swollen, infiltrated, and gangrenous. The adductor muscles were extensively lacerated and infiltrated, and blood was effused into the limb as high as the thyroid foramen. The obturator muscles were also torn, as were the obturator artery, and the branches of the profunda. The abdomen having been opened, blood was found to be extravasated into the subperitoneal tissue all around as high as the level of the umbilicus, and the quantity in the pelvic cavity was so great as very much to encroach on its capacity. The viscera and peritoneum were uninjured. On the right side the ascending ramus of the ischium was fractured just above the tuber ischii, and the descending ramus of the pubes was fractured below the symphysis. On the left side the ramus of the ischium was also fractured, and the bodies of both pubic

bones were fractured just internal to the ileo-pectineal eminence. All five fractures entered the thyroid foramen, and the fractured bones could be moved with considerable freedom on one another. The line of fracture of the two ischial bones traversed the course of the internal pudic artery, which had been torn across. The viscera were all free from disease, except slight congestion of the lungs.

Remarks.—This is a case of much interest, showing, as it does, how very severe an injury may be inflicted on the pelvic cavity without serious injury to the bladder. The tissues were violently torn, the bones were fractured and the parts displaced, and yet the bladder and urethra, as well as the other pelvic contents, escaped injury. The entire course of the urethra, from the bulb to the neck of the bladder, was, as it were, dissected out by the injury. It appears that he had emptied his bladder about an hour before the accident occurred; had it been distended, it could hardly have escaped rupture. Death was caused by gangrene of the thigh, which resulted from the great violence done to that limb, the muscles being lacerated, and the arteries torn.

XIII.—DEATH FROM MALARIOUS POISONING—SUSPECTED STRANGULATED HERNIA.

On the morning of August 6th, 1871, I was requested by a native medical officer to see a case of supposed irreducible hernia, with symptoms of strangulation setting in. I found Mr. ——, aged 28 years, a healthy, muscular young Englishman, of light complexion, and said to be of most active and temperate habits, suffering from a swelling in the left groin, below Poupart's ligament, which was painful on pressure, and accompanied by general abdominal tenderness. I observed a similar, though smaller, swelling in the other groin, which was much less painful. He was feverish; pulse 104, and moderately firm. His face and neck were covered with a bright red

efflorescence; this, I afterwards learned, was usual whenever he was at all unwell. It appears that on the 5th he had been out the greater part of the day, and had fatigued himself much by attending an auction. He also said that in jumping out of his buggy, he had given himself a strain, to which he ascribed the pain in the groin. He came home at 4 p.m. The day was very damp and sultry—a genuine Calcutta August day. He told his wife that he had a gnawing pain in his stomach, and that he thought it was probably due to fatigue and hunger, and accordingly asked for food. He ate some, but felt no better. Soon after eating he had a sharp rigor, the introduction to the phenomenon of a severe ague fit. The bowels, meanwhile, had acted, and he voided some greenish matter. During the thirst, which became excessive, he drank iced water, which was immediately rejected each time; and this continued for some hours during the night. The groin about this time swelled, and became more painful, the pain extending over the abdomen. It did not appear to have been more severe about the umbilicus than elsewhere. He passed a restless and troubled night; the pain severe, the nausea and vomiting frequent. The fever, which was very severe, abated towards morning. The Babu, suspecting a femoral hernia, asked me to see him. At this time (10 a.m.) sickness had ceased for some hours. The bowels were said to have acted scantily during the night. I examined the swelling in the groin, and sent him off to the hospital, where he was to be carefully watched, and a report sent to me if any further indications of strangulation made their appearance. I doubted the existence of a hernia, but as the case was obscure, and I could not remain with him, I thought this the best course to adopt. He was depressed and anxious, and suffering great pain in the abdomen and groin.

It appeared that he was rather better and felt easier after reaching the hospital. Nothing further suggestive of strangulation occurred. At about 2 p.m. symptoms like those of the day before recurred, and about 4 p.m. his breathing, which had been hurried, became more so. Cold sweats covered his body,

the pulse was rapid and feeble, and all the indications of collapse rapidly set in. I was sent for, and found him evidently rapidly sinking. He was in intense distress from dyspnœa, and his breathing was painfully gasping and hurried. The face and the lips were dusky and livid; pulse not perceptible at the wrist. Sinapisms were applied, and stimulants and quinine were freely administered, both by the mouth and as enemata. He was perfectly conscious—painfully so, indeed. Slight chloroform inhalation seemed to soothe him; but within half an hour after I saw him he ceased to breathe.

Post-mortem Examination at 9 a.m. on August 7th.—The body was that of a muscular, well-formed man. The abdominal viscera were generally healthy. The spleen and kidneys were quite normal. On the surface of the liver were a few pale patches about the size of a sixpence, but they were quite superficial. There was neither suppuration nor congestion around them; the viscus presented no structural change, and was otherwise healthy. There was no hernia, the inguinal and femoral rings being perfectly normal. The swellings in the groins, which on investigation I found had been there for some months, probably years (though much smaller than at present), consisted of thickened areolar tissue around a cluster of indurated glands. The intestines were normal; no choleraic fluid was found within them. The lungs were intensely congested, especially at the back, and contained numerous patches of pulmonary apoplexy throughout their structure; they were œdematous, and the bronchial mucous membrane was deeply congested and covered with frothy mucus. The heart was normal, and firmly contracted; both sides contained small, firm, decolorized clots extending into the aorta and pulmonary artery. All else was normal.

Remarks.—This is a very interesting as well as a somewhat obscure case. It is an example of the rapidly fatal effect sometimes produced at this season of malarious poisoning—the weather at the time being hot, damp, and replete with malarious influences. The symptoms were such as not unnaturally,

considering the state of the groins, suggested strangulated femoral hernia; indeed, so much so, that I was tempted to cut down on the swelling to remove all doubt. But when I saw him after removal to the hospital, the collapse was so complete that I did not do so. Death was due to the pulmonary engorgement accelerated by the formation of fibrinous coagula in the right side of the heart. The overwhelming action of the malarious poison can only account for the rapidly fatal phenomenon. The patient was a healthy and temperate man, his organs were sound, and he had not been ill for months before the day on which this illness commenced. A certain amount of enlargement of the scrotum, combined with hydrocele, together with swelling in the groins, suggest the existence of an elephantoid taint; although in other respects he was free from disease.

XIV.—EPITHELIOMA OF THE ARM—AMPUTATION AT THE SHOULDER-JOINT—RECURRENCE AND FATAL TERMINATION OF THE DISEASE BY HÆMORRHAGE.

T. D., a Hindoo peasant, aged 30, was admitted June 18th, 1866, with an extensive epithelioma, occupying the greater part of the left arm and forearm on its outer aspect, and causing great suffering and constitutional disturbance, from the pain and discharge which were constantly present. When he was a child of two or three years of age he suffered from a severe burn of the left arm and shoulder, owing to his clothes having caught fire. This resulted in a dense cicatrix on the outer and anterior surface, which produced complete contraction of the forearm and general atrophy of the limb, which throughout his life appears to have been of very little service to him. On admission he was a delicate, cachectic, and anæmic person, worn and reduced by suffering and the constant offensive discharge, and probably also from imperfect food; but he did not seem the subject of any malarious visceral complication. The cicatrix had probably

ulcerated on former occasions, but appears to have united again until the last attack—the commencement of his present trouble—which occurred about six months before, the cicatrix giving way and ulcerating, and the ulcer spreading until it involved the whole of the cicatrix in the arm; that part of it which extended to the shoulder not being implicated, evidently showing that the original injury had not been so severe as that on the arm. The entire cicatrix on the arm was an open sore, of a red, papillary, granulating appearance, and discharging a fetid ichor. There was no tendency to heal, and the red granulating irregular surface was evidently an epithelial degeneration. The microscopical appearances strengthened this view; and after watching him some time in hospital, whilst by good food, tonics, and care, we tried to improve his general health, it became confirmed. Before the operation, he had several slight attacks of intermittent fever. He also had constant pain, sometimes of an excruciating character, in the arm. No very manifest improvement taking place in his general health, and the epithelial ulceration extending, with much suffering, it was decided that the limb should be removed at the shoulder-joint without further delay. Accordingly, on August 10th, I amputated at the shoulder-joint by antero-posterior flaps. He bore the operation well, under chloroform, and lost very little blood. By September 1st he was convalescent.

On September 26th I saw him, and noted that although "the stump has healed I fear the disease is returning, for in the anterior part of the axilla there is a hard tumour forming, and it is rapidly increasing in size." He was readmitted into the hospital October 2nd. It was noted that "The stump is swollen and painful; he is feverish; and there is a discharge from a sinus which has reopened."

He left the hospital, and I did not see him again until January 27th, 1867, when he was readmitted with a large abscess in the axilla. The stump was round and tense, apparently distended with the morbid deposit. I opened the abscess; there was a free discharge of pus, and he was relieved. The

opening remained patent, giving exit to a purulent discharge, the shoulder all the time increasing in size. His general health, however, was not bad; he had little pain, and no appearance of cachexia.

March 5th.—It was reported to me that he had died rapidly from an attack of hæmorrhage, which came on suddenly on the preceding evening. There appears to have been no blow or injury. The attack was spontaneous, and although the loss of blood was not more than a few ounces, he died from its effects.

The following abstract of the post-mortem examination of the stump was kindly furnished by Professor Colles:—

"The scapula, clavicle, and upper ribs, with the soft parts covering them.—There is a ragged opening, which was originally probably a little larger than a shilling, situated about an inch below the junction of the outer and middle thirds of the clavicle. Some firm, slightly defibrinated clots hang out of it. It leads into a large ragged cavity, bounded in front by a mass of morbid deposit infiltrated into the substance of the pectoral muscles, the muscular tissue of which could not be recognised; externally, by the remains of the deltoid infiltrated with similar deposit and having a layer of it between its outer surface and the skin; posteriorly, by the scapula (the glenoid cavity of which is roughened, but otherwise healthy); and in all other directions by soft parts infiltrated by deposit, and so broken down and softened as to be undistinguishable. The cavity reaches above almost to the clavicle; posteriorly, an offshoot from it, large enough to admit the forefinger, turns round the lower edge of the scapula, and runs for about an inch between its dorsum and the soft parts. Another very large offshoot of it leads down behind the large mass of morbid deposit first mentioned as forming the anterior wall of the cavity to the lower edge of the pectoralis major, where it is only covered by skin and fascia.

"Along the cicatrix of the amputation, below and to the outside of the ragged opening which leads into the cavity, is a

large ulcer, about one and a-half inch in diameter, and one or two smaller ones. None of these involve more than the skin and fascia, but the tissues forming their floors are infiltrated with the deposit.

"*Microscopic characters of a portion of the deposit in the Pectoral Muscle.*—There were some traces of a fibrous stroma and a great number of cells. Most of these were flattened, roughly polygonal or ovoid, and had granular contents, but were mostly without nuclei. There were also some much larger cells—oval, pyriform, or caudate—with large nuclei, containing one or more nucleoli, the nucleus being so large as to be like a small cell enclosed within the parent one. There were also some large cells filled either with large nuclei or small non-nucleated cells, and occasionally groups of the latter free from the parent cell, but still adhering to each other.

"The upper lobe of the right lung contained in its apex a small mass of morbid deposit. Under the microscope this showed a fine closely-woven stroma of pulmonary elastic tissue, containing in its meshes some granular matter and a few non-nucleated cells.

"One of the kidneys contained a large cyst in the cortical substance, but was otherwise healthy."

Remarks.—As an amputation at the shoulder-joint there is nothing new or remarkable in this case. The operation itself is frequently performed, and meets with a large proportion of success. But the pathological interest of this true epithelial growth, occurring on the scar of an old burn, is great, showing that local degenerations of tissue may have an influence in inducing or favouring the production of malignant disease. That this was true epithelioma there can be no doubt; the appearance of the sore and the microscopical structure were equally confirmative of its nature. It appears to me to be evidence of the fact that, without hereditary tendency or other special predisposing cause, a tissue, such as a cicatrix already degenerate, may so much further change its structure that it becomes, if not the originator, at least the ready recipient of

the cancerous growth; for although it is probably most true that such epithelial growths are the least active and formidable expressions of the so-called malignant type of organization, yet I believe, as Sir James Paget says, that "in a large survey of them none of the features of malignant disease will be found wanting." Among epitheliomata, no doubt, there are many degrees of malignancy—from the simple warty growths to the most rapidly spreading epithelial cancer of vascular tissues, which extends as rapidly, and kills as surely, as medullary carcinoma itself; and it is important to bear this in mind when the question of removal by a surgical operation is mooted. Though it may be impossible to draw any precise line of demarcation between one variety and the other, yet I think it is of the greatest importance that all the circumstances in their history, as well as their actual structure and appearance, should be considered; and I am inclined to believe that in cases like the one under consideration, where the morbid growth is primarily attributable to local degeneration in structure, and where no appearance of infiltration or glandular complication is manifested, that we have (notwithstanding the general appearance and microscopical structure, however indicative they may be of epithelioma) much to hope from early and perfect removal of the disease. In this case the suffering and debility caused by it, and by the constant discharge, were sufficient reason, had no other existed, for attempting relief by an operation. The microscopic structure corresponded with what are known mainly to characterize epithelial growths—large cells with nuclei, and laminated capsules. But with the recurrence of the disease after amputation new features of interest were developed. The epitheliomatous character of the cell—if there be such a distinction—was lost, and all the microscopic characteristics of medullary cancer appeared. The general indications of true cancer—rapid growth and infiltration of the surrounding tissue—presented themselves, and it appears more than probable that the infiltration was becoming general, for the deposit in the lung was probably of the same nature as that

in the stump. In this patient, therefore, at a certain period of life—not an advanced one, either—a cicatrix of some years' duration becomes the seat of degenerative changes which exactly resemble epithelial cancer, and the similarity is not confined to mere histological structure, for it spreads and infiltrates like that disease. This, after removal, is rapidly replaced by a new morbid growth with even greater resemblance to the so-called malignant diseases than the former one. This also grows rapidly, spreads, infiltrates not only the surrounding tissues but distant organs, and finally destroys life, by inducing hæmorrhage. Here we appear to have all the characters of carcinoma spontaneously developed, the starting-point being the local degeneration of a cicatrix. It is surely suggestive of the local origin of cancers generally, and points towards their probable initiation in degeneration of the natural structures. It also points to a community of nature in the malignant growths, and indicates the possibility of any one form of cancer being, after removal, replaced by another, if, indeed, it does not tend to prove that they are all convertible, and at the most but varieties of one species. Inquiry, it is to be noticed, failed to elicit any evidence of hereditary proclivity to carcinoma in this case.

XV.—HEPATIC ABSCESS.

An English officer, aged 29, of tall, slight figure, and apparently of delicate constitution, came under my care on the 4th September, 1869. He had just arrived from a station in Oude. He had been in India about three years, and had had good health previous to the present attack, which commenced in July last. The following are his own brief notes of his case before he reached Calcutta:—

"*July* 13*th*, 1869.—Severe headache in the morning and during the night, was exposed to the sun all the afternoon; stayed in the house next day and took aperient medicine. 15th

to 22nd.—At duty, but not feeling well. 21st.—Whilst riding home in the morning, got what appeared to be a stitch in the side. 22nd.—Under medical treatment; kept at home and took aperient medicine. 24th.—Pain much increased; eight leeches were applied to the side; took aperient medicine; during the evening had a shivering fit. 27th.—No better; twelve more leeches to the side. Between the 3rd and 15th August had three blisters over the liver; pain inside continued much the same. About the 18th the original pain gave place to a diffused pain throughout the right side; counter-irritants were applied. 25th.—Observed a slight swelling about four inches from the spine and just below the ribs. 28th.—It was pronounced to be an abscess, and I was sent to Calcutta to appear before the Medical Board. During this time the bowels never moved without medicine. 1st September.—Started for Calcutta, bore the journey very well."

He arrived in Calcutta on the 4th September, and I saw him that morning. He looked weak, anæmic, and emaciated, with a sallow tinge of the skin, and the general aspect of a man suffering from liver abscess. On examination I found that the liver was enlarged downwards, posteriorly, and that just below the last rib in the right lumbar region, about four inches from the spine, there was a prominent fluctuating swelling, which was evidently a liver abscess pointing posteriorly, and rather low down. He had no fever; pulse 100; skin cool and moist; no great pain; little sense of fulness and uneasiness in the right side; breathing slightly embarrassed. He was taking no medicine; bowels had been confined for two or three days, but felt no inconvenience from it, and his tongue was clean, moist, and the papillæ natural. His appetite was by no means bad. It was evident that he was not now suffering constitutionally from the presence of pus.

On the 5th, after rest and a good night, I opened the abscess at the most prominent point, having made an incision through the integument, and then inserted a large trocar and canula. I drew off about eighteen ounces of thick pus, which had the

peculiar appearance and odour of that of the abscess of liver. I immediately syringed out the cavity with a solution of carbolic acid ʒj. in a pint of water. Left the canula in, and plugged it with lint soaked in carbolic acid one part, glycerine four parts; a bandage and tapes secured the canula *in sitû*. I ordered him also a solution of quinine and sulphuric acid in calumba. Diet of soup, bread and milk, and a little wine; the latter he did not like at first.

In the evening I again emptied the cavity of about eight ounces of pus, and washed it out as in the morning. He had no fever during the day. His pulse has come down since yesterday, but is quicker than it was in the morning. He feels well; much relieved by the removal of the pus; an enema was given to-day, but it did not relieve him; ordered two aperient pills.

