On the nature and treatment of the distortions to which the spine and the bones of the chest are subject : with an enquiry into the merits of the several modes of practice which have hitherto been followed in the treatment of distortions / by John Shaw.

ON THE

NATURE AND TREATMENT

OF

THE DISTORTIONS

OF THE

SPINE, &c.

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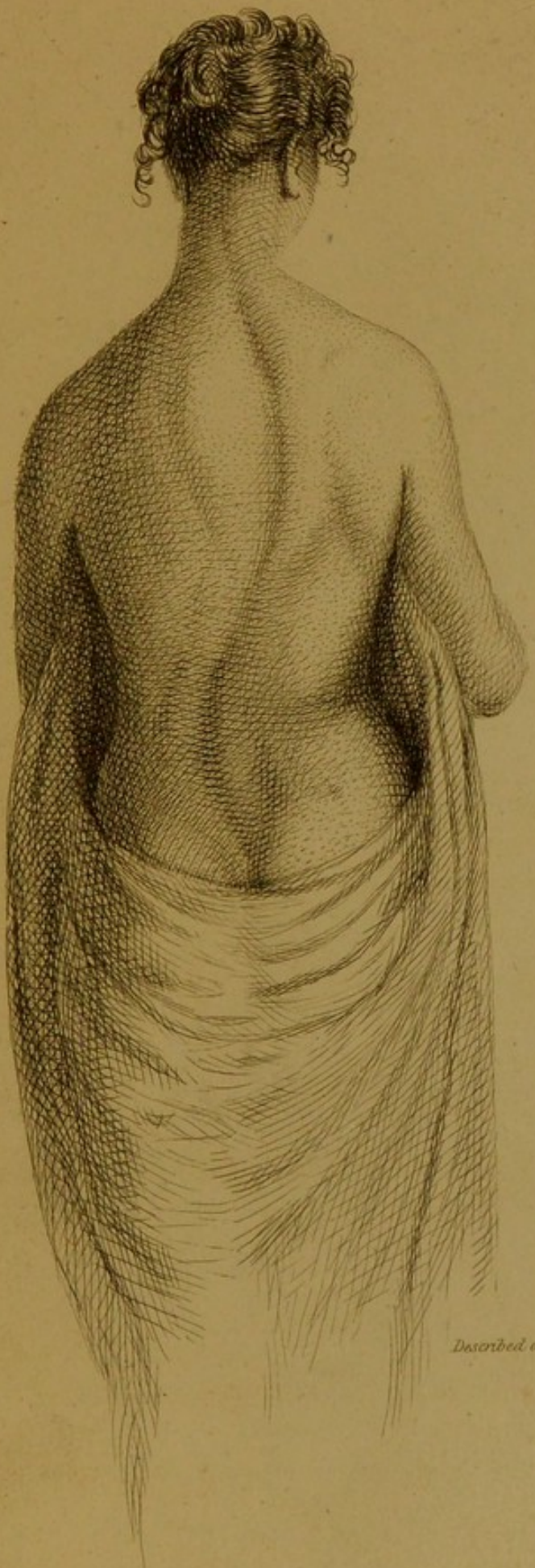

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ON THE

NATURE AND TREATMENT

OF

THE DISTORTIONS

TO WHICH

THE SPINE,

AND

THE BONES OF THE CHEST,

ARE SUBJECT.

WITH AN

ENQUIRY INTO THE MERITS OF THE SEVERAL MODES OF PRACTICE WHICH HAVE HITHERTO BEEN FOLLOWED IN THE TREATMENT OF DISTORTIONS.

ILLUSTRATED BY PLATES IN FOLIO.

By JOHN SHAW,

SURGEON, AND LECTURER ON ANATOMY.

LONDON:

PRINTED FOR

LONGMAN, HURST, REES, ORME, BROWN, AND GREEN,

PATERNOSTER-ROW.

1823.

TO

CHARLES BELL, Esq.

My Dear Sir,

It would be natural for any one who has witnessed your success in establishing the connection between the sciences of Anatomy and Surgery, to inscribe a work of this kind to you; but I, who have enjoyed your uninterrupted friendship for sixteen years, as your pupil, assistant, and colleague, have stronger motives for publicly expressing my acknowledgements. Permit me, then, to dedicate this volume to you; and believe me to be,

My dear Sir,

Yours, faithfully and affectionately,

JOHN SHAW.

London,
Dec. 1. 1823.

PREFACE.

As the spine forms a column, by which all the bones of the body are connected, and as the spinal marrow, the most vital of all the organs, is contained within it, the diseases to which it is liable are particularly interesting. Deformity is the necessary result of the slightest deviation of the spine from its natural shape, and Life is endangered by many of the diseases and accidents to which it is subject.

The enquiry into the distortion, commonly called Lateral Curvature of the Spine, occupies the whole of the present volume. * The importance of investigating

* The other diseases of the spine and the distortions of the limbs will form the subjects of another volume.

the nature of this malady, by which many young persons are rendered miserable for life, is too obvious to require any comment.

If the frequency and variety of distortions of the spine, have not hitherto been sufficient to attract the attention of pathologists, the necessity of investigating them, is proved by the fact, that while in some instances distortion depends on causes which endanger life, in others it proceeds from indolence and bad habit; and although the severest surgical treatment may be necessary in the first set of cases, the latter may be remedied, by restoring to activity, functions, which have been permitted to fall into disuse.

Happily, the enquiry is interesting in a physiological, as well as in a practical view; frequent opportunities are afforded of witnessing very curious phenomena, by which the healthy as well as the diseased actions of parts are illustrated. The man-

ner in which organs essential to life, conform to alterations in the skeleton, is not more surprising, than the changes that may be effected, by restoring parts to the regular performance of functions which had been neglected.

Since the treatment useful for one kind of distortion may not only be inefficacious, but even dangerous in another, it is obvious that they who propose to remedy distortions of the spine, should be capable of distinguishing the nature of the different cases. This power can only be acquired by a careful examination of the different organs of the body, both in a natural and diseased condition. To offer proofs of this, in the present state of the sciences of Medicine and Surgery, might be considered superfluous; but it becomes requisite, when we find it argued, that a person unacquainted with anatomy or pathology, is

sometimes successful in the treatment of distortions, where surgeons of eminence have failed.

In the first chapter, I have endeavoured to explain the reason of the occasional success of the Charlatan; and although it may be matter of surprise, that well-informed persons should entrust the treatment of their children to uneducated men, yet it must be admitted, that the opposite modes of practice which are recommended for the same affection of the spine, by surgeons of the first eminence, may influence the mind of an anxious parent, and lead to a suspicion that those unlearned practitioners have secrets for the management of distortions, with which surgeons are not acquainted.

To shew that the principle of practice is undetermined, we need not refer to the history of the various modes recommended by surgeons of former days, — we have only to observe those of our cotemporaries.

For example, one patient is advised to lie on the inclined plane for six or eight months, or even years, and not to sit up nor use the spine during that time; another, in exactly the same state, is recommended to practise all kinds of violent exercises; a third is sent to Hinkley or Bath, to be encased for years in iron machines, similar to those represented in the first and second figures of the sixth plate; a fourth is put into the hands of a professed rubber, or of a person who promises to reduce the bones to a soft jelly, and then to mould them to their proper places.

It often happens, that a patient having followed one of these modes for a considerable time, and under the direction of an eminent surgeon, is induced to try another, and is cured, although the means are perhaps diametrically opposite, and have been recommended by a *quack*. Such an occurrence, when combined with the well-known fact, that much difference of opinion

exists on the subject of distortion, is sufficient to confirm a parent's suspicion, that the knowledge of the *quack* is superior in such cases, to that of the surgeon. But the explanation of this occasional success (which will perhaps be an answer to the histories of wonderful cures with which we are liable to be assailed, during the necessarily tedious attendance on cases of distortion,) is, that so great is the variety of affections of the spine, and so many distinct stages are there in each case, that all the modes of treatment that have ever been proposed, may sometimes be useful and even successful.

From comparing the condition of patients affected with curvature of the spine, with a variety of specimens of distortions, I was some years since, led to suspect, that many important practical questions regarding these affections, were undetermined. As

my opportunities of seeing patients increased, these opinions were strengthened, for I frequently found that cases entirely different from each other, were classed under the same name; and that, while similar modes of practice were recommended for two distinct diseases, those which resembled each other, were as frequently treated on principles diametrically opposite. Such observations induced me to prosecute the enquiry; in doing so, I have not busied myself with vain theories, nor has my object been to obtain credit for a favourite hypothesis; but I have endeavoured to unravel the difficulties of the subject, by collecting a series of facts, which are not only apparent in the changes produced upon the living form, but admit of being demonstrated by the condition of the different organs after death.

To shew that the conclusions are drawn from observations made on the condition of patients suffering from the various

kinds of distortion, and also from facts which cannot receive a colouring from pre-conceived notions, I have added, in an Appendix, a short description of the specimens of distortion that are contained in Mr. Bell's museum. These are now so numerous, that they may be considered sufficient to determine most of the questions connected with the enquiry. But, besides these proofs, many have been brought forward from other sources, in support of the conclusions to which long and earnest investigation has brought me.

The following pages, such as they are, I now lay before the public, trusting, that the importance of the facts which they contain, will compensate for the defects of composition. It will be seen that I have followed the plan of demonstration, which, though not very usual in pathological works, seemed to me more adapted than any other, for putting my reader in possession of the facts on which my opinions

were founded, as well as of the opinions themselves. * I trust that the occasional repetitions into which I have been led, will be excused by those who are acquainted with the extent and difficulty, and I may say, even the novelty of the enquiry: for my reader must be aware, that although there are many works on one disease of the spine, by the most eminent surgeons, there is not a single book of authority, where the nature of the various affections which produce distortions of the spine are discussed.

When the discordant opinions that have hitherto prevailed on this subject, the mistakes that have been made, and the unnecessary torture which has been inflicted, are considered, I hope the importance of establishing, by unquestionable

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* This volume might have been much extended by the relation of a series of cases; but I have been anxious to found my opinions on a firmer basis; and especially on such proofs as will always be open to examination. The few cases given, are offered in illustration of disputed points.

facts, and legitimate inductions, the distinctions between cases of distortion which depend on specific diseases of the osseous system, and those which proceed from other causes, will be acknowledged; and when we recollect the distressing and anxious situation, in which the Physician-Accoucheur is often placed, on being called to decide a question involving the life of the most important member of a family; when the suspicion arises in the mind, that a most dreadful operation may sometimes be performed, without sufficient cause, it is unnecessary to urge the importance of being able to prove, by the most conclusive evidence, that, in whatever degree the spine may be distorted, the pelvis is not affected except in particular cases, which may be recognized by certain marks. The proofs that are given of the error of the prevailing opinion, regarding the effects of machines on the pelvis, and the facts shewing that the symptoms produced by distortion of

the spine, have often been mistaken for those of the disease of a vital organ, will perhaps be also considered as tending to improve pathology, and consequently to lead to safe and rational rules of practice.

In conclusion, I cannot but indulge the hope that my labours may be instrumental in rescuing from the hands of bone-setters, bandage-makers, and ignorant Charlatans, a department of practice, which is more than any other, peculiarly in the province of the surgeon, who has been well educated in anatomy and pathology.

London,
Dec. 1. 1823.

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PHYSIOLOGICAL AND PATHOLOGICAL

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ON THE CAUSES OF

DISTORTION.

It may be stated as a law of the animal œconomy, that the exercise of an organ is necessary not only to its perfection, but even to its preservation. This is often exemplified by the state of parts which are not kept in due activity; for if they are not exercised, they degenerate, so as even to lose their peculiar characters, and gradually to become similar in structure to the common cellular membrane.

In the investigation of this law, we are led to the curious and important conclusion, that the cellular membrane is not to be regarded merely as a modification of the original tissue or matter in which the

peculiar substances that give character to *bone*, *muscle*, and *nerve* are deposited, but even that, from which other parts may be formed. The leading proofs upon which this opinion rests, are, that the several organs, unless kept in action, degenerate into cellular membrane; and that under certain circumstances, new organs, different in appearance and in function, may be formed, where nothing but cellular membrane was before visible.

On first examining the parts which compose a joint, and each of which is so admirably fitted for its peculiar office, we do not at once acknowledge the truth of what has been stated. On the contrary, it is difficult to imagine that the *bone*, so curiously adapted for security and motion, the *cartilage*, so different in appearance from the bone, and the *secreting membrane*, so peculiar in its character, should, with the dense *ligaments*, the *tendons*, and *bursæ*, be all resolvable into a matter similar to the cellular substance by which they are united to each other. But however improbable this may at first appear, its correctness is easily demonstrated. As long as a joint is kept in

activity, the apparatus continues perfect; but when the motion of the joint has ceased for some time, all its complex parts degenerate; their peculiar characters and structure disappear; they fall into the same condition, and assume the same appearance with the cellular membrane. When we examine a joint which has been anchylosed, we see that the character of every part is changed. The bone is no longer hard, but softened and cellular; and the bursæ, the capsules, and the ligaments, form one indistinct mass of cellular membrane.

The converse of the above proposition holds—That new organs, different in appearance and in function, may be formed of cellular membrane. If a bone be dislocated, and its head lie imbedded in the cellular membrane, cartilages, capsules, bursæ, sheaths, ligaments, all may be formed from it; and if these parts, constituting a new joint, be kept in activity, although they may not have the regularity of the apparatus of the original joint, they assume all the characters of the several parts. Even the new cartilage is similar to the original matter,

which is supposed to be a substance *sui generis.* The new capsule has also all the characters of the proper synovial membranes. Indeed, when we carry the enquiry farther, we discover that all the membranes which have been hitherto classed as distinct from each other, and supposed to be peculiar in structure, are not only resolvable into common cellular membrane, but may be formed from it.

The condition of the capsule in anchylosed joints, is sufficient evidence of the consequences of the want of use on the serous membranes; and to demonstrate that the same effects are produced on the mucous membranes when the necessity for the performance of their functions ceases, we may offer the condition of the rectum when an artificial anus forms high in the intestinal canal. That serous membranes may be formed from the cellular substance, has been already shewn; and in proof of mucous membranes being produced of the same material, we may adduce the well-known fact of the change which takes place in the cellular membrane of the peri-

neum in fistulous sinuses, or when a new urethra is formed by an operation. *

But leaving these curious consequences for the present, let us return to the consideration of the general law — That every part degenerates, unless it continues to perform to a certain degree its peculiar function.

There are many illustrations and examples of this law, which it is important to observe in the enquiry in which we are engaged.

The effects produced upon the MUSCULAR frame, when there has been long confinement to bed, or when, for the purpose of deceit, the limbs have been bandaged so as to prevent the muscles from acting, are well known. But there are other sources of the diminution of the muscular power, which are still more important to observe; as, for example, the confinement of young

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* With the physiologist, it may be a question whether bone, ligament, tendon, &c. are formed out of the cellular texture, or by a deposite into its interstices; — certain it is, that the activity of the living principle rapidly changes and curiously adapts to a variety of uses, that which to our eye, appears only cellular membrane.

persons who are slightly distorted, for months together, to one position, or the encasing them in machines, which not only preclude the necessity of any muscular exertion, but, by pressure on particular parts, cause the muscular substance to waste. On this subject I shall not at present enlarge; but the consideration of the above effects is of the first importance in this enquiry, and will be resumed in another part of the work. *

The effect produced upon the osseous system by want of exercise, may not at first be so obvious as the effects on the muscles; but it is occasionally exemplified in a very striking manner. In Mr. Bell's collection, there are several instances of dislocated joints, where the margins of the old socket have wasted, and the cavity has been filled up by a spongy cellular structure. But even this change is not so curious as the effect which the cessation of the natural functions of the joint has upon the bone. In one instance, the head of

* See the observations on the plan of curing distortion by confinement to the inclined plane, and on the machines which are at present generally used.

the thigh-bone has completely lost its round appearance, and is not one-third part of what may reasonably be considered to have been its original size. An example is also given by Larry, the French surgeon, in which the head of the humerus, that had been dislocated and driven between the ribs, was found, upon dissection, to be wasted, soft, and spongy.

The conclusion generally drawn, upon finding a bone in such a condition, is, that the patient was of a scrophulous constitution: but this is an inference too important to be acquiesced in, without some investigation.