6*th*.—Drew off about eight ounces of pus this morning, and about four more in the evening; removed the canula, as it was irritating him; kept the wound distended with lint soaked in carbolic glycerine. The cavity is washed out on each occasion that the pus is removed with the carbolic acid lotion. Bowels have acted freely; the pills were aided in the morning by a sulphate of magnesia draught. He has taken his food fairly, and now takes beer instead of wine; sleeps well; looks and feels better; pulse 88 in the morning, has quickened a few beats in the evening, but there is no apparent increase in temperature.

8*th*.—He has been doing well; the quantity of pus diminishing daily—this morning about six ounces, in the evening not more than two. He takes food well; sleeps well, and is in good spirits.

9*th*.—He improves daily. This morning about two ounces of pus were removed, and this evening less than half an ounce. He takes his food and beer, and sleeps well; went out for a drive this evening. Is to take an aperient draught to-morrow morning, as the bowels are confined. Has had no fever; pulse, 78 to 84.

10*th*.—Barely half an ounce of pus this morning, and about a quarter of an ounce in the evening; the cavity of the abscess is contracting rapidly; pulse 74 this morning, up to 80 in the evening. He is looking much stronger.

11*th*.—He was slightly fatigued by the preparation for sailing to-morrow. About three-quarters of an ounce of pus, which was thinner this morning; pulse slightly quicker, but he feels and looks well. In the evening less than a dram of pus. He is well in all respects, and seems to be rapidly convalescing. He sails to-morrow morning for England.

A report from Galle stated that he was nearly well, and able to go on shore for exercise like the other passengers.

Remarks.—This is a good example of simple abscess of the liver resulting from the effects of a hot climate. There is no history of previous diarrhœa or dysentery, and it apparently commenced by congestion terminating rather insidiously, as so frequently happens here, in inflammation and suppuration; the pus probably having commenced to form when the rigor occurred on the 24th, about twelve days after the first symptoms of congestion had made their appearance. About this period, as inflammation involved the surface, the pain increased and continued, the peri-hepatitis, of which it was an evidence, proving so far salutary in causing adhesion of the lower portion of the right lobe to the parietes, and thus preventing extravasation into the peritoneal cavity.

There was every reason to hope that the abscess was a single one; the history of the case renders it probable, as there is no reason to believe that it was due to septic absorption from previous dysentery or ulceration of the intestines. The prognosis was also hopeful, as latterly he had been free from any constitutional fever such as would be caused by extension of the suppuration; and the rapid contraction of the cavity, after evacuation of the pus, evinced the tendency to repair by cicatrization. The injection of the cavity with carbolic acid solution was attended with the best results, as I think

that the antiseptic was beneficial in aiding the rapid contraction of the cavity.

XVI.—CASES OF INJURY OF THE ABDOMEN.

Case 1.—*Fatal Penetrating Wounds of the Abdomen and Thorax inflicted by an Assassin.*

At about 11.15 a.m. on September 20, 1871, I was suddenly summoned to see the Hon. J. P. N., Officiating Chief Justice, who had been stabbed, on entering the High Court, by an assassin, who rushed on him, and wounded him with a knife in the back and abdomen. He had been taken to a neighbouring house, and Dr. W. Palmer, of the General Hospital, who happened to be passing, had seen him. I found the patient lying on a couch in a lower room; he was pale, agitated, and exhausted; his respiration was hurried, and his pulse was quick and feeble; his hands were cold and bedewed with moisture. His clothes had been partially removed; those that remained were stained with blood, and other blood-stained clothes were about him. There had been, it was said, considerable loss of blood; his appearance confirmed that statement, and it also evinced the shock of a severe injury.

On examining the wounds, I found one directly through the umbilicus, passing into the abdominal cavity; but there was not, nor had there been any protrusion of the contents of the abdomen. Blood was trickling freely from the wound, but there was no appearance of any alvine fluid with it. The wound was three-limbed (Y), evidently having been caused by first stabbing and then withdrawing the weapon with a wrench of the wrist. It was a little more than an inch in length. A compress and bandage had been applied. I introduced a silver wire suture to prevent gaping and protrusion, and over it a fold of lint and a bandage soaked in carbolic acid lotion.

There was a slight abrasion on the inner and palmar aspect of two fingers of one hand, as though, in attempting to seize the knife, they had been grazed. There was also a wound entering the posterior border of the left axilla, a little more than an inch from its margin, and penetrating deeply downwards, inwards, and forwards, through the muscles and between the ribs, one of which could be felt to descend into the thorax. It did not appear to me that the lung had been wounded, though the pleural cavity was certainly opened. The depth of penetration beyond this could not, of course, be then ascertained. The bleeding from this wound was trifling, and easily arrested by slight pressure. The wound was of the same shape as that in the abdomen; a suture was similarly applied, with dressing and a bandage.

Respiratory sounds were audible all over the left side of the thorax. No air came from the wound. There was no hæmoptysis. At one time I imagined I heard a somewhat cavernous sound, which may have been due to the hernia of the stomach through the diaphragm, discovered after death. The result proved that pneumothorax had not occurred. He was very restless, tossing about, complaining much of cold, notwithstanding the heat of the weather. His face was pinched and anxious, and the lips pallid. There was constant thirst; nausea and retching soon supervened, and continued more or less until the end. Shortly he began to complain of a sense of distension of the bladder, and an intense desire to empty it; he was unable to do so voluntarily. A catheter was passed, and only a few ounces of clear urine withdrawn. He was very much depressed, but stimulants were very sparingly administered, with the view of not interfering with the formation of clots; iced water and gallic acid were administered. Towards 1 p.m., when restlessness, pain, and distressing irritability of the stomach increased, opium was given, and repeated at intervals of two or three hours with the greatest relief to his suffering. He retained consciousness until about midnight, and ceased to breathe at 1.20 a.m. of September 21st, or about fourteen hours

and a-half from the time when the wound was inflicted. He sank from exhaustion and shock. The retching, vomiting, and desire to void urine continued throughout, but they were much allayed, as was the distressing restlessness, by the opiates.*

The post-mortem examination was performed a few hours after death, and I am indebted to Dr. Ewart for the following account:—"The body was found to be well nourished, the general appearance being that of a powerfully built and well-made man of average height. Exactly at the umbilicus there was a wound, of a somewhat triangular shape, and about an inch in its longest diameter. Its direction, for about a couple of inches through the abdominal wall, was obliquely downwards and backwards, and then almost straight backwards towards the spinal column. The external opening of this wound was partially filled by coagulum, and the dressings covering the same were soaked in semi-fluid, dark-coloured blood. On following this wound inwards, it was found to pass through a fold of the small intestine, severing fully three-fourths of its calibre. The contents of the bowel had escaped in quantity through this opening into the cavity of the peritoneum. The wound then passed through several folds of the mesentery, thus wounding several mesenteric vessels, but without injuring the corresponding divisions of the intestines. Considerable bleeding had taken place from these wounded vessels, and upwards of a pound of fluid and coagulated blood was found extravasated, and gravitating towards and pressing upon the bladder. The peritoneum covering the intestines, omentum, and mesentery was of a vividly pink hue, and in the first stage of acute inflammation. No lymph had been exuded, sufficient time not having elapsed between the occurrence of the injuries aforesaid and death. About an inch and a-half from the posterior fold of the left

* The vomiting and peculiarly pinched expression of the face were no doubt due to the diaphragmatic wound and hernia of the stomach. The urgent desire to micturate is accounted for by the pressure of the blood-clot on the bladder.

armpit, and on a level with the same, posteriorly, another wound was observed a couple of inches long, also of a triangular form, with one of its angles extended, apparently from the withdrawal of the weapon employed by the assassin. This wound passed downwards, forwards and inwards, eventually penetrating the walls of the chest, and entering the pleural cavity between the seventh and eighth ribs, about four inches anterior to their attachment to the vertebræ. On opening the chest, it was found that the weapon had grazed and indented the inferior margin of the seventh rib, dividing the intercostal artery, and had actually incised cleanly the upper part of the eighth rib to the extent of fully three-fourths of its substance, the remainder having been fractured transversely. The broken end of the rib next the spine was split longitudinally. On further prosecuting a search for the course of this wound, it was discovered that it passed through the diaphragm, without, however, injuring the pulmonary pleura or lung, and without damaging any of the abdominal organs. The opening in the diaphragm was tightly plugged by a portion of omentum with a knuckle of the left division of the stomach, which were lying in the pleural cavity. Both these protusions were intensely congested, the peritoneum covering them being in the primary stage of inflammation. There was a very small quantity of bloody serum in the cavity of the pleura. The stomach, kidneys, liver, spleen, pancreas, heart, lungs, and the muscular and nervous systems were perfectly healthy. Death was caused by a combination of mortal injuries—(1) A large wound of the intestine, with escape of its contents into the cavity of the peritoneum, and consequent peritonitis (first stage); (2) hæmorrhage from several wounded mesenteric vessels; (3) traumatic hernia of the omentum and stomach through a wounded diaphragm; (4) the severe shock of the general nervous system caused by these injuries to vitally important parts."

CASE 2.—*Penetrating Wound of the Abdominal Cavity with Protrusion—Recovery.*

K., a Bengalee boy, aged 5 years, was admitted 25th August, 1871, with four transverse parallel wounds, from half to three-quarters of an inch apart, and of from an inch to an inch and a-half in length each, in the left ilio-lumbar region, caused by falling on a glass shade, which broke under him.

On admission, shortly after the accident, a portion of large intestine, about the size of an egg, with some omentum, were found protruding through the uppermost wound. A few small pieces of glass were found in the wound, but they had not injured the protruding bowel. The three latter wounds were comparatively superficial.

The boy was placed under chloroform, and the protruded bowel cautiously reduced. The wounds were closed with wire sutures, and dressed with carbolic acid. In anticipation of peritonitis, and to keep the bowels in a state of perfect rest, three minims of tincture of opium were administered every three hours for several days, and gradually diminished as he recovered. A very limited supply of food was allowed for the first three or four days. Under this treatment the boy did remarkably well. He remained for several days perfectly quiet, in a semi-narcotized condition, without pain or febrile excitement, during which time the wounds healed without suppuration. By the 20th September he was perfectly well in general health, and the wounds had nearly cicatrized.

He was discharged cured on the 29th September.

CASE 3.—*Local Peritonitis and Death resulting from a Kick in the Epigastrium.*

E. W., aged 21, a slight, delicate-looking East Indian sailor, was admitted April 12th, 1869, suffering from the effects

of a severe kick in the epigastric region, inflicted by a comrade in a drunken quarrel twelve days before admission. The pain and exhaustion had at length made him seek relief in the hospital.

On admission there was a marked fulness occupying the left hypochondriac and epigastric regions, which was painful on pressure and dull on percussion. He looked low and depressed, with an anxious countenance and a quick and feeble pulse. His stomach was irritable, rejecting quantities of bilious frothy fluid; the thirst was great, and he drank quantities of iced water, for which he had an incessant craving. There was no blood in the vomited matters. He never made any material improvement.

The vomiting and pain continued unabated throughout, but it was not until the 19th that a marked change in the temperature and pulse took place. The pain at this time began to decrease. The thermometer rose from 94° to 102° in the axilla, though the body and extremities felt cold and clammy to the touch. The pulse rose from 108 to 130, and in this state he remained, excessively restless, until the 22nd, when he died with hurried gasping breathing, in a state of complete exhaustion.

The treatment consisted of opiate enemata and local warm applications. Very small quantities of fluid food were given; nourishment was attempted by the exhibition of beef-tea enemata. The opium was also, on account of the irritability of the stomach, given by enema. Ice and milk were frequently given. Soda-water was very grateful, but everything was rejected, and each act of vomiting ejected with the fluid a quantity of dark-green bile.

Autopsy.—On laying open the abdomen, it was found that there was much congestion and some thickening of the great omentum, with loose recent adhesions involving all the left half of the greater peritoneal sac. The adhesions were firmest posteriorly, where there were dense, firm, fibrinous bands matting the gastric, hepatic, and pancreatic peritoneal coverings together; and a large and thick-walled cyst was formed by

adhesions between the transverse mesocolon and the stomach, to which it was so closely adherent that at first it looked like an abnormal dilatation of the stomach itself. This had been the focus of the inflammatory action, and the sac contained a quantity of serous fluid with granular matter and inflammatory lymph. The cyst itself was dense and lined throughout with thick layers of fibrine. The quantity of fluid it contained could not have been less than two quarts. It lay immediately below the stomach, and partly behind it; hence the pressure which caused the incessant vomiting. There was no rupture of any abdominal organ, but in the right lower and anterior aspect of the pericardium there was a well-defined patch of ecchymosis about an inch and a-half square. On opening the heart the immediate cause of death was seen in a firm white ante-mortem clot in the right ventricle, which not only obstructed the tricuspids, but extended far into the branches of the pulmonary artery. The remaining thoracic and abdominal viscera were quite healthy.

Remarks.—The chief point of interest in this case is the occurrence of deep-seated but localized peritonitis, after an injury inflicted on the surface. The symptoms are explained by the pathological conditions. The constant pressure of the rapidly increasing peritoneal cyst accounts for the vomiting, and that for the incessant regurgitation of bile into the stomach. The septicæmia resulting from or accompanying the peritonitis explains the depressed state of the pulse and nervous system, and accounts for the condition of the blood, which rendered it liable to form the fibrinous coagula in the right side of the heart, which caused death.

XVII.—CASE OF TUMOUR OF THE SCALP IN AN INFANT.

A Hindoo boy, aged two months, was admitted 13th October, 1871, with a large tumour projecting from the occipital region. The tumour was covered with integument

like the scalp, part being covered with hair and the rest naked, and distended by the fluid contents. It was elastic and fluctuating, evidently being cystic, and was attached by a firm peduncle to the occiput. The tumour was about half the size of the infant's head. The mother, who accompanied the child and nursed it, said that there was a small swelling there at birth, and that it had gradually increased. The infant was healthy and well developed in every other way. The mother was a healthy young woman who had had other children.

No communication with the cavity of the cranium or of the spinal canal could be made out; the tension of the fluid contents of the tumour remained the same, and was unaffected by pressure. The pedicle felt firm and fibrous, and was about the thickness of a man's thumb.

Shortly after admission the tumour was tapped with a small trocar and canula, and eight ounces of clear serous fluid were drawn off. The tumour after the withdrawal of the fluid became flaccid, and felt of the consistence of somewhat thickened integument. The fluid was very albuminous; its specific gravity 1·010; it contained no phosphates, and was alkaline in reaction. The child seemed quite unaffected by the tapping, and remained in excellent health. The tumour rapidly refilled and continued to increase in size.

The child was kept under observation for a month, when being much grown and in good health, the tumour was removed in the following manner:—An incision was made through the integument of the neck of the tumour. A curved needle armed with a strong double silk ligature was then made to transfix the pedicle, and the ligatures enclosing the pedicle were knotted firmly on either side, in the cut in the skin, so as to completely constrict the pedicle. Another ligature was then firmly tied on the distal side, and the pedicle divided between them. The child was under the influence of chloroform; only a few drops of blood were lost, and it bore the operation well.

It continued to thrive, taking the breast freely and sleeping well, complaining only when the wound was dressed, until the

eighth day, when it was seized with symptoms of general tetanus. The ligature was removed on the first indications of this making its appearance. Small doses of hemp were given by enema, as the child could not swallow; chloroform inhalations; and opiate lotion to the wound, which was looking very healthy. The disease increased rapidly, and proved fatal in less than twelve hours. No post-mortem was allowed.

I am indebted to Dr. McConnell, Professor of Pathology, for the following report concerning the tumour:—

"Tumour and contents weighed 1 lb. 9 oz., and contained twelve ounces of fluid.

"*Tumour.*—A large cyst with very much thickened walls, pedunculated at one end: walls of cyst consist from without inwards of the following tissues:—(1) Integument extremely hypertrophied; (2) a dense fibroid membrane, white, shining, and glistening in appearance, and composed almost entirely of white fibrous tissue; (3) loose cellular tissue; and (4) the true cyst-wall or capsule a thickish semi-opaque membrane, composed of white and yellow fibrous tissue, containing a large number of nuclei and a very considerable amount of fat. The inner surface of this structure is smooth and glistening, like the interior of the pericardium, and scattered over the surface are patches of lymph which look recent, breaking down readily, and also opaque dead-white deposits of fat. Opposite the peduncle is a very firm white cicatrix, with radiating fibres from its substance, passing outwards in all directions for about two inches. The substance of the peduncle itself is firm, and composed chiefly of fibro-cellular tissue with nuclei, traces of blood vessels, fat, corpuscles in considerable amount, and granular *débris*. In no portion of the cyst walls can anything like 'nervous structure' be detected.

"*Fluid.*—Amber-coloured; has a faint, sickly, or mawkish odour; contains a large quantity of flocculent, shreddy matter; specific gravity, 1·005; reaction, alkaline; albumen, two-thirds. Contains also some blood (altered) and fat in considerable amount.

"A little of this flocculent material placed under the microscope shows a very delicate reticulated structure, containing in its meshes altered blood-corpuscles and a considerable amount of fat."

The accompanying sketch was taken three weeks before the operation.

XVIII.—CASE OF PYOCYANINE.

It has occasionally been noticed that pus formed on granulating surfaces has a bluish or greenish-blue tinge, and the coloration has generally been attributed to the presence of a modification of the green colouring matter of the bile, or of the bluish ingredients sometimes found in the urine.

Dr. Gibb, in the "British American Journal of Science" (new series, vol. vi. p. 201), relates a case in which a purulent discharge of this colour was observed in a diseased female breast. The colouring matter is said to have been due to

cyanide of iron.* M. Fordos† says that it has no connection either with the bile or urine. By a chemical process, which consists in soaking the linen stained with the pus in water containing a small quantity of solution of ammonia, a bluish-tinted or green-tinted liquid is obtained. Chloroform is added to this, and the blue principle, with a yellowish foreign matter producing the green tint, is extracted from the water. By a further process the blue principle is obtained in prismatic crystals of a beautiful blue colour. This principle M. Fordos calls pyocyanine.