It is true, that when a scrophulous joint is amputated, the bone is found to be so soft that it may be cut with a knife; but a bone may be spongy and soft, although there be no scrophulous tendency in the constitution. That it may degenerate into this condition, merely from want of use, will appear from observations, the truth of which will scarcely be disputed. If a soldier in active service receives a wound for which immediate amputation is necessary, or if the same operation be per-

formed on a strong labourer while he is in full health and exercise, the bone is found hard as ivory, and compact in structure. But if either the soldier or the hospital patient should, in consequence of the accident, be confined to bed for some time before the leg is amputated, the bone is found soft and spongy, like that of a scrophulous person. A most remarkable instance of this, is preserved in Mr. Bell's museum. It is part of the thigh-bone of a very strong man, who was a country brewer's drayman. The bone had been fractured, but, being badly managed, had never united. After the lapse of two years the limb was amputated; but the bone, though still of its original diameter, is not thicker in its walls than the tenth of an inch, the cavity having been filled up with a cellular structure, loaded with fat. A still better example is recorded by Chesselden, the most eminent surgeon and anatomist of his day. In his splendid work on the Bones, we find, in the explanation of the fiftieth plate, the following description: — "The thigh-bone of a soldier, who was shot in the right groin at

the siege of Gibraltar, who being brought home the next winter, died soon after of a dropsy; the thigh-bone was wasted so much, as appears in the draught, and being weighed, after they were both sawed lengthways with a fine saw, the right weighed less than half the weight of the other."

Analogous facts may be observed in animals. It is well known, for example, that the bones of the leg of the race-horse, when he is in full vigor, are hard as ivory.

This law is not confined in its operation to the muscular and osseous system, but extends to every part of the body. Thus, in an anchylosed or stiff hip-joint, we find that its capsular LIGAMENT, the strongest in the body, wastes, and becomes a mere web of membrane, scarcely discernible. Even the ARTERIES lose their tubular form if the blood does not pass through them; but, in respect to them, another curious provision of nature may be observed.

There are certain vessels through which, after birth, the blood ceases to flow; some of these vessels do not thereby become entirely useless, but act subsequently as liga-

ments: for example, the umbilical vein of the fœtus becomes the round ligament of the liver. But should the blood be accidentally stopped in an artery or vein, the vessel gradually degenerates into common cellular membrane. And here I may further observe, that the operations of nature, consequent on the obstruction of tubes, afford the most beautiful proofs in illustration of the present subject. The obliteration of the old, and substitution of a new tube, seem to be exactly in proportion to the cessation of activity in the part obstructed; or, rather, to the call which is made for exertion and renovation of functions. — When, by the application of a ligature, there is an obstruction occasioned in a tube designed to carry fluids, and where there is no provision of nature for supplying its office by the aid of collateral vessels, the tube does not degenerate into a ligamentous cord; but, during the process of destruction of the part where the ligature is applied, so perfect an act of reparation is going on, that, before the circle is cut through, a new tube is formed,

which has all the peculiar characters of the old one.

When this is compared with the change consequent on a similar obstruction in an artery, the difference of effect is to be accounted for satisfactorily, by the operation of the law which we are now investigating. In the case of the duct, there is no substitute by which the offices of the obstructed vessel can be supplied. In the case of an artery, there generally are collateral or anastomozing branches, by which the blood finds its way, when the main branch is obstructed; and the effort of nature is directed rather to the enlargement of those collateral and auxiliary branches, than to the more difficult operation of regenerating and re-establishing the obstructed passage, by the formation of a new tube. This passage, therefore, is abandoned as useless, and falls into the condition of cellular membrane; but, to a certain extent, the process in both cases is the same; for when we examine an artery that has been tied, a short time after the ligature has come away, we do not find the vessel cut through, as we should at first expect; but we find it as a ligamentous cord,

continuous with the tubular part of the artery; and there is nothing, except an obstruction of the vessel, by which we can trace where the ligature was applied.

This, at first sight, is very perplexing; but if the artery be examined previous to the ligature coming away, a process of reparation is found going on, similar to that which takes place in an excretory duct, under the same circumstances; still, the ultimate result is, as already explained, very different in the two cases; the remains of the artery being ligamentous, while that of the duct is tubular.

Under certain circumstances, however, nearly the same thing takes place when an artery is tied, as when an excretory duct is obstructed. For example, when a ligature is applied to the carotids of such animals as have long necks, a set of vessels which, as they were invisible previous to the application of the ligature, may be considered new formations, are found in the cellular membrane, in close contact with the artery, and establishing a communication between the portions above and below the ligature.

In giving these illustrations, I should re-

fer to the book published by Mr. Travers, in 1812, on the Injuries of the Intestines; and to a late paper by Mr. Brodie, on the Ligature of the Biliary Duct. I ought likewise to state, that preparations, illustrative of several of the above facts, were made in 1805 and 1806, by Mr. Bell, during an examination into the effects of tying the intestinal canal.

In farther illustration of the necessity of action to the preservation of a part, I may mention, that no fact in physiology is better established by demonstrative proofs, than the effect which the cessation of due exercise of functions produces upon a NERVE. Of this I need not offer any examples here, as many may be found recorded by various authors. I may, however, particularly refer to those related by me, in a paper on Paralysis, which is published in the twelfth volume of the Transactions of the Medico-Chirurgical Society.

The history of the TEETH also affords curious illustrations of the operation of the same law; it is well known that a tooth will become loose, and even fall out of its

socket, if it be not submitted to the usual and natural degree of pressure.

The law which we have thus seen exemplified, in all the variety of parts liable to be affected by exercise or disuse, may be expected to operate very distinctly on that part of the body which forms the subject of the present enquiry; and accordingly we find, that in no part of the system, is this law better exemplified, than in the history of the affections of the SPINE. The muscles, whose office it is to support the vertebræ, may be so weakened by want of exercise as to become incapable of performing their functions. When this takes place, the vertebræ and the ligaments which bind them together yield to the superincumbent weight, for they are affected in a secondary manner by the same causes that have produced debility in the muscles. Weakness of the muscles is, therefore, perhaps, one of the most frequent forerunners of distortion; though there are many other causes which I shall have occasion to point out, in describing the various kinds of deformities.

Many examples might be brought forward from authors, of the importance attached by the ancients to exercise in developing the form; but such testimonies are now unnecessary, as we have daily opportunities of observing, not only the good effects of well-regulated exercise, but also the actual deformity which arises from the disproportionate developement that is produced by the undue exertion of particular classes of muscles.

This latter effect is especially observable in those opera-dancers who seem to pride themselves on their power of making extraordinary leaps and pirouettes; their legs being almost herculean, while their arms are quite feminine. That those persons who practise horsemanship and tumbling are better proportioned than the dancers, depends on the more general activity of their muscular system; and yet their muscles are so unnaturally increased by the violent exertions necessary to the performance of their feats of strength, that their appearance may be considered as amounting almost to deformity.

The good effects however, of athletic

exercises properly regulated, are too obvious to require any comment; and I am happy to have an opportunity of stating that there is a chance of their becoming general in the schools of this country.*

But in attaching so much importance to exercise, in developing and strengthening and preserving the several parts in healthful action, it is necessary to guard against carrying the theory too far. The capacity of yielding to a stretching power is natural to parts formed of cellular membrane, and possessing vascularity and life; but if this be done beyond a certain degree, and particularly if it be done suddenly or par-

* The gymnastic exercises practised by Mr. Clias, of Berne, seem to be well calculated to assist in developing and increasing the muscular strength of boys. His views concerning the effects of exercise appeared to me so just, that soon after his coming to this country, I introduced him to Mr. Macgregor, surgeon to the Royal Military Asylum, who immediately gave him an opportunity of shewing the good effects of his system, and has since with great liberality promoted and encouraged his efforts. How far the boys have benefited in general health by the exercises, may be proved by the fact, that of several hundred boys who had performed them for four months, not one had, during that time, been in the hospital.

tially, a change of vascular action may be induced, attended with a visible alteration in the structure of the part. Thus, after a violent sprain, the ligaments become spongy and weak; or after long and undue stretching, they are unnaturally lengthened, and become elastic. This last effect is particularly evident in the lateral ligaments of the knees of chimney-sweeps, and in the condition of the ligaments of the feet of the opera-dancers. It may be observed, that the ligaments of the ankles of some of the most admired dancers are so unnaturally stretched, that in certain postures, as in the bolero dance, the tibia nearly touches the floor; so bad indeed is the effect occasionally produced by frequent stretching of the ligaments, that the feet of many of them are deformed; for the ligaments which bind the tarsal and metatarsal bones together, become so much lengthened by dancing and standing on the tips of the toes, that the natural arch of the foot is at last destroyed. This effect is very evident when the dancer is obliged to bring his heels to the ground, as in walking the streets; he then appears lame, the po-

sition having become almost unnatural to him. *

In farther proof of the extraordinary changes which may be effected on the tendons and ligaments, by long and continued attempts to stretch them, we might notice the contortions into which the clowns in pantomimes, and in exhibitions at fairs, can throw themselves.

The most extraordinary exhibition of this kind I have ever seen, was that of a Chinese, who was called the Posture-master, a name to which he was most justly entitled. In one of his feats he brought his heels over his shoulders, his toes projecting backwards; and while his legs were in this position, he walked upon his hands.

The difficulty we shall find in putting a skeleton into such a position, may give us some idea of the degree this man's ligaments had been stretched, and of the

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* The gait of an opera-dancer, in walking, may be said to resemble, in some respects, that of a bear dancing; for this animal which, like all other quadrupeds, walks on the tips of his toes, when obliged to *dance* must bring his heel or os calcis to the ground.

manner in which the bones accommodate themselves to so unnatural a position.

I shall have occasion, in subsequent parts of the work, to refer to some of the facts which have been stated, regarding the changes that may be effected on the ligaments and muscles. But perhaps, enough has been already offered to enable us to comprehend, that the most probable source of many distortions * is either in *the cessation of the actions of some particular part*, or in *the undue and partial exercise of others.*

The causes of the first are so numerous and important, that I have considered it proper to make them the subject of a separate chapter. † The explanation of the second will be found in the description of the varieties of distortion.

But in referring to the sciences of anatomy, physiology, and pathology, for the discovery of the causes of the various dis-

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* The distortions which depend on specific diseases of the bones are not here included.

† See the chapter on Partial Paralysis.

tortions, it is necessary and perhaps may be expected, that I should endeavour to explain how a man professedly a quack, and completely ignorant of the anatomy of the body and of its physiology, is sometimes successful in the treatment of those maladies, when the well-educated surgeon has failed.

Several general remarks upon this question have already been offered in the Introduction; now, we are perhaps prepared to understand, that the success of such people often depends on their calling into action, by their methods of treatment, some dormant natural power. And thus, though most probably unacquainted with the principle upon which they are acting, they may bring into operation those laws of the animal œconomy, upon the due performance of which so much depends. The following history is offered as an example.

A gentleman, having been thrown from his tilbury, hurt his shoulder severely, and a very eminent surgeon was sent for. Before he arrived, much swelling had taken place, and it was difficult to discover whether there was dislocation or fracture; in

short, it was supposed to be only a severe bruise. As the patient however, did not in the course of two months recover the use of his arm, he went to a rubber; who told him that his arm was dislocated, and proposed to reduce it. I was requested to see the gentleman, and found that the humerus was certainly dislocated, but in a very unusual manner, the head of the bone being laid on the infra spinatus space of the scapula. The dislocation could not have been directly occasioned by the fall, but consecutive upon the change produced in the joint by the bruise; for had such a displacement existed at the time when the arm was first examined by the surgeon, he could not have overlooked it, although the joint might have been very much swollen. The patient however, thought otherwise: the surgeon was disgraced in his eyes; and the rubber having discovered a dislocation, gained his entire confidence. When I first saw this patient, he had no power over his arm; but by severe rubbing and pinching, while at the same time, the arm was kept in constant motion, the muscles acquired power; and

a new socket being at length formed, the use of the arm was so far restored, that the gentleman was again enabled to drive. Although the operator was deceived in his expectation of putting the bone into its place, and although he was probably not aware that he had been acting on a correct physiological principle (for he had made a new joint), yet we cannot deny that much good was done; nor can we be surprised that a patient, under such circumstances, should praise the quack at the expence of the surgeon.

After what has been said in the preceding pages, it will scarcely be necessary to add, that in such cases, the success depends on the principle, that a part which has become feeble and useless from having lain dormant for a time, may, by active exertion of its powers, be renovated; and that even from the cellular membrane (the common matrix) new parts may be formed. We shall perhaps in this way be able to explain several circumstances which have occasionally been matter of astonishment, and particularly how it happens that some of the rubbers appear to do good by what

seems to us, to be mere parade; as when, in finishing their operations, they pretend by certain manipulations, to put the bones and muscles into their proper places. This tour de maître I have witnessed; and in one instance, am satisfied the operator believed that after having brought the parts to a certain condition, he could change the situation of the muscles; for apparently without any wish to deceive, he tried to explain to me how he did it.

The truth is, that he was entirely ignorant of what he had been doing. He had not the least conception, that by rubbing the contracted ligaments and muscles for an hour, he had been instrumental in bringing into operation a curious and important law of the animal œconomy. But a man under such circumstances, when he restores the power of a limb, cannot justly be accused of duplicity, in asserting that the contraction and distortion depend on a displacement of muscles, which he, by a secret that has been long in his family, knows how to replace. He truly has performed a feat which the surgeon had

not the skill or science to perform; and ignorant himself of the principles which have been at work along with him, he may well believe that he is possessed of the secret by which the thing is done.

A knowledge of the principle upon which the success depends, while it leads to safe and beneficial practice, enables us to expose the tricks of those who pretend to push the bones of the spine into their places by a particular kind of instrument, after the vertebræ have (according to their language) been softened into a jelly by an hour's hard rubbing. The rubbing and exercise are truly the causes of the good effects produced in such cases; for by them, new powers and energies are excited in the part. It is impossible by such operations to change the situation of the muscles of a contracted limb, or to replace the bones of the spine, even were they dislocated. In some instances, the rubber may himself be deceived, and may in simplicity and ignorance set forth his pretensions; but there is reason to suspect that the parade of putting the bones into their places is

often a mere trick, and done with a view to deceive.

The cases in which the benefit derived from friction, shampooing, pressure, thumbing, &c. (which are all modifications of exercise) is most apparent, are those of stiff and contracted joints, after rheumatism, or any chronic inflammation. But to do good in such cases, great perseverance is necessary; and I might say, a degree of boldness, which *à priori* we should almost consider dangerous. The professed rubber proceeds in a much more violent manner than those who know the structure of the parts would venture upon, without some previous evidence of the practice being harmless. But this violence may be carried too far; an example of which is given in that part of the work, where the question of distortion being dependant on dislocation of the vertebræ, is discussed.

We may however, derive some information from observing the operations of professed rubbers; for we find, that even delicate patients bear much more severe treatment than we could have imagined

possible for them to suffer; and the occasional success attending such bold and decided practice also proves, that when judiciously applied it may be useful, and particularly in contractions of the joints; indeed by this plan alone, stiff and contracted joints are often restored.

Such practice will not be so efficacious in distortions of the spine; and yet the good effect produced by it on the spine of a person with a weakly constitution, is sometimes so great and so immediate, that the friends are easily persuaded to persevere in a plan which promises so speedy a cure.

Although disposed to give full credit to the benefit occasionally derived from the mode of treatment followed by quacks, I do not hesitate to say that such men are dangerous practitioners; for they must persist in their modes of treatment, either through ignorance of the natural changes to which parts are subject, or with a view to deceive the patient. If they are so ignorant as not to be able to distinguish between the different causes which produce apparently the same kind of distortion, they will be liable to com-

mit the most serious mistakes. And yet the uneducated man, who supposes that he understands more of the disease than the man of science, because he has been successful in a case in which the latter has failed, is not so dangerous as one, who with some knowledge of anatomy and pathology, is not under the control of honour or good faith.

In no set of cases which fall into the hands of quacks and machine-makers, is the truth of this more clearly evinced, than in the varieties of the diseases of the spine. Distortion of the spine is frequently the consequence of a disease which destroys the bodies of the vertebræ. During the active stage of this complaint, the rubber or machine-maker, unacquainted with the structure and diseases of the part, may, by operations intended to remove the distortion, so increase the irritation as to cause the death of the patient. But a very little knowledge will enable one, who by his conduct has acquired the opprobrious term *quack*, to understand that he cannot do so much as the surgeon can, during the active stage of the complaint. He therefore waits

until the disease has been cured by anchylosis of the vertebræ (this, it is most necessary to state, is almost always attended with a degree of distortion which it is impossible to remove *); he then unblushingly makes promises, that in a certain time he will remove the deformity by restoring the bones, which he pretends are dislocated, into their proper places; being probably aware, that by rubbing and pressing the bones and muscles of a weakly patient, so much real and immediate benefit will be produced, as to give confidence in his promise of doing much more in time.