It has generally, I believe, been observed in cachectic individuals, and examples have occasionally come under my observation in this hospital.

The following case being a marked one, occurring in an European female in moderately good health, though somewhat anæmic from malarious influences, is worthy of record :—Mrs. W., English, aged 35, stout, of light complexion, and rather anæmic, was admitted February 6th, 1871, suffering from two indolent ulcers on the right leg, just above the ankle. The ulcers were of several months' duration, and were ascribed to abrasions. Want of proper care on her part appears to have caused them to assume the indolent condition in which they were found. The surrounding parts were indurated from inflammatory products and textural irritation. Tinct. ferri sesquichlorid. was prescribed, with good diet and wine ; water dressing was applied, and the limb was placed at rest on a side-splint. After some days the liquor lyttæ was applied, with the view of removing the thickening of the tissues surrounding the ulcers, and of expediting absorption. The water dressing was also continued. Considerable improvement was effected; but the ulcers again assuming the indolent condition, ol. terebinth. ℥xx. was given thrice daily. The result was increased action, and it was observed that the pus which now covered the surface of the ulcers stained the dressings of a bluish-green

* Holmes' System of Surgery, 2nd ed., vol. i. p. 119.

† Year Book of New Sydenham Society, 1861, p. 112.

colour. This continued in a most marked manner for several days. The turpentine was discontinued, as her stomach became irritable, and sulphate of zinc lotion was applied like water dressing. Granulation was now proceeding, and the surface contracting, but the progress was slow, and by the middle of March the ulcers were still uncicatrized. About this time a cold abscess formed on the outer aspect of the right knee, which resulted in a sore very like those on the leg.

During April her general health was very much deranged, and, as suspicions of a constitutional taint were entertained, the iodide of potassium was administered. Her general health improved again; but the sores having relapsed into the indolent state, the liquor lyttæ was again applied with water dressing after it had taken effect. On May 16th, the discharge, which had for some time been quite natural, again assumed the bluish-green tinge, and it continued so for a week, when it disappeared, and the natural appearance of laudable pus was reproduced. Cicatrization was soon after this completed, and she was discharged in very fair health.

There was no reason to believe that the coloration was caused by any external application, for the greatest care was taken to prevent any deception.

Remarks.—I would incidentally allude to the benefit that may be derived from the internal administration of small doses —twenty to thirty drops—of ol. terebinth., given at intervals of four or six hours for some days, in the treatment of chronic ulcerations of an indolent character. I have for many years been in the habit of prescribing it in such cases, having first seen it used by the late Dr. Gilbert King, Inspector-General of Hospitals R.N., in the Royal Naval Hospital at Bermuda, so long ago as 1844. The effect on the capillary circulation is most marked, and I have frequently seen it succeed in promoting healthy granulation in most obstinate cases of chronic ulceration. To prevent strangury, it may be advantageously combined with nitric ether, and occasionally with tinct. opii. In this case the colouring appeared for the first time just after

the turpentine was administered, but after a long interval of absence it returned, when that remedy had been discontinued. I do not attribute the coloration to the turpentine, for I have no recollection of ever observing it on any former occasion to have followed the use of that drug.

XIX.—FATAL CASE OF UTERINE HÆMORRHAGE.

On Sunday morning, 23rd May, 1869, I was sent for to see Mrs. ——, whose expected labour (*primipara*) had commenced. I found that she had been suffering more or less since the previous evening; the pains were irritating and fatiguing, and had disturbed her rest throughout the night. I made an examination during one of the pains, and found the os uteri high up and pointing towards the sacrum; it was not dilated sufficiently to admit the point of the finger. The bowels were confined, so I ordered a dose of castor oil, and an enema if necessary. I saw her again later and made another examination; the pains were continuing as before, there was no change. The oil had caused sickness; the enema had proved effective; the bladder had also been emptied. Her pulse was natural, her skin cool and moist. The tongue was moist but slightly coated in the centre. Little or no progress had been made, by evening, in the dilatation of the os, which was rigid, with its margin thin and tense. There was no change in the position of the head which presented, and this was as high as ever. She complained much of the fatigue and worry of the incessantly recurring pains, but constitutionally she was unaffected. Her pulse, tongue, and skin were all as they were in the morning. The passages were moist and cool. The fœtal heart was distinctly audible, and there was no indication of constitutional disturbance of any kind. During the day she had been sick after the oil, and had vomited some bilious matter. She had taken a sufficient supply of fluid nourishment, and a little wine and water occasionally. To give rest,

I ordered, after the bowels had acted, liq. opii, ♏ xxv. It was repeated at bed-time, but she had, on the whole, a restless and disturbed night.

I found her on the morning of the 24th looking tired and anxious, but all her symptoms were favourable, pulse about 86; tongue moist and clean; skin cool and moist. The os uteri was now found to have dilated to about the size of a shilling, and was rigid. I prescribed small doses of antimony, ¼-grain to be given every hour, with the view of causing relaxation. After taking three or four doses, she was sick, and it was discontinued; I also put her under the influence of chloroform for a few minutes, on two or three occasions. During the day she took an ample quantity of nourishment; the bowels were relieved, and constitutionally she was as well as ever. Towards evening I became rather uneasy about the non-dilatation of the os uteri, and I expressed to her husband my desire if, by 9 p.m. more satisfactory progress were not made, to have a consultation. At 9.30 I made another examination, and ascertained that some progress had been made. The os was now about the size of a florin. She had slept at intervals, and her pulse kept steady; the tongue clean, and the skin was cool and moist. I saw her frequently during the night, as I remained in the house, and was satisfied that progress, though slow, was being made. At 10 a.m. of the 25th, the os had dilated to the size of the rim of a wine glass. As all her symptoms, beyond the delay, were favourable—pulse under 100, tongue clean and moist, skin and passages moist and cool, fœtal heart vigorous—interference was uncalled for. The pains continued, but perhaps with more rapid succession, and by 12.30 the second stage of labour had commenced. The head was now well down, and the character of the pains changed. The expulsive efforts continued at regular intervals, and at 5.40 p.m., when partially under the influence of chloroform, she gave birth, with little difficulty, and without the least laceration of the perineum, to a large male child.

The infant was partially asphyxiated, having the cord twice

round its neck; but on releasing this, using artificial respiration, and dashing cold water on the face and chest, it soon breathed and cried vigorously. The cord was then tied and divided. The uterus meanwhile had contracted firmly, and in from fifteen to twenty minutes the placenta was spontaneously expelled. Up to this time she had not lost an ounce of blood. I should have noted, that the membranes ruptured at about 10 a.m., and that the liquor amnii trickled away with each pain, but there never was any protrusion of a bag of membranes to aid in dilatation. Soon after the placenta had come away, the uterus being firmly contracted, the pad and binder were applied. She was feeling and looking well, and was much delighted at the birth of her child. Her pulse was peculiarly good, under 90, and firm. Indeed, it was remarkable how well she bore the second stage of labour; her strength which had failed slightly towards the close of the first stage had returned; the restlessness passed away, and her pulse which had quickened, though never over 112, sank to almost the normal standard. I then left the room at about 6 p.m., whilst the nurse arranged her bed and dress. In a few minutes I went into the room again to see that all was right before leaving. Whilst I was speaking to her she said she felt uneasy, and had a violent pain in her back. This was about thirty-five to forty minutes after the birth of the child. I put my finger on her radial artery, and found the pulse had suddenly quickened. I immediately had the binder removed, and found that hæmorrhage had begun. The uterus had relaxed, and was distended with blood. I instantly removed the clots with the right hand, grasping the womb with the left, applied ice, and douches of iced water externally, and injected iced water into the uterus. I gave liquor ergot, ʒss., and powdered ergot shortly after, and applied the magneto-electric current. The child was also put to the breast.

With these measures the uterus contracted firmly, and remained so to the last. The quantity of blood lost could not have exceeded two pounds. She was considerably depressed,

but did not at this time lose the red colour of the lips and eyelids; the pulse was rapid and irregular, but her voice was good, and she seemed free from alarm, when in reply to her query she was told that the bleeding had been controlled. She did not faint, neither did she manifest, at this time, the usual symptoms of dangerous hæmorrhage. She was quiet, and spoke calmly and cheerfully about herself. I gave her brandy-and-water freely, beef-tea, and brandy; and mustard poultices were applied over the heart and solar plexus, and to the back. Brandy was also given in the form of enema, and hot bottles were applied to the extremities; but her condition did not improve. The pulse became weaker, and more rapid and irregular; she was restless, and the surface of the body bedewed with a cold sweat. The countenance began to change, and signs of collapse rapidly set in. These symptoms did not make their appearance for fully half an hour after the hæmorrhage had ceased. I had, meanwhile, sent my carriage for assistance, and Dr. Chevers came at once. There was no return of hæmorrhage, the womb remaining firmly contracted, and not parting with the smallest quantity of blood. During the application of the magnetic battery, and whilst other measures were being taken to maintain uterine contraction, she was in good spirits, held the wire with her own hand, and laughed at the nurse, who held the other wire. Reaction never properly set in, she seemed to have no power of rallying, and notwithstanding every effort, she gradually sank. The pulse occasionally rose slightly, giving a delusive hope of reaction, and for a few moments she slept; but at last the breathing became hurried, as though pulmonary obstruction was taking place from coagula forming in the right side of the heart. She had become intensely restless; talked for a short time incoherently; and then sank and died, quietly, at about 9.30 p.m., three hours and fifty minutes after the birth of the child, and about three hours and a quarter after the occurrence of the hæmorrhage.

Remarks.—There are some points of interest to be considered

in a review of this sad and interesting case. The patient was a young English lady, aged 23, who had been married about ten months, and had resided in India four months. She was of a tall and sufficiently vigorous, though rather slight frame; her general health was good, nor was there anything in her appearance suggestive of deficiency in vital force. She was said to have suffered severely from measles shortly before her marriage, and was considered to have been somewhat constitutionally weakened thereby. She had passed through the period of her pregnancy without much inconvenience, and had completed the full time when labour commenced.

The progress of the first stage of labour was unusually slow, for commencing on Saturday evening, it was not until Tuesday at noon, that the fœtal head passed through the cervix, and entered on the second stage of labour. But as her constitutional powers were not depressed, no interference, beyond small doses of antimony to facilitate dilatation, opiates to give rest, and chloroform occasionally, was considered necessary; and the result proved that this view was correct, for the second stage of labour was completed within six hours, and she gave birth to a vigorous and healthy child without much difficulty, and with little suffering, as she took chloroform. After the expulsion of the placenta, the womb contracted firmly, and up to this period there had been no loss of blood. The relaxation of the womb that caused the loss of blood was sudden, but it was rapidly arrested; and though, in the first gush of hæmorrhage a considerable amount, about 2 lbs., of blood was lost, there was no repetition of it; the uterus, after being relieved of the clots, contracted firmly.

The amount of blood lost was not so great as to give rise to dread of impending death. Much more has been lost in other cases, and yet perfect reaction and recovery have followed. But there are certain constitutions that seem to be endowed with but little power of rallying from a shock, even though slight, and in which the vital energy, though equal to all the ordinary emergencies of life, is inadequate to the task of

recovery when any serious cause of depression has affected the nerve-centres. In such, no doubt, the great heat of a Calcutta May, and its terribly depressing influence, must be an additional source of weakness, and a most important obstacle to recovery, when any such shock to the nervous system has taken place.

That death should occur from syncope, or from great exhaustion in profuse hæmorrhage, either when the blood is flowing, or immediately after it has ceased to flow, is, though fortunately uncommon, yet sufficiently intelligible, and needs no explanation in any real or fancied constitutional defect in the sufferer; but that death should follow a comparatively moderate loss of blood, and when all else was apparently free from defect or disease, is more remarkable, and forces one to the conclusion that, in a constitution naturally inert as to vital power, the influence of climate, such as that of Calcutta in the hottest season of the year, must have had a prejudicial effect in preventing the reaction which, in other cases, under ordinary circumstances, might have been hopefully anticipated.

I am satisfied that the labour itself had nothing to do directly with the unfortunate result. The first stage was certainly very tedious, but it was neither attended with, nor followed by, any failure of constitutional strength. The second stage was accomplished with vigour, and after the birth of the child, the patient was in all respects as well as one could have desired to see her. I have frequently noticed that loss of blood in a surgical operation that would hardly affect one person, proves almost, if not quite, fatal to another, each being to all appearance equally strong—the difference being due, no doubt, to different degrees of vital energy in the individuals. In the case I have described, I can only ascribe death to a deficiency of this, and to the exhausting effect of the great heat.

XX.—CASE OF NEURITIS.

On April 27th, 1867, I was asked by a medical man to see a native gentleman, aged about 30, who had been suffering severely for the past three months from a painful affection of the left hip, which had confined him to his bed. He informed me that about three months ago he had been salivated for a venereal affection, and almost immediately afterwards the pain in the hip made its appearance. During this period he has had several attacks of irritative fever which have reduced him very much. The pain is so severe and constant that he is unable to sleep. Blisters had been applied over the seat of pain, and many remedies, including iodide of potassium, used without benefit. There was no shortening of the limb, no pain in the knee or hip-joint, or when the sole of the foot was smartly struck with the hand; but there was great pain in the course of the sciatic nerve in the gluteal region, and especially at one point, where I thought, after long and careful examination, that I could detect deep-seated fluctuation, with fulness and induration in the course of the nerve. There was also some tenderness on pressing deeply in the iliac region. It occurred to me that there had been inflammation in, and that the symptoms were due to effusion into, the sheath of the nerve. It is to be observed that he had been previously a healthy man, and not subject to sciatica or rheumatism. I made a puncture with a long narrow knife down to the indurated part, and gave exit to more than half an ounce of clear serum. The removal of tension caused by the fluid was followed by immediate and almost perfect relief. I did not see him again, but on the 10th of the following month I heard from the medical man who had consulted me as follows:—

"The patient was so much relieved by the puncture that he could get up from his bed and walk about the room. He left Calcutta for his home two days after we saw him. Yesterday I was informed that he is doing well there."

On May 30th, I was informed that the patient was quite well, and free from lameness.

Remarks.—This is the only case of the kind that I have met with, but I shall more carefully look for this effusion within the sheath of the nerve, in future cases of sciatica that may come under my observation. It is possible that in this instance it may have been due to the attack of syphilis, or to the mercury which he took to salivate for its cure. But as there was no other evidence of constitutional syphilis, and as iodide of potassium had no effect on the disease, I am inclined to think it was not traceable to this specific origin, but that it was the result of simple inflammation of the neurilemma. The relief afforded by the incision was very great, and, from the accounts I have since received, it seems to have been permanent. The pathology of this affection is interesting, and though the case is a minor one, I have thought it worth recording.

XXI. — RUPTURE OF THE SPLEEN, LIVER, AND LEFT KIDNEY—FRACTURE OF BOTH ARMS—DEATH FROM TETANUS.

R. L., aged 25 years, a Hindoo confectioner, was admitted February 20th, 1867, at 4 p.m., with a Colles' fracture of the left forearm and compound dislocation of the right wrist-joint, caused by falling from a tamarind tree from a height of 35 or 40 feet. He was stunned by the accident, and could not remember whether he had struck against anything as he fell.

There was a contused wound on the inner and anterior aspect of the right wrist-joint, about an inch in length, through which the styloid process of the ulna protruded, but it was neither fractured nor denuded of periosteum. The radio-ulnar ligaments were torn, and the bones were consequently freely moveable. The left radius was broken just above its lower epiphysis, and the styloid process of the ulna was detached,

giving to the wrist the peculiar deformity of Colles' fracture. Pulse very weak. Ordered tinct. opii ℥xxv. immediately; stimulant mixture every two hours. The dislocation was reduced, and the arm put on a straight inner splint and bandaged; a pistol-shaped splint was applied to the left forearm.

21*st*.—Complaining of pain in the hypogastrium. Passed urine once after the accident, which was uniformly bloody, but contained no clots. A catheter was passed with ease into the bladder, and a little more bloody urine withdrawn. No fracture of the pelvic bones could be detected. Pulse feeble. Stimulants every hour; hot bottles; diet, milk with soojee and soup.

22*nd*.—Passed bloody urine again. Wound beginning to assume an unhealthy aspect. The pulse becomes stronger day by day; hæmaturia ceased; pain in the hypogastrium subsided, but slight fever continues. Extensive suppuration and the wrist swelling; free incisions made to prevent any burrowing of pus.

On the 28th, the extremity of the ulna was found denuded to the extent of half an inch, and necrosed. Considering it to be the source of irritation, the dead portion was removed with the bone forceps.

Although the fever abated in its severity in two or three days, the wound still looked foul. Occasional starting of the limb foreboded the approach of grave mischief, and within a short time symptoms of tetanus set in. The wound was examined again. The joint was found to be disorganized, and the radius, necrosed at its lower end, protruded through the wound. Amputation at the middle of the forearm was performed on March 4th.

It is to be remarked that the tetanic spasms were limited to the muscles of the jaw, of deglutition, and of respiration, the extremities being completely free from the disease.

Brandy and soup were administered every hour, as also a pill composed of opium gr. j. and tobacco ʒj. was smoked every two hours. An injection of castor-oil, turpentine, sulphuric

ether, and assafœtida was given every six hours. The stump was kept wetted with opium solution.

On the day of the operation the tetanic fits became less frequent, and he could swallow food or medicine better than before. But the spasms increased, and he died on March 8th, four days after the operation, and sixteen days after the accident.