It is generally said by such persons, that a certain time is required to soften the bones; and when that is done, it is easy to put them into their proper places. But it is more than probable, that those who can talk thus, are aware, that by rubbing and pressing the bones, they become harder; that they are not dislocated, but mis-shapen, by the destruction of part of their bodies (from which the distorted appearance of

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* See the description of the sixth figure of the first plate.

the whole spine arises); that they are now firmly fixed and anchylosed; and that if it were possible to push them *in* or *out*, the operation would certainly be fatal to the patient.

ENQUIRY INTO THE CAUSES OF THE PARTIAL PARALYSIS AND WASTING OF ONE OF THE LIMBS DURING INFANCY, WHICH FREQUENTLY PRODUCE DISTORTION OF THE SPINE.

I HAVE endeavoured to shew the necessity of exercise to the perfection of the different parts of the body, and the possibility of rousing the dormant powers of an organ, by bringing functions which had been neglected, again into action.

But although we have frequent occasions to admire the effects of exercise, in renovating the natural structure of parts, and in restoring their functions, the expectations of the advantage to be derived are often frustrated, however ingenious the mechanical contrivances may be, if the state of the general health be not attended to, and if the connection be neglected that exists between parts, which though remote in situation, are closely united through nerves.

Every day's observation proves, that in

tracing to its origin, the history of the distortion so common among girls, we must not confine our enquiries to the present condition of the patient. Although she may have been in a comparatively good state of health for some years previous to to our being consulted, we shall probably discover upon enquiry, that while a child, she was either frequently affected with such symptoms as indicate disordered digestion, or that she suffered more than usual from the diseases incident to childhood.

This enquiry is the more necessary, as certain kinds of paralysis which occur during infancy have more or less effect in producing distortion at a later period.

There is much variety in such paralytic affections, but to the greater proportion, two circumstances seem to be common; viz. their connection or dependance on the state of the bowels, and the effect they produce on the spine, or on the limbs.

The species of paralysis most interesting in relation to distortion of the spine, is that which is marked by a wasting or deficiency in the growth of a particular part, although unaccompanied with much defect,

either in the power of sensation, or of motion.

Such cases are not only important, in so far as they regard the organ affected, but in the influence which they have over other parts of the body; and this latter consequence is the more interesting, as by proper care, it may be counteracted.

A diminution of size in one eye is the most common example we have of this affection; but neither this nor the diminutiveness of a finger, (unless for the deformity of their disproportionate size to the other organs) are of more consequence to the patient, than being indicative of the constitution being weak, and hence liable to more important defects. When one of the limbs becomes affected, not only is there a great deformity in the part itself, but the affection is often the source of distortion of the spine.

Such an instance as the following is not uncommon:—A boy, on coming home from school during the holidays, was observed to limp in walking, and to appear crooked while standing. On being stripped, the left shoulder seemed to be lower than the

right; but, on further examination, this effect was seen to be produced by the oblique position of the pelvis. On making him stand up, so as to bring the shoulders to the same level, the left heel was raised from the ground. And on carefully examining the left leg by measurements, it was found to be much smaller, in all its dimensions, than the right.

In several cases nearly similar, the change in the character of the limb became evident, so soon after an attack of abdominal irritation, as to leave little doubt of the cause. But, in the greater number of such cases, the defect is seldom observed at the time of the first influence, and does not become evident until the other parts of the body are fully developed. In consequence of this, it is often difficult to trace these affections to their origin, and we are occasionally unable to determine whether they proceed directly from a certain condition of the bowels, or from a disease of the brain. It is probable, that in most instances, the remote cause is a deranged state of the bowels; the affection of the brain being as it were, intermediate

between the disturbance of the bowels and the paralytic muscles. A common example of this, we have in the case of Colica Pictonum.

But certain paralytic affections of the muscles are sometimes so instantaneous, that we must consider them as depending on a change which has suddenly taken place in the brain, or spinal marrow, or in the nerves which supply the affected parts. These cases differ from the former, in being generally accompanied with an immediate loss of voluntary power over the affected muscles.

I have been told that such sudden attacks are common among children in India, and that strong and healthy children are more frequently affected than those of a more weakly constitution. An example of this I have seen in the case of a young gentleman from India. According to his account, at a very early age he lost the power over his leg in the course of one night and while he was in good health, as he has since understood from his parents. He likewise added, that with the exception of this attack, he was a remarkably healthy

child and stronger than his brothers, who are now powerful young men.

It may be observed in boys who have imperfections in one limb, that there is generally a defect in some other organ, and most frequently in one of the eyes. My friend, Mr. Soden of Bath, pointed out a well-marked instance of this kind to me. The case was particularly interesting, as the spine had become very much curved in consequence of the boy always inclining towards the lame side. It was difficult to get any history of the progress of this case, as the boy after the death of his parents, had been sent from Ireland to a school near Bath; but he could recollect that before leaving Ireland, his left leg though weaker than his right, did not prevent him from being active at play. The probability therefore is, that the defect originated at a very early period; and such I suspect is generally the case, although similar imperfections have occasionally their source in causes operating at a later period than infancy. Thus, after a fever, or any exanthematous disease, as measles, it some-

times happens that one eye ceases to grow in proportion with the other, and a species of squint arises; and occasionally after similar diseases, one side of the face diminishes in size, or while the growth is proceeding naturally on the one side, the other does not keep pace with it. In such cases our attention should not be confined solely to the condition of the eye or face, which is the symptom that first attracts the notice of the mother, but we should also examine the spine; for in this defect of growth, we have the clearest evidence of the constitution being in that state, which is often attended with distortion.

In illustration of another cause which occasionally produces a wasting of the limb, I may mention the case of a young lady, whose right arm ceased to grow in proportion with the left, after an abscess had formed under the deltoid muscle. That this cessation of growth depended in a considerable degree, on the muscles of the limb not having been sufficiently called into action, in consequence of the injury sustained by the principal joint at a time when the whole body is growing, is proved

by the change produced on the leg of a young person who has disease of the hip joint. I do not intend to class this last case among those of paralysis; yet it is useful to bring forward such instances in this enquiry, especially as the peculiar paralytic affection of the leg is occasionally confounded with disease of the hip. An interesting example of this occurred in the family of one of my friends, who had the best opportunity of receiving a variety of opinions upon the case.

The mother heard one of her children, during *teething*, scream so violently, that she ran up to the nursery, supposing the infant to have fallen out of the nurse's arms. On examining the child, no injury could be discovered; but it seemed to have lost to a certain degree, the power over one of its legs.

As the child continued to suffer, and apparently from some injury to its hip, it was treated as a case of diseased hip, although the symptoms were always very obscure. Indeed, after a time the only circumstance worthy of observation, was that the limb did not grow in the same

proportion as the other. It is now some years since the attack, and although the young lady has perfect command over the muscles and the movements of the joint, the limb is still so much less than the other, that she is obliged to wear a high shoe.

On comparing the history of this case with others, there seems to be little doubt that it was an instance of paralysis, consequent upon the abdominal irritation which so frequently causes those symptoms attributed to the natural operation of *teething*. Since there was some reason to suspect that the nurse had let the child fall, the safest course was to proceed on the supposition that there was an injury of the hip. But when such symptoms occur at the critical period of weaning, we should look with much anxiety to the condition of the bowels, especially if there be, at the same time a disturbance of that process which in healthy children is natural, and not attended with irritation, viz. *cutting the teeth.*

All such affections as those described above, are by some called scrophulous; but

as this term is by the same authors, applied to the condition of every patient who in any way, evinces constitutional debility, the term will not assist us in distinguishing one case from another. When the whole system is, as it were, under the same influence, as shewn by its effects on every accidental injury, or sometimes by its gaining such an ascendancy over the frame as to check its growth and limit the stature to that of a dwarf, it is commonly said that the person is scrophulous. But we must look to a different source for the causes of such imperfections, as are confined to a single limb or finger, or to an eye, or to the side of the face. *

Such imperfections are frequently found to be co-existent with disordered digestion,

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* It is a curious but well-authenticated fact, that chickens hatched by artificial heat are generally misshapen; one of the legs being often defective. Although this is not an observation that bears directly on the present question, yet it may be admitted as a proof of the bad consequences of any process of rearing which is not conformable to nature. Another example, more applicable to our enquiry, is the deformity of the limbs occasionally observed in animals that are badly or over-fed.

or consequent on a severe attack of illness during infancy. That these causes have much effect on the growth of the body generally, and especially on the osseous system, may be frequently observed in children, who have suffered any severe attack of illness during infancy; for we often find in them that the first, or deciduous teeth, and even the second set, are imperfectly formed.

I could give many cases in proof of the correctness of these observations on the causes of the partial paralysis, which so often occurs about the period of weaning, and is commonly ascribed to *teething;* but my principal object being to direct attention to the general question, I shall abstain from such details.

It may be useful to make a few observations on a species of partial paralysis, which depends on a distinct cause, or at least takes place at a different period of life from that described above. It is important to attend to it, as it is liable to be mistaken for distortion of the spine, and indeed often

produces distortion, if its effects be not counteracted.

It is scarcely necessary to point out the danger of the spine becoming crooked, when a young person is so unfortunate as to be affected with the common paralysis of one side of the body. In these cases, the cause and effect are obvious; but it sometimes happens, that although there be no suspicion of paralysis, one shoulder falls in such a manner as to give the patient the appearance of a person with distortion of the spine. Such a case is very perplexing; for although the power over the scapula is so completely lost that the shoulder falls, if not supported, yet when it is held up, the patient has as complete command over the muscles of that arm, as over those of the other.

Similar instances of partial paralysis occur in other parts of the body; but the above deserves to be particularly noticed, not only because it has been mistaken for distortion of the spine, but because it bears much analogy to certain paralytic affections of the muscles of the face, the cause of which has been ascertained by the late very

extraordinary discoveries of Mr. Charles Bell.

As these discoveries have been made public in the Transactions of the Royal Society, and in the different Scientific Journals of the last two years, it is unnecessary for me to give a detail of them, or to do more than to bring to the recollection of my readers, that it has been shewn that the spinal accessory nerve, which is distributed upon those muscles of the shoulder that assist in accelerated respiration, performs functions in every respect analogous to the office of the nerve called portio dura, which passes to the muscles of the face.

When we consider the great similarity between these two nerves, both in distribution and in function, we can easily imagine that the spinal accessory nerve may be affected in a manner similar to the portio dura. Hitherto, there have not been so many instances of paralysis of this nerve observed as of the portio dura*; but a

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* See a paper by me, in the twelfth volume of the Medico Chirurgical Transactions.

sufficient number have been seen, to shew that a very slight disturbance of the functions of the spinal accessory will affect the shape of the whole body.

The importance of this discovery will, perhaps, be made more evident, by stating that the late Dr. Monro, and Mr. John Bell, of Edinburgh, than whom, there have been few men more assiduous in research, acknowledged themselves to be quite unable to account for a case of distortion, which may now be proved to have depended on an affection of the spinal accessory nerve.

In mentioning these circumstances, I may be permitted to state, that Mr. Bell's discovery of the two roots of the spinal nerves being endowed with distinct properties, the one for bestowing sensibility, the other for bestowing the power of motion, will probably assist in the illustration of another important question, connected with the present enquiry, viz. the cause of one patient having a burning pain, or a loss of sensibility, in a particular part, while another complains that either a set of muscles are deficient in voluntary power, or are liable to be spasmodically affected.

I will not here enter further into these questions, as I shall have frequent occasion, in the course of the work, to refer to them. Those who are interested in these discoveries will find them detailed in the Philosophical Transactions, and in the 286th and 292d numbers of the Medical Journal. It is gratifying to find that all the deductions, which were at first drawn from an observance of the anatomy of the nervous system, in the various classes of animals, have been verified by experiments, made first in this country, and more lately in France.

Our first care in laying down a plan of treatment, to guard against or to remove the consequences described in the preceding pages, must be to discover whether distortion or paralysis have already taken place, or be merely threatened.

If only threatened, our efforts may be directed solely to the removal of the causes of irritation; but if paralysis has already taken place, we should not confine our treatment to what is called general means, or

constitutional remedies, but at the same time attend to the local defect.

There being much reason to suspect that a disordered state of the bowels is frequently a source of that irritation of the system during infancy, which, when severe, causes convulsions, and when more moderate, gives rise to the symptoms generally denominated those of *teething*, the necessity of paying particular attention to the organs of digestion must be obvious.

Respecting the best means of remedying the disturbed state of the bowels, there is a variety of opinions, which I shall not discuss, but rest contented with stating my conviction, that many cases of paralysis which occur in children, proceed from disordered digestion, produced by the crude and insoluble matter with which the stomach is loaded, at an age when it is capable of digesting only the simplest food.

Disorder of the digestive functions is probably also one of the principal sources of imperfection of the body, at a later period of life; but still it cannot be assigned as the only one. Whatever weakens a child's constitution may have the same effect; as,

for example, the depletion occasionally necessary in the inflammatory attacks to which children are so subject. It will probably not be denied however, that be the original cause of the local defect what it may, it is absolutely necessary to attend to the state of the digestive functions.

But we must guard against the error of considering attention to the bowels to be all that is necessary. A strict regulation of the diet, and the moderate use of purgatives, will tend much to the restoration of the patient's general health; but such means alone are of little service in many cases of local affection. To restore a part to its pristine state of vigour, we must also attend to the principle laid down in the preceding pages. *The active exercise of an organ is necessary, not only to its perfection, but even to its preservation.*

In pursuance of this principle, whatever may have been the original cause of the wasting and paralysis of the limb, I would recommend that we should, in addition to such plans of treatment as the state of the constitution may call for, endeavour by friction, shampooing, warm and cold bath-

ing, &c. to excite a certain degree of action. This is to be assisted by mechanical contrivances, to bring the paralytic muscles into play, and also to support them in certain positions while they are at rest. This last rule is particularly necessary to be attended to, in the treatment of those cases where the limb seems, by its weight, to drag upon the weakened and relaxed muscles, or upon the ligaments of the joint.

I shall not enter at present upon the consideration of the manner in which particular cases are to be treated; but defer this, until I come to that part of the work, in which the methods of curing contractions of the limbs, and such diseases of particular muscles as produce distortions analogous to that of wry-neck, are discussed.

ON THE DISTORTION, COMMONLY CALLED LATERAL CURVATURE OF THE SPINE.

HAVING in the preceding pages endeavoured to shew the several conditions of the constitution that may render a young person liable to become distorted, I should now describe the characters of each kind of distortion; but as the symptoms are various, and in a great measure dependent on the causes by which the distortion has been immediately produced, it is impossible to enumerate them accurately, without at the same time fully describing the particular instances. I shall therefore in this chapter, limit myself to a general outline of the characters of those which are of most frequent occurrence.

When the spine of a girl, about the age of fourteen, is becoming crooked, the attention of the mother or governess is at first directed to the state of the shoulders or breasts. At this age, it is most frequently to the latter; one either

appearing larger than the other, or growing so unequally as to lead to a suspicion that it is diseased. But in a younger girl, the state of the right shoulder generally attracts attention, as it appears larger than the left, and when the distance of the two shoulder-blades from the spine is compared, it is found to be farther removed than the other; or is, as often said, "*growing out.*" It may perhaps also be noted, that the left hip is different from the right.

If the spine (which has probably been overlooked by the mother) be now examined, it will be found to be curved nearly in the form of the italic *f*. The whole of the right side will also have acquired a rounded and barrel-like form, while the left is diminished and contracted, the ribs being closer together than is natural. There is, moreover, a sinking in, or depression of the right, and a corresponding fulness of the left loin.

This description nearly corresponds with the sketch of the girl's figure in the second plate given in illustration of the effects produced by a slight lateral distortion of the spine. The second figure in the same

plate will assist us in forming a correct idea of the causes of the above changes in the form ; for it will at once be evident, that the size of the right shoulder, the swelling of the same side of the neck, and the increased distance of the tip of the shoulder from the head, do not depend on any enlargement of the scapula or muscles of the shoulder, but on the change in the relative position of the ribs. It will also be obvious, that the appearance of the left hip being *out*, is caused by the left ilium being more elevated than the right, which is a consequence of the weight of the body being sustained principally by the right leg. The cause of the barrel-like form of the right side of the chest, and the contracted state of the left, is also obvious ; and it is easy to comprehend how the projecting transverse processes of the lumbar vertebræ may give the appearance of fulness to the lower part of the same side. The sketch is so demonstrative that it is scarcely necessary to add, that these changes depend in a great measure on the condition of the spine. This kind of distortion is further described in the explanation of the plate.