Post-mortem Examination, nineteen hours after death.—— Lungs: healthy and crepitant; firm decolorized clots in the right ventricle passing into the pulmonary artery; left ventricle very much contracted; a small decolorized clot in the aorta. Liver studded with numerous pyæmic patches of whitish-grey softening, each rather smaller than the tip of the little finger, and extending about a quarter of an inch into the substance of the organ. There is a superficial rent of the posterior thick margin of the right lobe and two others on the under surface; there is also a dark line along the upper and anterior surface, which is apparently another superficial rupture nearly healed. Spleen with two ruptures in its posterior edge, the upper one extending deep into its substance. At the upper end of the left kidney is a very extensive rupture running up into the hilum. The areolar tissue surrounding the vessels at their entrance into the hilum is dense from infiltration of blood. Nearly three-fourths of the kidney, including its upper and nearly all its posterior surface and a great part of its anterior, is of a pale buff colour, and soft and doughy to the touch. The posterior portion so affected is separated from the sound part by a dark-coloured, wavy line of demarcation, which can be seen extending through the deep as well as the superficial structures on the surface of the incision made obliquely in the anterior surface of the organ. About two ounces of blood-clot lay on the great omentum, which was folded and wrinkled upwards. Some coagulated blood lay over the kidney and left side of pelvis. No peritonitis. Cavity of the bladder normal.

Remarks.—This is a case of great interest, not only in a pathological and surgical, but also in a medico-legal point of view.

The injuries to the abdominal viscera were themselves such as are generally considered more than sufficient to cause speedy death; and the question has over and over again occurred in courts of justice as to the effects of rupture of the spleen—an accident, unfortunately, of frequent occurrence where the spleen is so liable to be softened and enlarged as the result of malarious poisoning. Though it has been always considered possible that a person might survive for a short period after rupture of the spleen, yet it has been regarded as an accident almost certainly mortal. Yet here we have not only rupture of the spleen, but also of the kidney and liver, without any indication beyond hæmaturia of a few days' duration, that there was any abdominal injury at all. The abdominal pain had disappeared, the urine and secretions were normal, and, but for the unfavourable changes which occurred in the arm, all seemed to be doing well. The injury was so severe that from the first it was considered doubtful if the limb could be saved, and when extension of suppuration and tetanic symptoms together urged the necessity, amputation was performed in the hope of saving life. Not the least suspicion existed that the abdominal viscera had been so severely injured. The hæmaturia, which had passed away without leaving any further indication of mischief, had been attributed to some comparatively trivial injury of the bladder or kidney. The state of the liver was very interesting, studded with numerous patches of degenerate or dead tissue, whilst the lungs and other organs were free from the presence of any indication of pyæmic poisoning or capillary embolism. I think it is obvious in this case that the mischief was due to capillary embolism occurring through the splenic vessels in consequence of the laceration of the spleen. No doubt minute coagula had formed in the bruised and injured vessels of the spleen, and had been carried thence direct to the liver, giving rise to numerous emboli which resulted in the local deaths with which the viscus abounded. There does not appear to have been any suppuration in the medulla of the divided bones.

XXII.—REMOVAL OF THE LOWER LIP FOR EPITHELIOMA —CHEILOPLASTIC OPERATION.

A Hindoo blacksmith, aged 58, was admitted May 1st, 1871, with an ulcerated epithelial growth involving the centre of the lower lip. It was indurated, nodular, and ulcerated, making its first appearance five years ago, and had been growing rapidly during the last six months. There were no glandular complications, but a portion of the centre of the lower alveolar process and gum were affected, and the incisors were partly displaced. His health being otherwise good, the diseased parts were removed on May 10th.

The entire lower lip was removed by a V-shaped incision extending from the commissures of the lip to the point of the chin; portions of the alveolus and gum, with part of the frænum linguæ, were also taken away. The incisions were prolonged from the point of meeting at the chin in a curved direction downwards, outwards, and then upwards as far as the masseter on either side. The flaps, being dissected away from the bone, were then brought forwards and upwards until the first two incisions formed the margin of a new lip, the flaps being united by three horsehair sutures in the central line, and leaving a triangular gap over the chin to be closed in by granulation and cicatrization. Union occurred rapidly, and

he was doing well until the 16th, when he had a severe attack of erysipelas of the face and scalp. From this, under the influence of purgatives, quinine, tinct. ferri muriatis, plenty of wine and nourishing diet, he recovered, and the union was not disturbed. His recovery was somewhat delayed. Cicatrization of the lower part of the wound was not complete until July 21st, when he was discharged.

The lower gum and teeth were well covered by the new lip, and the triangular gap had contracted to a small scar. The lip was adherent to the jaw, and its margin cicatrized satisfactorily.

XXIII.—CASE OF DISEASE OF THE HIP-JOINT.

C. W. B., aged 12, an East Indian boy, of delicate constitution, was admitted May 3rd, 1867, with symptoms of active disease in the left hip-joint. It appears that about six weeks ago he sprained his left hip by falling into a ditch, but the pain was so trifling that he took no notice of it at the time. Two or three days later he had fever, which continued for three or four days. About this time (he is not very positive in his account) he began to feel pain in the left knee-joint on the inner side, and shooting up the thigh. This pain, as well as that in the hip, from which he now suffers, had increased daily since then.

On admission, the boy looked delicate and strumous; he was thin and sickly-looking from pain, and want of rest and nourishment. The left thigh was flexed towards the abdomen, and he lay with his knees drawn up towards the trunk. The limb was wasted, and there was swelling over the hip, with external heat, and excessive pain on the slightest touch. There was no evidence of the formation of pus about the joint.

The least attempt to examine the limb caused agonizing pain. He had had no sleep, it was said, for many nights. The constitutional irritation was extreme, and the boy was rapidly

sinking under the suffering caused by the articular disease. I put him thoroughly under the influence of chloroform, and then cautiously and steadily extended the flexed limb until it was quite straight. It was already shortened, not merely from pelvic deviation, but from actual absorption of the bone, although there was neither dislocation nor distortion. I secured the extended limb on a long splint, reaching from the foot to the axilla, and over this applied a starched bandage. Some citrate of quinine and iron, with cod-liver oil, and a good diet, were ordered, with two ounces of port wine.

May 4th.—The pain is much relieved, although, after recovering from the chloroform, he felt it for some hours. He is so much relieved this morning, and slept so well last night, that he says he is better than he has ever been since the disease began.

10*th.*—No pain in the limb or joint, even on pressure or tapping the sole of the foot; no starting of the limb at night as formerly. He is improving in every way; has a good appetite, and is getting strong.

It is unnecessary to continue details. The splint was finally removed on June 1st, and the limb was found to be shortened one inch and a-half. Partial anchylosis had taken place, and there was complete absence of any pain. He walked with a stick, limping from the shortness of the leg and from the wasting of its muscles during disease and confinement; but he was rapidly regaining the strength of the limb, and was discharged from the hospital on July 29th. I do not think suppuration occurred; if it did, the pus must have been absorbed.

Remarks.—This is an excellent example of the beneficial effects of rest in the treatment of hip disease. The mischief was progressing rapidly when the boy came under treatment, and would soon, no doubt, have exhausted his strength. Forcible extension, practised carefully under the influence of chloroform, is highly beneficial in this disease, and was in this case, as I have seen it in others, most successful. Rest was the

only therapeutic agent of any importance—at all events of a local nature—required; under its influence, and with the support afforded by nutrients, iron and quinine, he rapidly recovered; the disorganization of the joint was arrested, and repair accomplished. I found the ordinary straight thigh splint answer the purpose admirably, and I applied it just as it would be applied in an ordinary fracture of the thigh. The improvement was immediate, and steadily progressive, only leaving it a matter of regret that the opportunity of treating the case earlier had not been afforded.

XXIV.—CASES OF INJURY OF THE SPINE.

Case 1.—*Displacement of Cervical Vertebræ in a Child through Lifting it by the Head.*

On the evening of the 12th of May, 1871, Mr. —— brought his child, an intelligent and interesting girl of 6½ years of age, with the following account of an accident that had happened to her that day at about 12.30. She had been taken up by the head by a grown-up person, and so lifted on to a table. The child told her father that she felt pain, heard something snap, and found that her head was twisted to one side, and that she could not return it to its natural position. She went home at 3 p.m.; her head was then twisted to one side, she had considerable pain in the neck, and there was a bony projection at the lower part of the back of the neck on the right side, and a little above its junction with the shoulders.

The father and mother being alarmed at the child's condition, brought her to me at about 7.30 p.m., when I found her to be in the following condition:—She was a slight but healthy child; her father and mother and other relatives assert that there was no deformity before the accident. Her head was slightly inclined forwards, and her face twisted towards the left side.

On my examining the neck, and manipulating the injured part, she said she felt some pain, but it was evidently not very severe, as she allowed me to move her neck and head freely. There was a marked bony prominence which I took to be the right lateral process of the sixth or seventh cervical vertebra. There was considerable mobility, and, considering the nature of the lesion, wonderfully little pain. The head could be rotated in either direction; considerable flexion and extension were practicable, but the distortion remained, and the prominence was unchanged. There was neither swelling nor contusion about the neck or face. The child seemed well in other respects, and bore the examination with great patience. There was no evidence of injury to the spinal cord. I could detect neither crepitation, nor movement as of fractured processes in contact; neither could I, by extension of the neck and rotation, make any permanent impression on the distortion.

The absence of pain led me to suggest the possibility of some previous accident, the results of which might have been unnoticed; but the father was most positive in his assurance that such was not the case. The girl was equally positive in her statement that the injury was caused as I have described. I know the child well, and believe that she had no previous deformity of the neck.

I diagnosed the injury to be dislocation of the articular process of the fifth or sixth from the sixth or seventh cervical vertebra on the right side. I examined carefully for fracture, but beyond the fact that there was more mobility than might be expected in dislocation only, I could detect no symptom.

On the 13th May, in consultation with Professors Ewart and Cutcliffe, I again, under the influence of chloroform, made a careful examination, and after continued and careful extension of the neck, with counter-extension from the shoulders, effected a change in the position of the bones, and partially returned them to their normal position. But during the manipulation it became evident that there was not only dislocation, but fracture of the transverse process; and after returning the parts to

as nearly as possible a normal position, it was not deemed prudent to use any further interference, and the child was placed in the recumbent posture, with instructions to keep her so, and to support the head on either side with a pillow stuffed with sand.

14*th*.—She is well, and free from pain; the face has a very slight inclination to the left shoulder, but it is easily straightened. The head and neck are moveable in all directions. A slight prominence can still be felt, but it disappears on rotating the head and pressing it backwards. I directed that the child should be kept on her back, and the head and neck laterally supported, as I have described.

19*th*.—The child is well and free from pain; a certain amount of distortion remains.

It appears that the child was lifted from the bench, on which she was sitting, to the table, at some feet distance; she was raised suddenly by the head, felt sharp pain, and heard a snap in her neck, as of a bone going out of place. There can be no doubt that in this sudden and violent transport from the bench to the table, raised by the head, some sudden rotatory movement, aided by the weight of the unsupported body, caused dislocation of the articulating process of the sixth from the seventh cervical vertebra, and probably fractured the transverse process near its junction with the body of the bone.

Case 2.—*Avulsion of the Intervertebral Substance; Fracture of a Vertebra, and Compression of the Cord.*

B., a stout healthy-looking Hindoo labourer, aged 25, was admitted on the 17th June, 1870. Five days previously he and another man were carrying a heavy beam of wood, the ends resting on their heads. His companion suddenly let one end of the beam drop; his end then fell, and in doing so, gave his head and neck a violent wrench backwards. He fell to the ground immediately, completely paralyzed below the neck. In

this condition he was carried home, where he remained until the fifth day, when he was brought to the hospital. The abdomen was then tympanitic, and the bladder fully distended with urine. He stated that until the fourth day he had made water, and his bowels had acted, but not since. His statements were probably not very reliable. His bowels may have acted, and urine may have dribbled from an over-distended bladder. His pulse was regular and firm, about 80. Tongue moist, but coated. Temperature apparently natural. Sixty-four ounces of urine were removed by the catheter, and an aperient draught ordered by the admitting officer. Respiration was diaphragmatic. His face wonderfully little indicated his grievous condition. There was a depression in the cervical region, but no crepitation or lateral displacement could be detected. He could move his head and neck, and spoke very clearly, describing how the accident occurred. Below the clavicles nearly all sensation and motion were abolished. The point of a sharp instrument drawn round the body was felt across the upper part of the pectorals, and deltoids in an irregular line; on the back it descended rather lower. He seemed painfully conscious of his miserable condition, and begged for relief.

Towards the evening his temperature rose to 104°. This varied from 101° to 104°, until the 22nd June, when it rose to 104·5° in the morning, and 106·5° in the evening, and on the 23rd, the day of his death, to 107°. The pulse varied, but never exceeded 85. The respiration was hurried, being 36 to 40 per minute. At first a saline diaphoretic was given, and the urine amounted to 100 to 110 ounces daily. This gradually diminished to eighty ounces daily. The saline was discontinued. Morphia was given to soothe the pain in the neck, and allay restlessness. He took soup and other fluid nourishment, and remained quite sensible until the morning of the 21st June, when he became delirious. The breathing became more difficult from accumulating mucus in the bronchial tubes, and the upward pressure of the distended abdomen. He sank at 1.20 a.m. of the 23rd.

The urine was regularly drawn off; it remained clear, but was very watery; sp. gr. 1·010; neutral; neither excess of phosphates nor mucus, neither albumen nor sugar. There was persistent partial priapism.

Autopsy.—The body was that of a vigorous muscular man. Viscera were healthy, except that the lungs were hypostatically congested, and the tubes full of mucus. All the other organs, whether thoracic or abdominal, were healthy. On examining the spinal column, it was ascertained that in the violent backward wrench, the third intervertebral cartilage had been torn across, or rather torn away from the upper surface of the body of the fourth cervical vertebra. The laminæ of the third cervical vertebra were broken, and depressed upon the cord. On removing the medulla spinalis and its covering there was no apparent injury; but on laying open the theca a small spot of coagulated blood was found corresponding to the fractured laminæ, and just above it the cord had been compressed and softened—practically cut in two. This was very evident, for on pouring a gentle stream of water on the cord, it washed out the softened nerve-substance, leaving a deep groove, as though a cord had been tightly tied round it. This injury was exactly beneath the depressed portion of the laminæ, and must have been caused by their edges.

Remarks.—This case is interesting both in a physiological and pathological point of view. The instances, I believe, are very rare in which men have survived such accidents more than a few hours. In this case the patient lived twelve days after the injury.

It is impossible to conceive anything nearer to instant death than this man must have been on receiving the injury. The spinal cord was compressed, physiologically severed, just below the origin of the fourth cervical nerve, as the third vertebra, with its intervertebral cartilage, was torn from the upper surface of the fourth. The phrenic nerve must then have been seriously compromised, as its third origin from the fifth cervical

nerve was thus severed from the two other origins; and it is difficult to believe that the fourth cervical nerve could altogether have escaped, as the injury to the cord was close to where it is given off; and if so, the chief origin of the phrenic must have been much interfered with. With this damaged internal respiratory nerve, and with such feeble aid received from the muscles descending to the upper part of the thorax, and supplied by nerves given off above the fourth cervical, life was sustained for twelve days. Death occurred on the twelfth day, from exhaustion and the gradual failure of the respiration. The paralyzed abdominal and thoracic muscles, unable to resist the pressure of the gas-distended intestines and of the diaphragm, pushed up into the thorax, with the rapidly increasing congestion of the lung, and accumulating mucus in the bronchial tubes terminated his existence, though not until long after the time when such cases usually prove fatal.

His sufferings, notwithstanding the complete paralysis below the neck, were great, and his vivid consciousness of his distressing condition was not the least painful part of them. He was for some days peculiarly intelligent, and no one would have supposed, from the appearance of his face, that his state was one of such perfect death in life. Towards the last, as the blood became imperfectly aerated, and his energies exhausted, he was delirious, and when death occurred he was unconscious.

XXV.—EXCISION OF THE ARTICULAR EXTREMITIES OF THE TIBIA AND FIBULA, AND OF THE OS CALCIS, ASTRAGALUS, AND SCAPHOID BONES.

A delicate-looking lad, a Mahomedan, aged 9 years, was admitted July 27th, 1868, with extensive disease of the right ankle-joint, of five months' duration, the result of a sprain some time previously. The joint was much swollen, the swelling involving the lower extremity of the leg and the foot as far

forward as the metatarsal joint. It was full of sinuses, and a probe passed into softened and diseased bone. The limb was wasted, and the general health much impaired. There was a profuse purulent discharge of a strumous character from the sinuses. With the object of improving his general health, he was ordered a generous diet, cod-liver oil, and ferruginous tonics. The ankle was placed at rest on a splint, and dressed with the usual carbolic acid and oil dressing. He improved considerably in general health, and the pain, swelling, and discharge abated; but as the disease was too extensive to admit of any hope of recovery, I proposed an operation, which was assented to, and performed February 17th, 1869.

Two incisions were made, one on either side of the ankle-joint posterior to the malleolus, about five inches in length, and curved in direction. The tendons being exposed were turned out; the fibular malleolus was first sawn off, the foot then being turned inwards, and the ends of the tibia and fibula removed to the extent of about half an inch, so much being diseased. The astragalus, being found softened and diseased, was next dissected out, and on exposing the articular surface of the os calcis it also was found to be extensively diseased. A vertical incision was accordingly made over the tendo Achillis and heel, and the os calcis having been exposed was dissected out. The scaphoid was next removed, as it also was much diseased. The other tarsal bones appeared to be free from disease. The wounds were stitched up with horsehair sutures, and dressed with the carbolic oil dressing, and the leg was placed on a splint to keep it at rest.