It is natural at first to suppose, that all the cases which resemble each other should depend on the operation of similar causes; and that the gradations in the alteration of the form should always proceed in the same order. But this idea is incorrect, for we can trace many cases of distortion, which nearly resemble each other, to different causes. Upon this question, there is a great discrepancy of opinion, some alleging that all distortions depend on disease of the bones, while others maintain that they proceed from disease of the muscles. Before enquiring into these opinions, upon the supposed correctness of which, the different methods of treatment have been founded, I shall endeavour to describe the manner in which the most common distortions take place, and try to avoid making any statement that is not supported by demonstrative proofs.

ON THE IMMEDIATE CAUSES OF THE LATERAL CURVATURE OF THE SPINE.

While a girl is in a slightly debilitated state, either in consequence of a fever, or from the bad health frequently attending the change, which at a certain age takes place in the constitution, the lumbar portion of the spine often yields to the superincumbent weight of the chest and head. But the yielding is at first so slight and gradual, that it is seldom observed, until by the natural effort to restore the balance, the upper part of the spine is curved in the opposite direction. The effects of the distortion then become very remarkable, although the friends are perhaps still ignorant of the cause. Indeed, while a girl is in this condition, it is not unusual for the mother to imagine that there is disease of the mamma, or a tumor forming on the neck. The marks of leeches and blisters which are occasionally seen on the breast and side of the neck, lead to a

suspicion that the mother has not been the only person deceived. If the spine were now to be examined, the case could hardly be mistaken; for in all probability, it would not only be twisted to one side, as the term lateral distortion implies, but three curves would be found in it. One (and which was probably the first formed) commencing at the pelvis, and passing towards the left side, as far perhaps as the tenth dorsal vertebra; from which the spine would probably take a gradual bend towards the right, up to the third or fourth; and from this, the upper part of the spine would take a slight curve towards the left, thus bringing the head nearly perpendicular to the pelvis.

Although this will perhaps be admitted to be a correct description of the most frequent case of lateral curvature, and of the manner of its commencement in weakly children, yet, as a similar change occasionally takes place while a child is strong and muscular, we must look for the operation of some other cause than mere debility.

If we examine a number of school-boys,

we shall find many of them with slight distortions of the spine, the marks of which are chiefly observable in the condition of one of the shoulders; the right being generally larger or further removed from the spine than the left. If we notice the position of the boys while they are repeating their lessons, we shall observe that the greater number balance themselves on the left foot. As a natural consequence of this position, there is a slight curve of the whole spine; and although it be especially observable in the part between the shoulders forming a convexity towards the right side, still, on examining the lumbar portion of the column, we shall generally find a corresponding convexity towards the left.* On further enquiry we shall probably learn that the boys, who by long continuance in this habit of standing have become slightly distorted, also sit in a twisted position while writing, the right shoulder being more elevated than the left (as seen in the sketch of the girl writing); and that they also use the

* See the marginal Plate illustrative of the effects of standing on one leg.

right arm in preference to the left, more than boys naturally do.

The slight distortion, consequent upon the above causes, will be much increased if the boy sleeps on a soft feather-bed, and with a high pillow; for he will naturally lie on the right side. The effect of this position in bed, is also illustrated by a marginal plate in the volume of plates.

Although a boy may be all the while in good health, the causes just enumerated are sufficient to produce a slight distortion of the spine. But if he be permitted to run freely about for some time, and if proper attention be paid to his figure, he will quickly become quite straight; while, if the distortion be neglected, or if the boy should fall into bad health, or enter a profession in which he is much confined to one position, then the curves will rapidly increase, and have all the characters of the distortion so common among girls.

It is not difficult to comprehend why girls are more frequently deformed than boys. As children, they are not only more subject to the causes, by which the distortion just described is produced; but they

seldom have the opportunities of counteracting them, by the active exercises in which boys indulge.

If a weakly girl of ten years old be obliged to sit for hours on a narrow bench, without any support to her back, it is not surprising, that notwithstanding all the reproofs she may receive, she endeavours to relieve herself by allowing the lumbar vertebræ to sink to one side. This may of itself be sufficient cause for the origin of a curve; but if the position in which girls generally sit while writing, drawing, playing the piano-forte, and more especially the harp, be taken into account with the causes already mentioned, it will be admitted that it is scarcely possible for a girl so situated to avoid being crooked, particularly if she is not permitted to take such exercises as give tone and strength to the muscles of the spine.* But there are also other cir-

* The observations made at page 7., and in the enquiry into the opinion that distortion of the spine is always attended with disease of the bone (page 93.), will perhaps be sufficient to shew the incorrectness of the idea commonly entertained, that persons are scrofulous because their spine is distorted. The distress occasioned to

cumstances to be taken into account; for I shall presently shew that the means commonly employed to counteract a slight degree of deformity, are more likely to increase than to remove it.

The character of the figure of a person, whose spine is slightly distorted, is so peculiar, that it is scarcely possible to conceal its effects by stays or instruments.

The shape of the chest may be altered by stays, when the distortion of the spine does not reach above the fourth dorsal vertebra; but still there will be a peculiar gait in walking. This is important to attend to, as it is a consequence, not so much of the natural elasticity of the trunk being destroyed by stiff stays, as of the change of direction in the fibres of the two great muscles (the psoæ) by which the thighs are moved forward.

If the distortion of the spine be continued farther up, as in the second plate, the difficulty of concealing the defect will be in-

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a family by one of the children being in this condition is much increased by the supposition that it is a proof of a scrofulous constitution.

creased; for there will be a constrained position of the head and neck, with the head generally inclining to one side.

Although habitually balancing the body on the left leg is one of the principal causes of slight distortion of the spine, and especially of the apparent enlargement of the right shoulder, we shall generally find, that when the distortion is increased so far as to have the appearance of the italic *f*, the patient no longer stands on the left, but on the right foot, as represented in the second plate.

This change in the manner of standing is now almost necessary to keep the body balanced; and it may often be observed, that girls in this condition have a habit of putting the left arm behind the back, and taking hold of the inside of the right elbow; thus assisting to balance the figure by pulling down the right shoulder, and elevating the left.

STATE OF THE SHOULDERS AND RIBS, IN CASES OF LATERAL DISTORTION OF THE SPINE.

I SHALL now endeavour to give a more particular description of the condition of the shoulders and ribs, in the common cases of lateral curvature.

During every period of the disease, it is important to attend to the state of the shoulders and breasts, because their form alters, in a remarkable manner, according to the degree of distortion, or to the plan of treatment which has been pursued.

When the spine is not more distorted than that represented by the figures in the second plate, we shall probably find that the right shoulder and breast are larger and more prominent than the left; but if the curve of the spine be increased, although the right shoulder be large and round, the breast of the same side may be flat and contracted. It may also be occasionally observed, that the breast and the upper part of the neck, on the left side, are prominent,

while the same parts, on the right side, are lower, although the right shoulder-blade is more prominent than the left.

That an increase of one side of the chest is the consequence of even a very slight lateral curvature of the spine, may be proved by bending the body to one side. This effect is demonstrated in the second figure of the second plate.

But when the curve is increased, the ribs become flattened in front; and it is in consequence of this, that in general, the more prominent the shoulder is, the flatter the breast becomes. If the distortion be permitted to increase still farther, a complete change in the form takes place: the cause of this will be shewn in the explanation of the second and third figures of the third plate.

In several patients, I have found the right shoulder prominent, while the left side of the neck, and the left breast, were fuller than the same parts on the right. The cause of such a variety is easily explained; and the specimens, numbered 14 and 15 in the Appendix, afford good examples of the state of the spine and ribs

in such cases. They differ in several respects from the state of the skeleton represented in the second plate, and especially in the second curve taking place lower down. As a consequence of this, the three superior ribs of the right side, instead of arising from the second convexity of the curve (as in Plate II.), rise from the third concavity, as in fig. 2. of Plate I.; while the superior ribs of the left side arise from the convex part. The right shoulder is hence much distorted, for the scapula is removed to a great distance from the spine, and is almost turned round, in consequence of its inferior angle being elevated by the prominence of the fifth and sixth ribs, upon which it rests, while its upper part, not being supported by the superior ribs, falls forward. A flattened appearance is also given to the same side of the neck, and upper part of the breast, in consequence of the three first ribs arising from the concave side of the curve.