During the operation no vessel of importance was divided, and though the oozing from the vascular and diseased parts was excessive, no ligature was needed; neither was any tendon injured. The ligamentous structures were so much softened, if not disorganized, by the disease, that very little difficulty was experienced in exposing and removing the bones.

The report says: "The little fellow has done very well since the operation. About a fortnight ago two small exfoliations

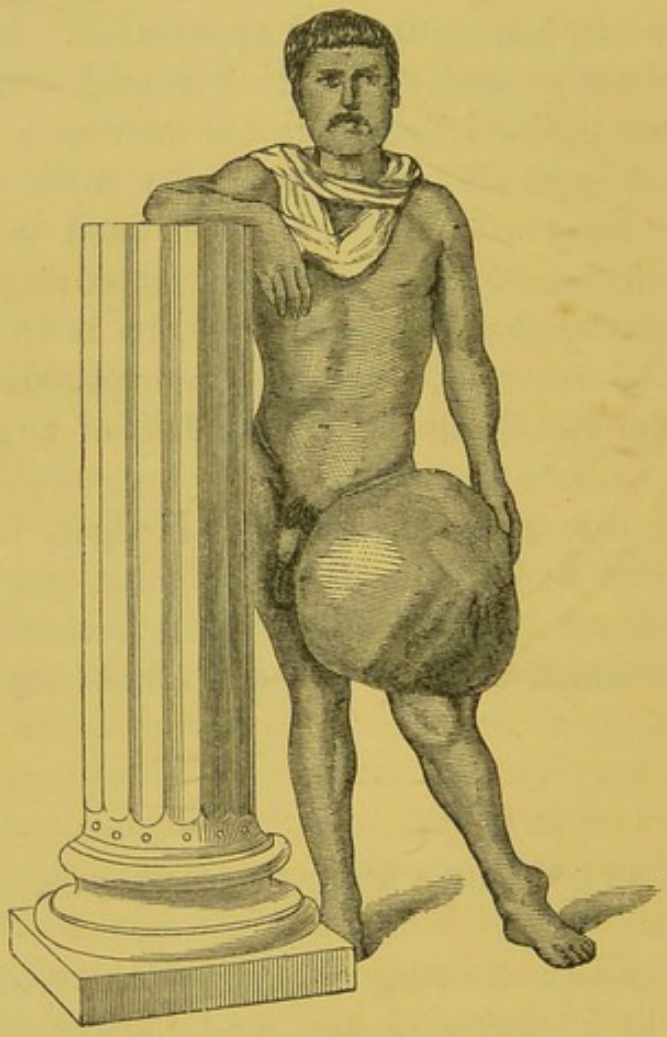
took place from the ends of the tibia and fibula. The operation wounds have healed, the sinuses are closing, the discharge is diminishing, and the thickened tissues about the ankle are gradually resuming a more natural appearance. He is able to put his foot to the ground, and to bear considerable weight on it. He lifts his leg and foot from the bed without aid, and moves the toes and the foot generally with comparative freedom. He takes cod-liver oil, iron, and a good diet, and is in good spirits, and gradually improving in health. Should no unfavourable symptom arise, he is in a fair way to make a good recovery, and it is remarkable how little the shape of the foot is altered by the loss of so much of its substance."

Excepting a case referred to by Dr. Hodges, in which the ends of the tibia and fibula, the astragalus, part of the os calcis, and the three cuneiform bones were removed, I do not know of any in which so much of the foot has been removed as in this one.

XXVI.—CASE OF ENCHONDROMA.

The accompanying drawing illustrates the case of a young native, of about 28 years of age, who presented himself for relief at the Medical College Hospital, but declined to accept the only means that we had to offer him, viz., amputation at the hip-joint. The magnitude of the tumour, which he said was rapidly increasing, was very great, and almost incapacitated him from walking or following any occupation. It had all the appearance of enchondroma, which view of its nature was strengthened by the fact of the existence of similar growths elsewhere. He was in excellent health, had no indication whatever of the presence of any constitutional disorder, and beyond the inconvenience caused by the great size of the tumour, he complained of no suffering. His spirits were good; he was generally free from pain, and was well nourished. He

remained with us a few days, and then left, and we have heard no more of him.



I fear that his condition must soon have become worse; but I must confess that I was not sorry when he declined to submit to an operation that I still felt it was my duty to offer him as the only means of permanent relief.

XXVII.—NECROSIS, WITH SEPARATION OF THE ENTIRE SHAFT OF THE TIBIA.

M. D., an English boy, aged $3\frac{1}{2}$ years, resident in Calcutta, was admitted 12th December, 1870, with a large abscess below the left knee. The mother said that the child had hurt his leg

when playing, and that his health had been good. The abscess was opened, and about ten ounces of matter evacuated. It continued to discharge for some days, and the inflammatory action was subsiding when the lower end of the knee swelled, and became painful. Another abscess formed, and was opened just above the ankle. Both abscesses continued to discharge freely.

At this time he was transferred to my ward. He had fever daily. The leg was swollen, and on manipulating it a crepitation could be perceived near the ankle. There was evidently a large piece of loose bone. Under chloroform the upper opening was enlarged, and through it the whole shaft of the tibia, extending between the epiphyses, was removed. There was comparatively little hæmorrhage. The limb was supported and placed at rest on a splint. The child being in poor health tonics, quinine, and iron were given.

A few days later he had a severe attack of dysentery, to which he nearly succumbed. He recovered, however, under the use of ipecacuanha; and from about the beginning of August he began to improve—new bone was evidently forming from the periosteum which had been left. The sinuses gradually closed, small fragments of sequestra coming away occasionally. The leg was slowly consolidating.

By the end of September the leg was much stronger, the splint being dispensed with, and the child using the limb. He was gradually gaining strength, when on the 6th November he unfortunately fell, and broke the new bone. It united again, and on the 19th of the following January he was discharged in good health, his leg being strong, and without any deformity, excepting a slight curvature.

XXVIII.—REMOVAL OF A FIBROUS TUMOUR FROM THE THIGH.

On June 11th, 1868, I removed a large fibrous tumour from the inner side of the right thigh of a Mahomedan, aged about

20 years. The tumour had been growing for about three years, and lately had been painful, as well as inconvenient, from its size. It was situated at the inner aspect of the thigh, and was firmly attached by deep-seated adhesions to the rami of the ischium and pubes. It was partially moveable, and was very dense and unyielding. Its growth had been so rapid lately as to be suggestive of malignancy, but the lad looked healthy, and had no other indication of carcinomatous diathesis. The tumour formed a large swelling at the upper and inner side of the thigh, and it had begun to interfere with the use of the limb. There was no swelling of the lower extremity, although the femoral vein and artery were subjected to considerable lateral pressure; he said, however, that at times the leg did swell.

I determined to attempt its removal, as its rapid growth threatened serious consequences, and accordingly I proceeded to do so by making a vertical incision about ten inches in length along the inner side of the thigh in the axis of the tumour, and corresponding to the direction of the gracilis muscle. On dividing the integument and fascia I found that the tumour was covered by the gracilis, which was stretched out like a membrane over it. Dividing this transversely, I then, by a process of dissecting and tearing, exposed the tumour, which lay between the adductors and muscles on the anterior surface of the thigh, having deep adhesions, which were very firm where it was connected with the rami of the ischium and pubes. These I was obliged to divide with the scalpel, the remainder of the growth being enucleated by dissection. The femoral vessels were pushed to the outer side. The hæmorrhage during the operation was rather profuse, and several ligatures were applied—one large and deep branch, probably of the obturator, being troublesome. He became rather low on the table, but, on the whole, bore the operation well. All bleeding having ceased, and the surface of the deep cavity having been sponged with carbolic acid, the edges of the wound were brought together with horsehair sutures, and he was put to bed, having rallied under

the influence of stimulants. The operation was necessarily a tedious one, but he was kept constantly under the influence of chloroform. The carbolic oil dressing was applied, and continued throughout. He made a very good and rapid recovery. The wound granulated with less suppuration than I ever remember to have seen in a similar wound. He had slight irritative fever, and a temperature of 103° for a few days, but subsequently there were no untoward symptoms, and he was discharged from the hospital on August 11th, just two months after the operation, in excellent health, with the wound almost cicatrized. A trip to sea with his master completed the recovery, and he is now in perfect health, and the wound has left a lineal scar, which causes him no inconvenience. The tumour was examined by Dr. Ewart, and proved to be of dense fibrous tissue, with no indication of the existence of carcinoma.

XXIX.—INTRA-CRANIAL SUPPURATION AFTER SLIGHT INJURY OF THE HEAD—TREPHINING—FATAL TERMINATION.

W. J. S., aged 43, formerly an indigo planter, was admitted July 18th, 1870. He stated that three days ago a piece of brick was thrown at his head, and caused a slight wound, which was dressed and thought no more of at the time. On admission he was slightly intoxicated, and was found to have a wound on the left side of the head one inch and a-quarter in length, situated posteriorly to the parietal eminence, and reaching down to the bone. The pericranium was slightly denuded; margins of wound somewhat inflamed. Bowels costive; tongue foul. The patient was a tall, thin man, much broken in constitution by excess and exposure to the debilitating influence of a tropical climate.

21*st.*—Patient doing well—in fact, wanted to be discharged from hospital—till 6 p.m., when some bleeding occurred from the wound, which was easily controlled by pressure. Is slightly feverish. Fever mixture and purgative draught.

24*th*.—Everything went on well till 6 p.m. to-day, when he complained of a slight aching pain over the left eye.

27*th*.—Bowels moved every day by means of purgatives. Has slight hemicrania of the left side. 6 p.m.: Is feverish and restless.

28*th*.—Bowels freely opened. Still feverish, and complains of a feeling of nausea. Head to be shaved and an ice-bladder applied. 6 p.m.: Temperature, 101·4°; pulse, 88, full. Has had four scanty stools. Tongue foul. Pupils contracted.

29*th*.—Temperature, 100°; pulse, 72. Nausea has now ceased. He feels weak, and complains of a feeling of heaviness in his head; not at any particular part, but all over. 5 p.m.: Temperature, 101°; pulse, 72, full and hard. Great uneasiness in the head. Complains of weakness in the right arm and leg, with sudden startings, and a sensation as of pins and needles.

30*th*.—Much the same as yesterday. Wound not looking so clean. Eyelids slightly drooping.

31*st*.—Tongue very foul. Bowels costive. Right arm very weak; can only raise it by a series of jerks. Loss of sensation in the right side of the face. Slight difficulty of speaking. Mind clear. The granulating wound is dry, flabby, and glazed, with a puffy swelling around it. A crucial incision was now made down to the bone, and a small quantity of pus evacuated. Bone found bare and roughened over a small area. 6 p.m.: The power of articulating (or rather the memory of) certain words is lost, and he uses words wrongly. 9 p.m.: Has vomited once.

August 1*st*.—9 a.m.: Temperature, 101·3°; pulse, 80. Aphasia very complete. Complete paralysis of the right arm; right leg very nearly the same. Endeavoured to express what he wants in writing with his left hand, but could only trace the initials of his name. Mind seems clear. A trephine was now applied over the seat of injury, and a teaspoonful of thick pus evacuated from between the skull and dura mater. Skull naturally very thick (one-third of an inch), and without diploë.

Some plastic matter formed on the inner surface. No bulging of the dura mater, which was carefully examined. 1.15 p.m.: Had a slight convulsive fit, which began in the right arm, and extended over the whole body, lasting two minutes. When the fit was over, he breathed in puffs, the air escaping from the right side of mouth. 11 p.m.: Has had several fits. Pulse, 110, and rather hard. Examined the dura mater, but could detect no bulging. A cathartic enema, stat.

2nd.—7 a.m.: Passed a stool in the bedclothes. During the night slept for a very short time, convulsive fits occurring at short intervals. Very restless. Can only utter sounds like "ai cairna," which he repeats incessantly. 9 a.m.: Dura mater punctured, and a small quantity of pus let out. Seems to be sensible, and expresses his wants by signs. 3 p.m.: Fits becoming violent.

3rd.—Temperature, 101°; pulse, 76, small; respiration, 18, regular. Has had a very restless night. Stools and urine are passed involuntarily, or without an effort to express that he wishes assistance. Occasional convulsions throughout the day.

4th.—2.30 a.m.: Had a very slight fit. 6 a.m.: Since last report has been sleeping quietly. 9 a.m.: Temperature, 98°; pulse, 72; respiration, 16. Is conscious, and asks by signs for food, drink, &c. Stools and urine passed in the bedclothes. A curious frothy appearance of the eyelids. 4 p.m.: Tongue very foul. Ordered a fetid enema. 5.30: Begins to articulate. Said "pipe," which was given to him, and he smoked.

5th.—9 a.m.: Temperature, 98°; pulse, 68; respiration, 16. Is able to say a few words, which he repeats over and over again, without seeming to have any very definite idea of their meaning. Head easy. Wound granulating healthily. Brain seen at the bottom of the wound rising and falling normally. Can move the right leg, but the effort to do so causes him a good deal of pain. Hyperæsthesia of the right leg, reflex movements very powerful; right arm not improved at all. Answers questions by signs. 11.30 a.m.: Moves his right leg pretty freely. Endeavoured to talk, and seemed much

distressed at being unable to find words for his ideas. Became very low-spirited and depressed. 6 p.m.: Had a slight spasm in the left side, which he expressed by saying, "I had padsum." Sensation returning in the right arm.

6*th*.—9 a.m.: Sensation in the right arm nearly perfect. Tingling in the right eyelid. Can now move his right arm slightly, and can lift it up with his left, but a good deal of pain is thereby experienced. Temperature in right axilla, 97·4°; temperature in left axilla, 98·1°. Can read print and can articulate, though slowly, most of the words in an easy sentence. Wound doing well.

7*th*.—Temperature, 98°; pulse, 68; respiration, 16. Small slough removed from the dura mater. Brain seen below, but it seems at some depth. Right leg has nearly recovered; right arm doing very well. Bowels still only moved by enemata.

8*th*.—Temperature, pulse, and respiration normal. Wound suppurating freely and looking very healthy. Sensation and motion are now quite restored to the right leg. Right arm can be raised to his head, though the motion is somewhat jerking. Says that the hand is very weak, and that he cannot hold anything in it. Speech is now very fair, though slow, as if it were an effort of memory to find the words, or that the tongue required schooling to articulate them. Occasionally hesitates at a word, and failing to pronounce it, substitutes another, not always, however, relevant. The tingling of the right eyelid has now entirely ceased. Appearance natural. 10 p.m.: Pulse, 80, and full. Complains of an uneasy feeling across the brow; articulation not quite so clear as it was in the morning. Has been exercising his newly-recovered power of speech too freely, and has evidently fatigued himself. Directed him to keep quite quiet, and not to talk.

9*th*.—7 a.m.: Had an attack of bleeding from the granulations. This, he says, has done him a deal of good, and he certainly does look better.

13*th*.—Doing well since last report. Wound very healthy, and closing rapidly. Bone, except at one side, nearly covered

by granulation. The hole in the dura mater would admit a pin. Very little discharge from the wound. 7.30 p.m.: Had a slight convulsive fit, beginning as the others in the right side. He was conscious while it lasted, but could not restrain the movements of his limbs. 8.45 p.m.: Had another fit.

14*th*.—Had two more fits during the night, chiefly affecting the right side. Complains of a dull, throbbing pain in the head, and a feeling of heaviness. The hole in the dura mater dilated with a probe, and a drop or two of pus evacuated. Pus has all along come more copiously from between the dura mater and brain than from between the bone and dura mater.

15*th*.—Feels all right again this morning. Wound very healthy, rapidly closing; free discharge of laudable pus. Bone concealed by granulations, except at one point, where it is evidently dead.

17*th*.—Not doing so well. Wound looking unhealthy about the aperture in the dura mater. Right arm very much diminished in power.

18*th*.—Patient weak and low. Right side completely paralyzed. I again trephined over the place where the bone is dead, and slit up the dura mater on a director. Free evacuation of pus, and a long shreddy piece of slough from between the dura mater and brain came away.

19*th*.—Much the same as yesterday, only weaker. 10 a.m.: Had a slight convulsive fit, which only affected the paralyzed limbs.

20*th*.—4 a.m.: Speech becoming affected. 9 a.m.: Weak and very irritable; seems sensible. 7 p.m.: During the day has gradually lost the power of articulation. Now howls when he wants anything.

21*st*.—9 a.m.: Cannot utter the slightest sound. Wound nearly filled up with tough, insensible granulations. Opened the wound in the dura mater in several places on a director, and evacuated a small quantity of yellow pus which had become pent up. No appearance of sensation during this. No pulsation of the brain apparent, but remote pulsation is

felt on pressing the finger into the spot where the skull was originally trephined. This causes slight pain and a jerking motion of the right arm from the elbow downwards. Countenance dull and heavy; intelligence much affected, though he can still be made to understand. He gradually sank, and died at 4 a.m. of the 22nd.

Autopsy, ten hours after death.—The body very largely emaciated. Considerable adhesion of the dura mater to the cranium. Some portions of the margin of the aperture formed by the trephine were in a state of necrosis. Between this aperture and the longitudinal sinus there was a patch of commencing necrosis, the size of a shilling, beautifully circumscribed by a very narrow groove. The dura mater adhered to the brain in a circle of about three inches in diameter, corresponding in situation with the aperture in the skull. A thin clot of blood, about the size of a crown-piece, lay over the upper surface of the left anterior lobe. At the seat of injury, and filling up the hole in the bone, caused by the first application of the trephine, was a fungus cerebri. Around the adherent dura mater a circle of the substance of the brain, an inch in width, was discoloured and softened, and on making an incision into it, the contents of an abscess were evacuated, consisting of very offensive pus, sloughs, and softened brain-substance. The brain on this side was much softened, and, in many parts, nearly broken down. On exposing the third ventricle, the left thalamus opticus was found softened, while the corpus striatum seemed normal. The ventricle was separated from the abscess only by a thin layer of softened tissue. Very little fluid was found in the ventricles, and this was not opaque, but slightly sanguinolent. The abscess was about the size of a hen's egg, and extended forwards over the island of Reil, which was darker and more soft than in the normal condition. A thin layer of softened brain separated it from the floor of the abscess. The right side of the brain was congested. The liver, spleen, and kidneys were enlarged.

Remarks.—At one time the operation of trephining appeared

likely to prove successful, for the worst symptoms passed away. He regained—having been completely aphasic—the power of speech; consciousness, which was all but obliterated, returned; hemiplegia, which was complete, passed away; he was able to read; to get up from his bed and walk; and there was every appearance of the wound closing in by healthy granulations, except at one side of the trephine aperture, where the bone was evidently dead. The improvement was only transient—fresh indications of mischief appeared, paralysis and aphasia returned, and he relapsed into a state as bad as that from which he had just been relieved. The trephine was again applied, more pus evacuated, and, to a certain extent, relief conferred; but the mischief had spread to the interior, and a cerebral abscess had formed.

The case illustrates the danger that may attend any scalp-wound, however slight; and proves that in such instances, where intra-cranial suppuration results, perforation of the skull offers the only hope of safety. The patient was completely relieved by the first operation, and had the mischief not extended to the brain-substance, there is every reason to believe that he would have recovered.

The patient was a man prematurely old, broken in constitution by climate and excesses, and who met with the accident in the very worst season of the year—a time in Calcutta when, owing to the malarious, hot, and humid state of the atmosphere, suppuration, even in the most healthy, is only too prone to occur.

The condition commonly known as "Pott's puffy tumour" was well seen in this case, and the welling out of pus from within the cavity as the trephine pierced the cranium was very satisfactory proof that the diagnosis was correct and the operation justified. The dura mater was not opened until the following day, as it looked perfectly healthy, and evinced no signs of suppuration between it and the brain. The symptoms of cerebral pressure not yielding to the first operation, the membrane was carefully punctured, and a small quantity of pus

evacuated. This was soon followed by an amelioration in the symptoms; gradually one by one they cleared away. Consciousness and speech returned, paralysis passed away, and he had assumed all the aspects of complete convalescence, when a return of the symptoms showed that intra-cranial mischief was again insidiously advancing. The trephine was again applied, and more pus evacuated, but this time without success; a cerebral abscess had formed, and he sank.

The post-mortem examination revealed the presence of a large abscess, the gradual formation and pressure of which accounted for all the recurring symptoms. The forward pressure in the first instance accounted for the aphasia, as it pressed directly over the island of Reil, and compression of the cerebral ganglia explained the hemiplegia. The necrosis of bone was limited almost to the area removed by the trephine; those portions which escaped that instrument were in rapid process of exfoliation, a deep groove having already formed, and the dura mater become adherent just beyond the groove. It proved that the suppuration between the bone and dura mater was of limited extent, the adherent state of the dura mater to the cerebral lobe showing that it was also limited there. It was by extending deeply into the substance of the brain that the suppuration proved fatal.

XXX.—TWO CASES OF APHASIA.

Case 1.—*Aphasia and Death Resulting from Softening of the Left Anterior Cerebral Lobe and Cerebellum, due to Atheromatous Degeneration and Embolism of the Cerebral Arteries.*

The following very interesting case appears to corroborate the views recently advanced by certain pathologists as to the cause of loss of power of speech, or of the memory of words. It is also very remarkable as an example of cerebral softening, at a comparatively early age, from atheromatous degeneration

of the vessels of the brain, with embolism of the basilar artery. I therefore give the notes I made of it, before and after death, in detail.

I have known Mr. —— for several years, and until three years ago his general health was good; he is about 42 years of age, of a nervous, excitable temperament, and of energetic and active habits of mind and body. About three and a-half years ago he consulted me concerning one or two sores on the leg, which were of a suspicious character, and which he seemed to consider might owe their peculiarity, if not their origin, to a constitutional taint; if so, the disease must have been contracted in early youth, for he denies the possibility of any infection for many years. His habits and mode of life have been temperate and active, his occupation necessarily exposing him to frequent change of station, with much of his time spent in the open air. I did not attach so much importance to the sores as he did; they readily healed with rest and simple applications. But I prescribed iodide of potassium, with reference to the possible specific origin. In September, 1863, I was informed that he had been attacked, suddenly, with hemiplegia of the right side.

He had, apparently, no warning; the attack occurred during the day, when he was talking to some one. He appears for a time to have lost all power in the right side, though he retained consciousness, but this paralysis was not of very long duration. He recovered partially, and subsequently regained power in his limbs; his speech improved, though some thickness, slight difficulty of articulating certain words, and a quick and excited mode of speaking remained. He was most judiciously treated; no depletion was had recourse to, and his powers were husbanded as much as possible.

In 1864 he went home to England, round the Cape, and on the voyage he appears to have been subjected to much anxiety and excitement from the danger to which the ship was exposed in a gale of wind, which required that she should be taken into port in the Mauritius and there detained for some weeks. It

does not appear, however, that he suffered from this exposure; on the contrary, his health and strength improved with the change, and the improvement was further confirmed during his residence of fifteen months in England. He returned to India in June, 1865, and I saw him soon after his arrival; he looked well, and all traces of hemiplegia, so far as the limbs were concerned, had passed away. His voice, however, was still slightly affected; there was an indistinctness in the articulation of certain words; there was also an unnatural rapidity of utterance. His intellect seemed unimpaired, and he resumed his appointment. As the hot weather came on, he appears to have begun to fail; his memory became defective, his manner excited, and his speech more rapid and uncertain. There was a tendency to forget, or to substitute words, and his intellectual powers, naturally great and much developed by scientific and literary study, showed signs of failing.

On one occasion I was asked to see him when he was in Calcutta, and I found his manner excited, his speech quick and somewhat indistinct. His memory was evidently on the strain, and though I could see no absolute indication of the original disease returning, it was evident that some permanent defect remained, which, under the excitement of heat and work, was becoming more marked, and indicated that cerebral change (whether dynamical or structural was uncertain) was present.

On the 8th of April I was asked to see him; he had been sent in from ——— on his way home. The accompanying statement of his case was subsequently forwarded by the medical officer who had seen him during his last attack; and it clearly explains what happened shortly before he came to Calcutta.

"On the 23rd March last I was called to attend Mr. ——. On my arrival I found him insensible, with a small pulse, pupils dilated, breathing easy, at times muttering to himself the most absurd nonsense; his breath was extremely fetid. No paralysis, but slight convulsive movements of the right side of the body. His servants informed me that he had

been accustomed to fits of drowsiness, and on one occasion, I am told, he slept for three days. I was further informed that his bowels were not moved for three or four days.

"Next day I found him better, *i.e.*, he was able to walk; he could not recognise people at once, but did so after an effort. On questioning him he gave a reply, but it was all nonsense; he improved a little, and on the 5th April I sent him to Calcutta.

"I treated him principally with purgatives; I also gave him small doses of mercury, partly as a purgative and partly to affect his system; this last did not occur. I made him pass his urine daily in my presence, to satisfy myself as to the state of his bladder; the urine was thick and very ammoniacal in smell. All this time I kept him up with light nourishing food. When he left me he was able to walk; he had an appetite, could recognise people, and could answer questions very rationally; but if he attempted to carry on conversation he was lost; it was quite apparent his memory was affected."

I find him looking remarkably well, as to physical health, stouter and stronger than I had ever seen him. The right hand grasps as powerfully as the left; the legs are equally strong. The tongue is protruded perhaps a little to the right side, but the cheeks, lips, and eyelids are all perfectly natural. The voice is not thicker than before, the words are articulate, but the speech is altogether incoherent. The expression of the countenance and the pupils are natural; no look of fatuity, insanity, or imbecility; he at once knew and seemed pleased to see me. He is accompanied by a nurse, who says that he eats and sleeps well, and that he is perfectly quiet, tranquil, and easily managed. Indeed, but for his shaven head and incoherent speech, it would be difficult at first sight to believe that he is so ill as he really is. His condition is indeed one of great urgency, and there is reason to fear that some structural change, degeneration, or softening in the cerebral lobes is taking place. The prominent symptom at present is loss of memory of words—aphasia, as it has been designated by

Trousseau and other pathologists. It is difficult to say how far the intellect is affected; but certainly the main difficulty manifested is the inability to give utterance to more than the first few words of a sentence. He seems perfectly to comprehend any question that may be put to him, and makes an attempt to reply: but the first three or four words have barely found utterance before he lapses into the most incoherent and purposeless jargon, which appears to indicate that the memory of words is not only lost, but that ideas in the wildest and most incoherent jumble supervene on the forgotten sounds. His attempts at writing are as incoherent as his speech; and a note I received the other day was barely legible or intelligible.

His appetite is good, and his secretions are tolerably normal. A tendency to constipation is obviated by a croton pill, and cold to the head seems to be grateful and soothing. His pulse is natural, and his digestive organs are in tolerable order. The tongue has a tendency to be coated, and the breath to be offensive, but an aperient removes, or, at all events, improves these conditions. The nurse says that he occasionally wets his bed, and once or twice he appears to have forgotten where he was emptying his bowels; but there is neither incontinence of urine nor fæces. A cold bath, the douche or shower bath, is given every morning, and this, with cold to the head, quiet, the removal of any cause of excitement, and a regulated diet, is all the treatment that has been adopted since he came here. There can be no doubt that the heat aggravates his condition; he is more incoherent and more restless under its influence, and less patient of control.

April 30th.—He has been doing well, much as I have reported, until last night. The nurse states that at midnight he was sick; that he became more peculiar in his manner; passed urine in bed; was more incoherent, and seemed to have more restless or irregular movements of the limbs; was quite conscious, and answered all questions as usual. I find him this morning with a peculiar expression of countenance,

the eyes partially closed, his body and limbs somewhat curled up in bed. His head cool, pulse quick, tongue clean, bowels confined. I observed that the right arm was more rigid than the left, and that he used the left most; he could grasp firmly with the right, but he could not control its movements, and when he wanted to move it he had to drag or lift it with the other hand. He was cheerful as usual, laughing and trying to joke, but unable to remember his words. I ordered ice to the head, rest, quiet, and a purgative.

May 1st.—He is no better: the bowels were moved freely, and the enema acted. He has had a restless night; has passed urine in the bed, and when he speaks is quite incoherent. Right arm and forearm more rigid, but the wrist flexible; he cannot use it freely, aiding its motion with the other hand. The right leg is also feeble, and towards the afternoon it became more so. He understands all that is said, and answers in a peculiar half-sleepy and incoherent tone. He keeps his eyes half-closed, and the eyebrows contracted; the pupils are natural. His face looks less intelligent, being heavy, dull, and oppressed. The blister on the scalp has risen. Pulse varies from 60 to 65; it rises with any exertion. Temperature of the body normal.

2nd.—No improvement; the arm and leg are still rigid. He quite understands what is said, and tries to give an answer. Bowels have been freely moved; has taken nourishment. Keep the blister open; cold to the head. Repeat the enema in the evening, and give another pill if the bowels are not freely moved. Eyes closed, but opens them when told. He replies in a few incoherent half-formed words to what is said, but it is difficult to make out how far he is conscious. The head is cool; pulse 60; skin natural in feeling and temperature.

3rd.—This morning I find him changed, and the change appears to have commenced about 9 p.m. yesterday. He is lying in the most profound sleep, snoring occasionally. The limbs are certainly more relaxed than they were, and the rigidity in the right arm is diminished. His mouth is closed,

and he has taken no food. The enema operated freely. Pulse 60; skin cool; thermometer 98° in axilla; pupils natural —if anything, slightly contracted; but they respond freely to light. He is quite quiet, and has not spoken. He opens his eyes partially; makes a feeble effort to protrude the tongue when spoken to, which shows that he is still partially conscious.

4th.—He is much in the same condition; more comatose, if anything, but still appears to recognise the voice, for he opens his eyes when told to do so, though he makes no other sign. Pulse 112, feeble.

The details of the case need not be further pursued, as they offer little variation, the patient getting weaker daily until the 9th May, when he died.

Post-mortem examination thirteen hours after death.—On opening the cranium, a small quantity of opaque fluid was seen lying under the dura mater; underneath the situation of the blister the vessels of the dura mater and corresponding bone were somewhat congested. On removing the brain from its attachments, opaque, but not inflammatory, exudation was observed in excess about the fissure of Sylvius and in the subarachnoid space generally. When the dura mater was completely removed, and the brain turned with its under surface upwards, the whole of the inferior surface of the left anterior lobe of the organ appeared shrunken and smaller than that of the opposite hemisphere. There was also noticed a matting together of the convolutions on each margin of the fissure of Sylvius on the left side. Just on the antero-lateral aspect of the left corpus striatum, between that ganglion and the convolutions, there was a portion of yellowish and softened brain, from which, when cut into, a small quantity of opaque serous fluid escaped. The size of the cavity remaining after the fluid had flowed away was about that of a pea; and this, in all probability, represented the centre of the mischief which produced the hemiplegia, and interference with the faculty of speech three years ago. There was observed also somewhat extensive white softening all around this spot, affecting the convolutions on the

one hand, and the anterior portion of the corpus striatum on the other. The softened brain here contained granules, broken down nerve-tubules, and nerve-vesicles, but it was mainly composed of fat globules of variable size.

On the left and inferior aspect of the pons Varolii a portion of white softening, as large as a hazel nut, existed. The nervous structure was so altered in consistency that on pouring water on the part the softened material was washed away, exposing a breach which penetrated the transverse or commissural fibres, the upward fibres from the corpus pyramidale, and the vesicular continuation of the olivary ganglion. But the whole structure of the pons—the medulla oblongata and crura cerebelli—was softer than natural. Its disorganized nerve-substance was found to be constituted of a great quantity of granular matter, a few stray tubes and vesicles undergoing disintegration, and abundance of fat globules of different sizes. Neither in this nor in the softened part of the left anterior lobe could a single exudation corpuscle be seen.

The arterial circulation was examined with care. The vertebrals and basilar were thickened, rigid, and of a yellowish opaque colour, from atheromatous or fatty degeneration. At the commencement of the basilar, the thickening of the vessel was so remarkable as to narrow its calibre most materially. It felt hard, like a piece of cord to the touch; on laying it open its internal lining was opaque and roughened, having lost its brilliancy and smoothness. Immediately on the distal aspect of the atheroma a dark-coloured clot of recent standing was seen completely blocking up the artery, and thus cutting off the normal supply of blood to the cerebellum, pons, and the posterior lobes of the brain on both sides, until a supplemental supply could be furnished by the internal carotid arteries, through the anastomotic system of the circle of Willis. The whole of the primary and secondary arteries of the cerebrum and cerebellum were more or less spotted with a yellowish coloured atheromatous substance. It was most characteristically developed, however, in the vessels on the left side of the brain.

The heart was flabby; aortic valves healthy; but the ascending aorta, the curtains of the mitral valves, the innominata, left subclavian, and carotid all contained atheromatous deposits.

For the above description of the post-mortem appearances I am indebted to Dr. Joseph Ewart, Professor of Physiology and Pathologist to the Medical College.

Remarks.—This case is one of great interest and importance. I have not been able to ascertain that there was any hereditary tendency to disease, either of the vascular or nervous systems; and the history of the patient, previous to the attack of hemiplegia, three years ago, tells only of a sound mind in a sound body. His mental and physical vigour were both remarkable, and although he was always of an excitable and vivacious disposition, there was nothing in the least suggestive of any organic or structural disease.

On hearing of the attack of hemiplegia, three years ago, and learning that it was not in any way connected with recent exposure to the sun or to great heat, I was at a loss to account for it, and my thoughts reverted to the ulceration of doubtful origin, as suggestive of a constitutional cause. I also thought of embolism; but not having the least idea that he was the subject of any vascular unsoundness, I was equally unable to account for the symptoms on this ground. I happened to know that the cardiac sounds were normal, and that he was free from any indications of valvular or other form of heart disease.

That a small vessel had given way, and temporary hemiplegia resulted from the pressure of a small clot in or near the left corpus striatum, was the last conclusion at which I arrived, and the subsequent history, up to his return to duty, appeared to support that conjecture. The post-mortem examination proved that it was even more than that. The universally diseased condition of the arterial system, and the extent to which this had proceeded in the cerebral vessels, fully account for all of not only the past, but the recent symptoms.

The arteries of the brain—principally of the left side, and more especially those of the posterior part of the encephalon—have

been diseased, as well as the vertebrals and the basilar, to a degree that I have never before seen. The vessels on the left side were unusually thickened and irregular from atheromatous deposit, and the basilar itself was completely plugged with a coloured but firm clot. This, no doubt, was of very recent origin, and dated from about the period when he passed into a state of almost perfect insensibility some days before his death.

The progressive disease of the vessels had, no doubt, so far interfered with the circulation generally, through the left side of the brain, as to induce the gradually increasing symptoms of cerebral softening to which his history points as having been present; and the probability is that other and smaller embolisms have, like that of the last attack, formed from time to time, and compromised the nutrition of the brain, though not occurring in the vicinity of, or where they immediately affected, the cerebral ganglia.

The cause of embolism, no doubt, lay in the roughened coats of the diseased arteries. As the atheromatous degenerations gradually increased, disorganizing the smooth epithelial lining of these tubes, the blood could hardly flow over them without leaving fibrous deposits or coagula, which in their turn being washed away by the current, were carried into smaller channels which they plugged; and thus the blood itself became the source of the mischief. The recent large embolism in the basilar artery—the result of contact with the roughened and diseased vertebrals—is only an example, on a larger scale, of what probably occurred years ago in a smaller vessel of the anterior lobe, and no doubt often, more recently, in the cerebral circulation generally, until finally the starvation of the medulla oblongata precipitated the fatal event. It is interesting, in reference to the observations of recent distinguished pathologists, to note that the lesion in the first place seemed to affect the left anterior lobe, and that certainly a marked feature in the case throughout was the affection of the speech; for even after the first attack, though perfectly recovered in all other respects,

there remained some peculiarity in his speech—a rapidity of utterance, and a tendency to forget or to substitute words that was quite unsuitable. As the wasting of the brain-substance proceeded, this condition of aphasia also tended to increase, until just before the occurrence of the last fatal embolism of the basilar artery it had become the most marked feature of his condition.

The arterial disease must, no doubt, therefore be regarded as the cause of mischief, and it is remarkable that it should have gone to such an extent at the comparatively early age of 42. The aorta was literally one mass of atheroma. There was more diseased than sound tissue, and it is probable that the same condition existed throughout the arteries, although no local gangrene had occurred to give evidence that it was so. In all other respects the patient was in remarkably good health, being fatter and more muscular than I had ever seen him, to within a fortnight of his death. His organs generally were sound; the lungs, liver, spleen, and kidneys performed their functions naturally; the heart's action was normal in rhythm and sound; and his pulse was steady and regular. The atheromatous degeneration of the arterial system appears to have been a constitutional peculiarity, and to it must be assigned the disturbance in the circulation which resulted in the pathological conditions I have described.

Case 2.—*Aphasia, followed by Recovery.*

This patient was an English officer, holding an important post; he was about 52 years of age, and of about thirty years' Indian service. During late years he had suffered much from chronic diarrhœa and anæmia; a recent visit to Europe had, however, somewhat re-invigorated him. He was of spare but active figure, and of regular and temperate habits; very intellectual, and much given to study. The duties of his office were of an important and responsible nature, and just before

the illness, for which he came under my care, they had been unusually onerous. He had, moreover, suffered much anxiety of mind and domestic affliction from the illness and death of a very near relative. He had lived alone, and had almost secluded himself from society since his return from Europe some months previously; but lately his friends had induced him to go out a little, and he had apparently enjoyed the relaxation and change.

It was on June 8th, 1868 (the weather being intensely hot), that I was called in while passing his house. "He had just had a fit." His servants, and one or two of his friends who saw him the day before, say he had been perfectly well up to 7.30 or 8 that morning. He had written a note just before he was taken ill, which was quite correctly worded; one written to me, probably when he felt the attack coming on (No. 1), was not so correct.

His servants say that he was lying on his couch, when they suddenly saw that he was convulsed on the right side, and that, on going up to him, he was quite unconscious. It was 10.15 a.m. when I saw him; he was lying on the couch with his eyes closed, but opened them directly I spoke, and appeared to recognise me; he then began to talk incoherently. He appeared not only to be unable to collect his ideas, but also to have lost the memory of words; he kept repeating one, which resembled "played." This came in as the second or third word of every sentence he tried to give utterance to, and he spoke very fast. For example, after replying to my question, "How are you?" he said, "I am better, I have played" (then incoherence)—"I don't know what brought this on,"—"I have paid, played, played," and then again he became altogether incoherent. His pulse was 120, and the radial arteries felt rigid. The cardiac sounds were natural, perhaps rather weak. I had repeatedly examined his chest before the attack, and the urine had also been frequently analyzed, and nothing abnormal detected. Having lost a near relative from Bright's disease, he had been curious

on this subject, and was constantly directing his attention to the state of his kidneys. The head was cool; the face pallid; no paralysis; no alteration in the tone of his voice; articulation was perfect; his tongue was clean; his bowels had acted freely that morning. His servants say, that it was the *right* side that was convulsed. Ice had been applied to his head before I arrived.

It occurred to me that the great heat of the weather—thermometer over 90°—had something to do with the attack, which probably indicated degenerated cerebral vessels, perhaps an embolus in one of them; or that there had been some slight hæmorrhage, or congestion, or transient interference with the cerebral circulation, and probably great general exhaustion of the nerve-centres.

I ordered chloric ether and acetate of ammonia, and enjoined perfect rest and quiet; ice to be applied to the head if it became hot, beef-tea to be given occasionally, and the bowels to be acted on by a simple enema. I saw him again at 4.30 p.m., and he looked pretty well; he replied in a word or two to every question, but immediately lapsed into a state of incoherence: he did not recur to the same word that haunted him in the morning, but he substituted other words, and seemed totally unable to grasp the one he wanted. He evidently understood all that was said to him, and tried to answer. A friend asked him to go and stay at his house: he thanked him, and was able to say he preferred remaining where he was; but he was quite unable to continue the conversation, and became incoherent. I left instructions that he should be well watched, and that beef-tea and the medicine should be given regularly.

June 9th.—He is in much the same state: pulse about 120; temperature of the body somewhat high. He replies to a first question intelligently, but soon lapses into incoherence. I asked him to read; he took the book and pretended to do so, but it was the most incoherent jargon, he all the time looking quite intelligent. He has taken some nourishment, and is said

to have slept. But for his shaven head, he looked fairly well. Cold had been applied, and his bowels had been relieved.

11*th*.—He remains much in the same condition: pulse from 110 to 120; skin cool, perhaps slightly feverish at times; the bowels act regularly. Takes readily all fluid food that is offered, and sleeps well. He is very quiet, tractable, and gentle; does or attempts all that he is asked to do. He walks with a peculiar gait, the body being bent forward; but this is merely an exaggeration of his ordinary carriage. His tongue is slightly coated with whitish fur, and there is a peculiar and somewhat offensive odour in his breath. A small blister had been applied to the nape of the neck, which has risen well, but he does not complain of it in the least. He seems quite tranquil, and even happy; appears to recognise his friends, but he cannot tell, or rather, perhaps, he cannot remember, their names, or the words he wishes to say to them. Yesterday I asked him to name one of his friends who came into the room; he smiled and said, "Oh! that's go-up," and then he muttered some unintelligible words. He can reply to a first simple question, such as, "Have you slept or eaten well?" He answers, "Oh yes, or no," as the case may be; but the next question, however simple, puzzles him completely, and the reply (for he tries to answer) is the most incoherent nonsense—words without connection or meaning. I asked him to read yesterday, and gave him a book; he looked for his spectacles, put them on, then gazed long and earnestly at the book, muttered a few words, and put it down. I next asked him to write a note; he sat down at his writing table to do so, took pen and ink, adjusted the paper, and sat looking at it. Then, after about a quarter of an hour, repeatedly making efforts to begin, and saying, "I can't write, oh, that's just it!" he scrawled three figures of 8. To-day, he read a few words correctly, and then became incoherent. He sat down to write at my request, and after about twenty minutes' delay, he produced the note No. 2, and then seemed so exhausted, that he was glad to go and lie down. It is difficult to say how far he

knows what he is doing. In the midst of the simplest reply to a question, he puts his hand to his forehead, appearing to try in vain to recall the word or idea he wants. For example,—"Have you done so and so?" "Oh yes!" "Do you like it?" "Oh yes!" "Why?" "Because I—I—I can't work a bit, because it is a tight height." I have directed that he shall be very closely watched day and night, but he is tractable and gentle in the extreme. Nourishment with a little wine to be given frequently; an aperient when the bowels are confined; perfect quiet; the head to be kept cool; the feet warm, for they are sometimes cold.

12*th*.—He seems rather better to-day: pulse 84; skin moist; head cool; bowels freely opened. I tried him with reading and writing; he read a few words correctly, but others he changed altogether. His writing is appended in Nos. 3, 4, 5. He answers questions pretty well, and looks as if he understands what he wants to say, though he is unable to remember the words he requires. He saw me looking at some numbers of "Good Words" lying on the table, and said there was something in them that was very good, although he could not remember what it was, or who wrote it; but he took one of the numbers up, and opening it at Gladstone's article on "Ecce Homo!" said, "Take it with you." All this was uttered as by one in perfect health, but he lapsed immediately into incoherence. He has eaten and slept well; is in good spirits, and answers cheerfully to any question. The same treatment continued.

13*th*.—He looks better; is sitting up; slept well; and is taking food freely. Had a pint bottle of claret, and a glass or two of sherry yesterday. I asked him if he had read the newspaper, and he replied, "Oh yes; Eyre! Eyre, Chief Justice." He then took up the *Englishman* and read that "the Chief Justice, and all the *budges* (judges) had done so and so;" he made one or two mistakes, but on the whole had more command of words than he had yesterday. He remembered my name, and mentioned it several times, but he could not manage

that of an intimate friend who had just then come in to see him. I asked him to write a note, and he at once cheerfully sat down to do so. The result is appended. (No. 6.) There is also a memorandum of what he wished to have for tiffin (No. 7) and dinner, and an order that was to be sent to his wine merchant. (No. 8.) His skin and head were cool; pulse 84; bowels open; much less of the peculiar odour noticed in his breath. Altogether, he looks much better and stronger; is cheerful; and walks with a less stooping gait. To-day I ordered quinine with tinct. nucis vomicæ. The blister on the neck is still open. He takes a generous diet, and a pint of claret daily. In the evening he was evidently better. He had written an order to his wine merchant, and some other notes. He read several lines with few mistakes; he seems much interested in doing this, but soon gets tired, and then he becomes quite unintelligible.

14*th*.—He is better this morning: pulse 80; has slept well; no heat of head or body; reads very well, miscalling only a few words. Talked quite naturally about many things, and especially about his illness; recollected being taken ill, but could not describe his sensations; remembered people also who came to see him, and the days on which they came, but could not always recall their names; even whilst talking he forgets words, or substitutes others of a similar sound; at the same time he appears conscious of his defect of memory. He wrote a note (No. 9) to a friend; he remembered his name and appeared much amused that he did so. It had been stormy during the night, and this was evidently in his mind when he wrote. Notwithstanding that he spoke so well, the wording of his written memorandum (No. 10) shows how far he still was from health. I should note that the handwriting from the beginning has been almost as steady and firm as when in his usual health.

15*th*.—He seems to be doing well. He read a telegram in the paper, and commented fairly on it, but made several mistakes in his words; read part of a book equally well, and

wrote memoranda (Nos. 11, 12) about his food; his writing falls far short of his reading or conversation. His physical health is good; bowels regular; pulse 80; temperature of body normal. His memory in some respects is not so good as it was a day or two ago; he could not to-day remember the names of common objects, or his intimate friend's name; but he was quite sensible of his defect of memory, and smiled as he alluded to it. He takes his food well, and half a bottle of claret daily.

16*th*.—He is much the same, with memory, if anything, rather clearer. He reads with few mistakes, but his writing (No. 13) is not equal to his reading; he has a fair appetite, slept pretty well last night. It should be noted that during the last ten days rain has fallen, and that the atmosphere has been much cooler, which has been in his favour.

17*th*.—He is improving; had a good night; tongue clean; pulse 80; blister healed. He read an advertisement in the newspaper quite correctly, and spoke well with occasional mistakes, of which he was quite conscious.

18*th*.—He continues to improve, and reads and writes (No. 14) better, forgetting fewer words. His physical health is otherwise good.

19*th*.—He continues to improve; conversation perfectly natural; reading almost without a mistake; writing (Nos. 15, 16) improved, but still not correct. An ordinary observer would now probably not notice any peculiarity in his conversation.

21*st*.—Doing well; speaks almost correctly. In reading he occasionally mispronounces a word, but seems aware that he has done so.

22*nd*.—He is doing well; speaks and reads correctly, or nearly so; writing (No. 17, 18) improved, but still not perfect. Does not seem to be in quite such good spirits as he has been.

27*th*.—He is quite convalescent; has been out driving. His conversation and reading are now nearly perfect. He occasionally forgets or substitutes one word for another. He has a tolerably distinct recollection of all that has happened, and

remembers being taken ill, but has no recollection of the fit. He is to leave India for Europe by an early steamer.

July 3rd.—He has left by the steamer, in all respects much better, but still he occasionally forgets a word.

He arrived at home safely, and for some time was much better for the change. Subsequently I heard, but without details, that there had been some recurrence of the symptoms. At a later period (September, 1869) I heard that he was alive and well.*

The following are specimens of his notes and memoranda written at my request during his illness. The writing generally was as good and firm as though he had been quite well. There are peculiarities which cannot be represented in print; often the initial letter of a word is obliterated and re-written, as though he had hesitated as to what letter he should use, and many marks and letters that are unintelligible have been left out, as they could not be imitated.

A gradual improvement in each note may be observed, but the composition was always inferior to his manner of expressing himself; and when he wrote the last of these notes, his conversation was almost without a mistake. Most of these memoranda were signed in his usual bold and firm handwriting; his signature, indeed, alone would not have betrayed any defect.

No. 1. June 8th.

Please come wall and see me. Y.
8th August.

No. 2. June 11th, 1868.

I am so bad to-day, abad, all abad. Yesterday all ab—abeledu—all bide—blessed, blesse tut.

Js. Js. Js.
P. P. P. P. P.

Bless, bless.
Bless: 11, bless 11, blesse.
P. B. B. B
P. P.

* He died about a year afterwards.

No. 3. June 12th, 8 a.m.

Wednesday.

I should nisbly a wark of blacking a boik of book if I ask.

No. 4. June 12th, 4 p.m.

Have any one a dundred any brere wone.

By belief was very ill. A dwellng; so derely a darèf; a waif all along light. At about a enaty brefest a baturfent about after a dayfeet about first day.

No 5. 12th June also.

I am better, he is better, but ill a ill my bill a better ill i bill my better is a bouller ill I———

No. 6. June 13th.

It was bloying all the well, it was barring in bottle, it was sainty. It has been raining all the night; I have been very.

No. 7. June 13th.

Bacon. Begs. Begels. Spiripe Scink. Soups. Spitch Cock. Spinciple.

This was what he wanted for tiffin.

No. 8. June 13th.

Beshonath Law.

Claret wine as usual. Some for my tervan.

No. 9. June 14th.

You we have had an awnully lot of both, during last night it was training during last night, the train was for-fully getting it.

No. 10. June 14th.

I heems to have been pretty well and am as just as you are all. I am better than I was, but I hope in a few days I shall be able to do so as I well can.

No. 11. June 14th.

Swit Bread. Dinner. Soup. Spick lock. Brodline.

No. 12. June 15th.

Something about two o'clock a bed of mutton to read. Then at night, I will have something to read at nice I will have some wine for me.

No. 13. June 16th.

It has been wet than it used to be. There is very little to be done for all the Englishmen to be said.

No. 14. June 18th.

I have been seeding the paper, and have been reading about all the news.

Kidneys for breakfast.

Spitch Cock. Soup. Roast mutton.

Wine. Bordeaux.

No. 15. June 19th.
Morning. Eggs and Bacon.
Tiffin. Mutton chop. Soup. Mutton or Beef.
Bordeaux.

No. 16. June 20th.
We have ordered fish and omelet.
There is nothing ordered for tiffin, as nothing is yet settleded.
Soup. Beef or Button.

No. 17. June 21st.
I am very much better than I have been for the last few times. I have ordered some breakfast, but nothing yet for tiffin and dinner.

No. 18. June 22nd.
I am quite well, and I have nothing to bother me about my head at all. I have not heard what we are to have in tiffin or T. Tinner. The T breakfast we are to have fish and omelet.

Remarks.—I have recorded this case in detail, as it illustrates some points in the pathology of the disease that have been much discussed by recent observers. The symptoms were exactly those described by Trousseau and others; the loss of memory of words, even whilst the intelligence was comparatively good, was remarkably shown during his recovery. The incapacity to write correctly whilst he was able to express himself almost clearly, was very illustrative of that phase of cerebral disease which has been termed "agraphia" by Dr. Bastian.

The convulsion on the right side, at the commencement of the disease, so far supports the views of Dr. Dax and others who localize the cause of the disease in the left cerebral hemisphere. Happily, the opportunity did not occur of ascertaining whether in this case the views promulgated by Drs. Dax and Broca, as to the precise localization of the lesion in the anterior and outer portions of the middle lobe of that hemisphere, near the island of Riel, and consequently close to the posterior portion of the frontal lobe, were correct. His recovery without paralysis, and the almost perfect restoration of the power of speech and writing seem, I think, to indicate functional disturbance rather than structural change. His prematurely aged

appearance, the rigid arteries, and other general indications of adipose and atheromatous degeneration, suggest the possibility of disturbed cerebral circulation, and point, perhaps, to the middle cerebral artery as the seat of some transient interruption of the circulation, or the temporary presence of a thrombus or embolus. It is possible that congestion or slight hæmorrhage may have occurred from similar causes; and as the central ganglia were probably only slightly compressed, the symptoms, after the convulsion had passed, were confined to what was due to changes of a transient nature that had occurred in the left anterior cerebral lobe.

It is possible also that this may have been one of the protean forms assumed by cerebral exhaustion, the result of long residence in a tropical climate, exhaustive disease, and an overwrought brain; and that structural disease, in the conventional acceptation of the term, may have been absent. In any case, it was impossible not to regard with anxiety the future of one so affected; and the chief practical lesson to be derived from such a case is, the avoidance of a too protracted residence in a climate where we were never intended to live, the early acceptance of those warnings which usually precede the breaking down of the vigour and force of the nerve-centres generally, and the timely relaxation from oppressive mental work, as well as absence from the exhausting effects of a hot, damp, and malarious Indian climate.

Very little has been said about treatment; as far as the administration of drugs went, very little was needed. Rest, proper nourishment, and the absence of all excitement were the conditions necessary to enable Nature to repair the mischief and restore the diminished power. Due attention was paid to the state of the bowels, and the head was kept cool, if ever the least increase in temperature suggested excitement of the circulation. An allowance of wine was permitted with the food, for although a very temperate man, he had been accustomed to take a regular quantity of stimulants, and this certainly was not the occasion on which to withdraw the accustomed supply. A blister was

applied to his neck, but I doubt if it was of any service, and I believe now that he would have done just as well without it. I strongly urged that he should never return to this country, and that his brain should not be overtaxed with work of any description.

XXXI.—A CASE OF SO-CALLED MADURA FOOT.

S. T., a Mahomedan, aged 30, a healthy, muscular, agricultural labourer, from the Burdwan district, about eighty miles from Calcutta, was admitted the 28th of May, 1871. He gave the following account of his case:—A corn having formed on the sole of the left foot, near the root of the great toe, about eighteen months ago, and inflamed, it was cut. The sore healed, and for about a year he was well. The part then began to swell, inflame, and become painful, and sinuses formed about it. Native remedies were applied without benefit, and blisters were equally unsuccessful. The foot soon began to swell generally, and in six months had attained its present condition. He says that he has never before been away from his home.

The left foot was much enlarged, forming a firm ovoid mass thirteen inches in circumference around the instep, and studded with papillary prominences, the orifices of sinuses which led in all directions deep into the mass. A probe could be passed to a considerable depth into the sinuses, which were tortuous; but no bone could be detected. These prominences were fungoid, and around each orifice there was the appearance of an areola of gelatiniform tissue. Out of each of the sinuses, in addition to a sanio-purulent oozing, sebaceous-looking matter could be pressed. There were one or two such sinuses also about the ankle-joint, but they did not extend above this. The swelling was confined entirely to the foot, which had assumed an ovoid shape, and was as convex and prominent at the sole as on the dorsum. It caused considerable pain.

The swelling increased rapidly, and from the 28th July to

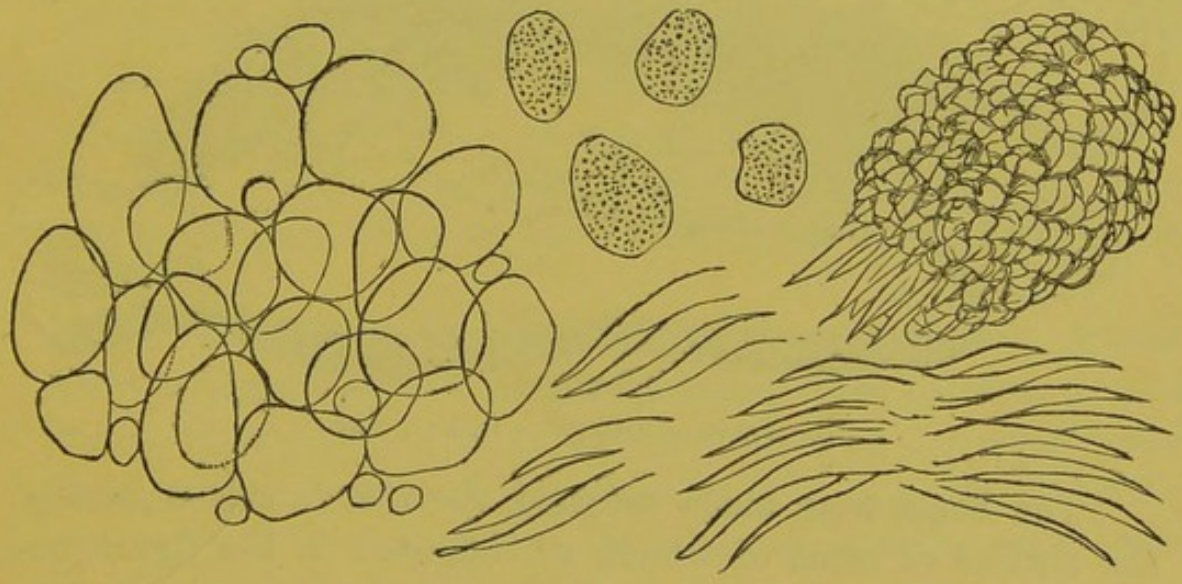
the 13th August it had augmented in circumference by two inches. The foot was removed by Syme's amputation on the 13th August. One or two sinuses remained in the heel flap, and its tissue was found to be thickened and infiltrated. Several masses of the diseased tissue were dissected out, leaving the anterior portion of the flap very thin. Notwithstanding this searing of the flap, only a portion of it perished, and the patient had, by the 12th September, nearly recovered, with a very good stump. It is worthy of note that one or two sinuses that remained in the heel closed in, and cicatrized completely. He had an attack of phlebitis of the saphena vein, but under the influence of aperients, quinine, and iron, with application of nitrate of silver lotion, he quite recovered from this, and is now in excellent health. The tibia, where divided, was perfectly healthy.

On making a longitudinal vertical section of the foot, it was found to consist of a mass of fibrous and connective tissue, pale degenerate muscular fibre, and fatty tissue, blended in a confused manner, with gelatiniform-looking substance.

The bones seemed to be softened and undergoing fatty degeneration, the metatarsus as well as the tarsus being affected, and it was evident that some of the sinuses led directly into this substance, and from them was obtained a sebaceous-looking matter similar to that which was found in the sinuses. There were several depôts of this matter scattered throughout the foot, and with each a sinus communicated. There were here and there a few patches of pale pinkish, slightly yellow or orange-coloured discoloration, but nothing in the least resembling the dark masses described as being found in some cases of this disease. I made most careful microscopic examination of the foot, and I gave specimens of it to Professor Ewart and Dr. T. Lewis, who also made a most careful and elaborate examination of it. The result was that nothing could be detected that in any way supported the theory that the disease is due to the presence of a fungus. Crystalline fringes bordering granular matter at first suggested the possibility of some low form of

vegetable growth, but they were completely soluble in ether, and left no trace of any organism. Nothing but muscular and connective tissue in a state of degeneration could be observed. The conclusion arrived at was that in this case, at all events, no fungus exists.

My experience of the disease is too limited to enable me to offer any positive opinion on the subject, but I cannot help thinking that it is possible that the fungoid growths, where they do occur, may be a consequence and not a cause, of the disease, whose affinities are more probably to be referred to



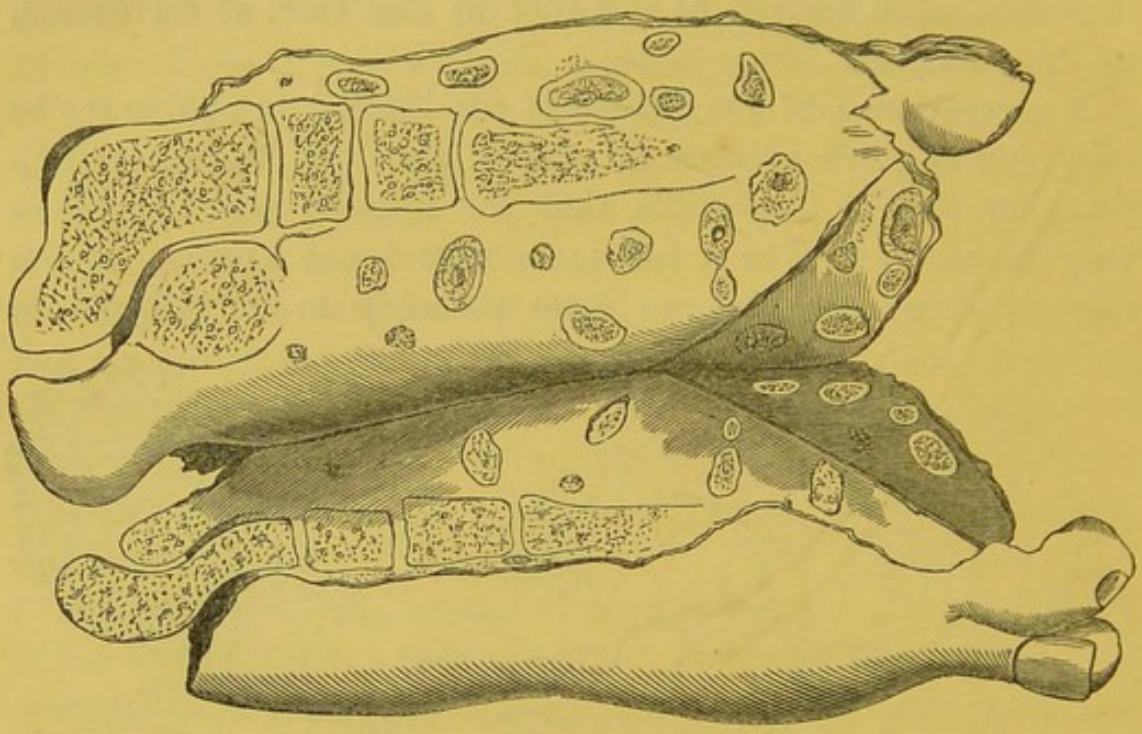
elephantiasis or some allied constitutional disorder, than to the presence of a vegetable growth possessing the strange and seemingly improbable power of finding its way into the depths of the tissues forming the foot. The accompanying sketch was very kindly made for me from nature by Dr. T. Lewis, of H.M. Medical Staff—an officer whose microscopical investigations of the lower forms of vegetable growths are so well known.

I do not know that any case of this disease has been hitherto reported as occurring in Lower Bengal.

Subjoined is an extract from a letter which I have since received from Dr. Lewis in relation to this case :—

"The saw is seen to have been carried through the tarsal bones (a little to the right of the os calcis—a small portion only

of it having been sawn through), through the third (?) metatarsal bone, and between the flexor tendons belonging to the second and third toes.



LONGITUDINAL SECTION OF MADURA FOOT.

"The bones were much softened, the metatarsals especially, the outline of some of which, as indicated in the figure, had become less defined.

"Nodules of various sizes interspersed throughout the tissue of the foot—both above and below the bones—are seen to have been cut through. These constitute, I believe, what have been referred to as the 'fungus masses' peculiar to the disease. They consisted of more or less oval patches of pale yellow granular matter, generally distinctly isolated from the surrounding tissue, and here and there presenting some pigmentary deposits of a saffron or pinkish tint, but in other cases dark, and the substance quite soft. Several of these accumulations presented a gelatinous, glistening appearance at one part, being also of a firm consistence, whereas another portion of the same isolated mass would be soft and granular; indeed, these patches were, not infrequently, observed to be somewhat

honeycombed, as if little 'cups,' composed of fibrous tissue, had been filled with an exudation—aggregations of which constituting the so-called 'fungus mass.'

"A great number of preparations of these masses, pigmented and otherwise, were subjected to microscopic examination, and no great difficulty was experienced in recognising pretty nearly all the forms delineated in the numerous illustrations which have appeared in various journals in connection with this subject. I failed to discover the slightest indication of the presence of any fungus.

"On subjecting the specimens to the action of *warm* ether, all these peculiar forms—arborescent, spore-like, cyst-like, mycelium-like, and so forth—disappeared, the fibrous stroma alone remaining. Various other reagents were resorted to, and every endeavour made to detect some substance of a vegetable nature but in vain.

"In order still further to satisfy myself on this subject, thirteen samples of the material forming these patches, selected from various parts of the foot, were prepared; to each of which some animal or vegetable substance, or a combination of the two, were added, such as cheese, albumen, blood-serum, boiled rice, Pasteur's fluid, plantain fruit, &c.

"These specimens were set aside in a moist chamber, and carefully watched from the 14th August to the 7th of November, 1871—over two months—corresponding preparations of the nutritive media *alone* having been similarly kept under observation.

"Notes of the examinations were recorded from day to day, but the results were so completely negative, as far as the appearance of any peculiar fungus was concerned, that I do not think their publication would be of much interest."

One-half of the foot was forwarded to the Museum of the Royal College of Surgeons of England; and the following is the account which I have received from Dr. Goodhart, the Pathological Assistant of the Museum:—

"Section of foot. The skin over the dorsum is healthy,

except two small circular openings of sinuses, one over the posterior part of the interspace between the third and fourth metatarsal bones, the other over the metatarso-phalangeal joint of the third toe. The sole is swollen over the ball of the toe, and is perforated in various places with from ten to twelve circular apertures. These are rather peculiar. In some the hole in the integument is circular, and as cleanly cut as if it had been punched out with a circular drill; in others the cuticle is

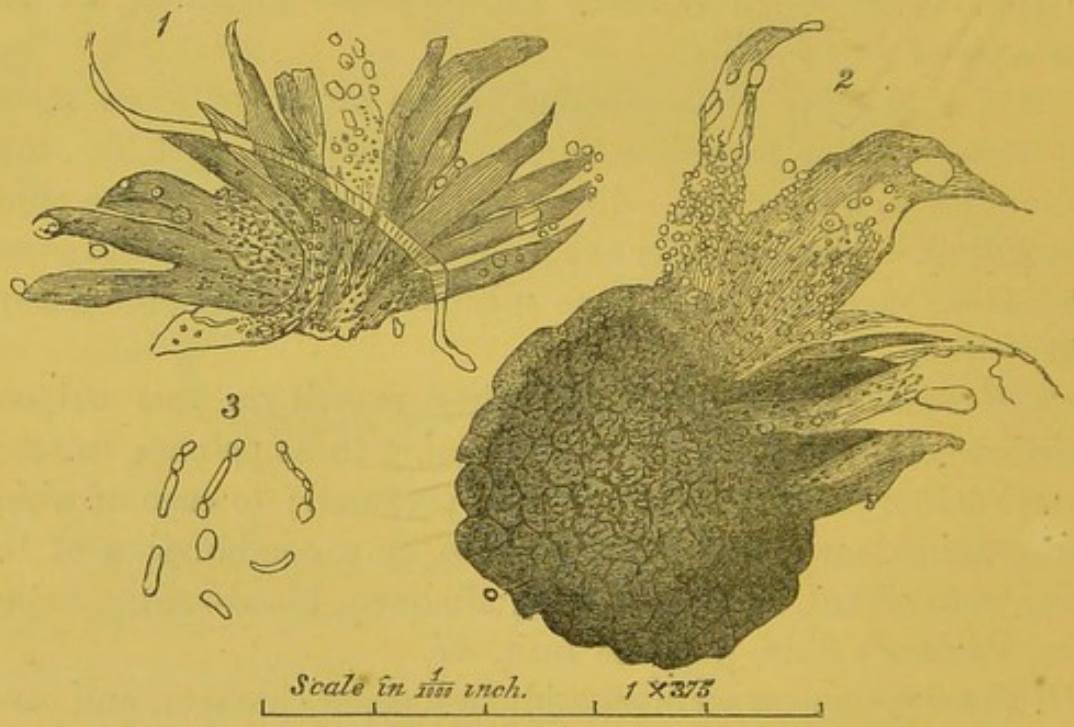


Fig 1.—Radiating processes from "fish-roe" masses. Crowds of these were seen in the field. They were obtained from small white bodies, rounded, the size of herring roe, found here and there in the sinuses. These processes could only be seen when one of the white bodies had been obtained. Diluted caustic potash destroyed them. Much fatty material existed about them.

brown and ragged over the sinus, and worm-eaten in appearance. Each sinus is lined with a thick membrane, which has a smooth and shining internal layer; these walls are quite distinct from the surrounding structures, though inseparable from them by dissection. The sinuses extend throughout the substance of the foot. They are filled with a soft brownish pulp, which has no definite structure in its present state. The section of the foot further shows the layer of fat superficial to the plantar fascia to be for the most part healthy, though in

many places riddled by sinuses. Beneath the fascia the muscular structures are all matted together, and granular, while a soft, brownish, granular material in many spots replaces them. The bones seem undergoing a similar change at the base of the second metatarsal bone, and at the under part of the scaphoid and cuneiform. On slitting up some of the sinuses collections of small round white bodies were found at their deeper parts, having much the appearance which has been described as 'fish-roe.'

"Examined microscopically, no characteristic appearances were obtained except from the 'fish-roe' bodies. The muscular structures of the foot were much wasted, but were not altogether destroyed; they still retained their characteristic appearances. The sinuses and parts around all showed very similar changes—viz., an areolated stroma crowded in with slightly oval bodies of uniform size, and $\frac{1}{2000}$th inch in diameter. They were hyaline-looking, with very distinct outline, and without a trace of nucleus (? fungus spores). Much fatty degeneration existed, and it seemed possible that this cellular structure might be only granulation material changed by the preservative fluid in which the specimen had been immersed.

"The 'fish-roe' when flattened out under a covering-glass was very greasy. Each small sphere appeared in the constant form of a central opaque mass of cells fringed by a circlet of tapering processes (Figs. 1 and 2), which looked not unlike large columnar epithelium, the nuclei of which had become obscured by fatty changes. On subjecting them to the action of dilute caustic potash they were destroyed, leaving behind much granular matter and small spore-like bodies, as shown in sketch, Fig. 3. These masses correspond exactly to what have been described as nests of spores coated over with fat crystals. Upon this point I am not able to decide. In one or two places it seemed to me that these so-called fat crystals were evidently mycelium; but if they are fat crystals only—and they were destroyed by alkalies—then the only approach to fungus noticed in the case is accounted for. Nothing else of note was observed. The specimen was much altered in character by preservation.

"The case is evidently exactly similar in most respects to those described as due to a fungus. The bodies which have been described as containing spores were also present, but after repeated examinations by the microscope, I have failed to obtain satisfactory evidence of their presence, though it is still possible that they may be in the *white balls* mixed up with fatty matter."

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