The change in the character of the left side, in the same examples, is also very distinct; for since the three upper ribs arise from the convex aspect of the spine,

they stand out, so as to make this side of the neck round and swollen, which appearance is increased in effect, by the scapula being more than usually depressed. To shew the importance of attending to these distinctions, it is only necessary to state, that a young lady had her neck repeatedly bled and blistered, in consequence of such a swelling having been supposed to be caused by a tumor.

It will now be obvious that the character of the distortion of the ribs and shoulders depends very much on the condition of the spine. In some instances there is little change in the position of the shoulders, but such cases are very rare. If the distortion of the spine be confined to the lower part of the column, as in fig. 3. of Plate I., the upper ribs will probably not be affected, and, consequently, the position of the shoulders and breasts will not be much altered. When such cases are independent of rickets, the deformity is more easily remedied than when the spine is distorted higher up; but, unfortunately, persons so deformed are generally ricketty. The second and third figures

in Plate III. will afterwards be particularly described; but at present they may be referred to, as affording a good illustration of how much more marked the deformity is, when the upper division of the spine is the part principally affected.

With a degree of lateral distortion a stoop is often combined. This is generally seen in old people, but it is not rare among young persons, and especially in girls, who are obliged to sit much at work, or in young ladies who practise a great deal at the piano-forte; it is also observed in those who are short-sighted. I shall not, at present, attempt to explain the cause of this, as it will be more easily done in the description of the means used to correct it.

A change often takes place in the shape of the chest, which, though quite different from that produced by the simple lateral distortion of the spine, is almost as great a deformity. In its first stage, the spine and ribs are bent forward, so as to have some resemblance to the back of a spoon.

By the bending forward of the spine, a change is produced in the figure of each rib. In the natural state of the chest, the part of the rib between its *head* and *angle* is nearly straight; but when the spine is bent, this part of the rib forms a large segment of a small circle, so as to give an unusual degree of roundness to the middle of the back. The part of the rib between the angle and the sternum is also altered; for, instead of making a large circular sweep, it goes obliquely forwards, and thus gives an oval form to the side of the chest.

The first effect produced by this change in the form of the spine and ribs, is to make the shoulders appear round and full, and the lower angles of the scapula to project, which latter effect is caused by the falling forward of the scapulæ; for they are not only unsupported by the upper ribs, but are dragged forwards by the clavicles being carried in the same direction with the sternum. Such a degree of distortion is more common in lads of sixteen than in young ladies; and this is, perhaps, fairly attributable to its being, in the first instance, the consequence of an habitual carelessness

of manner, which is checked by the attention generally paid to the carriage of girls. However, in the description of the treatment of such cases, it will be shewn, that many of the means used for the purpose of correcting a slight stoop, tend to increase it.

In some instances, the ribs are elongated and flattened in an extraordinary manner, although the curve of the spine is not very great. I cannot offer any examples where it could be distinctly proved that this was consequent on the use of stays or machines; yet there can be little doubt that a lateral pressure made upon the ribs, when the spine is slightly bent, will tend to throw the sternum forwards, and thus give the chest not only a form resembling that of a bird, but even of a fish. Indeed, in Germany, this shape of the ribs is familiarly called *karpfen*, from their resemblance to the ribs of a carp.

I shall now enter into a short examination of the opinions generally entertained on the causes of lateral distortion.

ON THE OPINIONS GENERALLY ENTERTAINED ON THE CAUSES OF THE LATERAL CURVATURE OF THE SPINE.

As many rules of practice have been founded on certain opinions of the causes of distortion, it is absolutely necessary to enquire how far they are correct.

On the Opinion, that Distortion is caused by an irregular Action of the Muscles of the Spine.

The idea at present generally acted upon, is that distortion depends either on a diseased action of the muscles of the spine, or on their undue or irregular action. The latter opinion (originally German) has, of late, prevailed in London; but it is not difficult to prove, that although irregular muscular action may produce a degree of distortion, that it alone cannot be the cause of the common lateral curvature of the spine.

The principal muscles which support the

spine, in its natural position, are in two great masses, which pass from the pelvis to the head. Although these have been divided, in an arbitrary manner, by anatomists, into many distinct muscles, still the several divisions are admitted to have nearly the same action, viz. that of supporting and giving motion to the spinal column. But, to avoid the objections that may be made, to arguments founded on considering the muscles on each side of the spine as forming only one great muscle, I shall confine my observations to the condition of the sacro lumbalis and longissimus dorsi, in the common cases of distortion.

As the part of the spine between the origins and insertions of these muscles, is almost invariably curved in two opposite directions, before we can agree in the opinion that lateral distortion depends on the irregular action of the muscles, we must believe that the lower portion of the muscle, on the one side, may be in forcible and unnatural action, while its upper part is relaxed; and that in the muscle of the other side, the reverse takes place. But this cannot be admitted; and, indeed, the more the

theory is enquired into, the more erroneous it will be found to be. If the distortion depended on an undue action of the muscles of one side of the spine over those of the other, the curve would be always in the form of a single arch, instead of its being of a serpentine shape, as it generally is, between the points from which the muscles arise and those into which they are inserted. It has been stated, by way of argument in favour of the opinion, that the muscles on the concave side of the curve are stronger than those of the other; but I suspect that this statement is not founded on proofs derived from an examination of the muscles in the dead body, for I have found those on the convex side to be the largest. Indeed, there is one circumstance in the condition of the nerves of a distorted spine which would induce us to believe that the muscles on the concave side would be even more deficient in energy than those on the convex side; for the nerves which pass to to them, are diminished to less than one half their natural size. *

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* See the description of the preparations in the Appendix.

The idea, that the muscles on the concave side are the strongest, has perhaps originated in the fulness produced by the projection of the transverse processes and bodies of the lumbar vertebræ having been mistaken for increased muscularity. In cases similar to that represented in the second plate, this appearance has been pointed out to me, as a proof of the correctness of the above theory.

The practice which has been proposed in Germany, to counteract the supposed undue action of the muscles, is, to anoint those on the contracted side with softening and relaxing unguents, such as goose-grease, &c.; while the weak muscles on the other side are to be rubbed with spirits and strengthening liniments. *

In England, it has been proposed to keep a patient confined to the horizontal position until the equilibrium of the muscular power is balanced. The German practice

* See "Ueber die Verkrûmmúngen des Menslichen körpers und einē rationelle und sichere heilart derselben. Von Dr. Johann Christian Gottfried Jörg." Leipsic, 1816.

is at least innocent; the bad consequences of the English mode will be presently described.

The belief, that distortion occasionally depends on a disease of the muscles, is also general; but the only cases which I have seen, that could be fairly attributed to such a cause, were consequent upon the disease which produces wry-neck. * But these were so peculiar as not to be mistaken nor confounded with that generally denominated *lateral curvature.* There may occasionally be a similar affection of some of the muscles which lie upon the spine; but as I have never seen any examples of it, I may be entitled to doubt whether lateral distortion is ever caused by a disease of the muscles; for it cannot be intended to class those distortions of the spine which are consequent upon habitual stooping to one side, or those which occasionally take place after chronic rheumatism, with the affection which I have, in common with

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* These will be particularly described in the part of the work allotted to the consideration of the contractions of the limbs.

others, called lateral curvature, although in fact, the distortion is more of a serpentine form.

Examination of the Opinion, that Distortion is produced by Disease of the Ligaments, or by Dislocation of the Vertebræ.

By some gentlemen, distortions of the spine have been supposed to depend on a diseased state of the ligaments. In almost every case of distortion, the form of the ligaments is altered; but the change ought to be considered rather as the consequence than the cause of the disease, for a similar change may be produced by merely keeping the ligaments long in one position, as has been already exemplified in the condition of the limbs of tumblers and opera-dancers.

In the spines of those who have been much distorted, I have found the intervertebral substance diminished on the concave part of the curve, in the same proportion as the bodies of the vertebræ, but I have never found any mark of disease in it; on the contrary, in the cases which I have examined, it has retained all its peculiar

firmness and elasticity. I may particularly refer to the specimens numbered 12 and 13 in the Appendix; for as they are not dried, but preserved in spirits, they still afford proofs, not only of the intervertebral substances having retained all their characteristic qualities, but also of all the other ligaments being in a healthy condition. This is especially the state of the anterior and posterior ligaments of the bodies, and of the elastic yellow ligament at the roots of the spinous processes.

When the ligaments are diseased, distortion of the spine is produced, but of a very different character from that which forms the subject of the present enquiry. Some instances are given in the Appendix; but the subject is so important, that I reserve the full consideration of it to the next volume.

Is Lateral Distortion ever consequent upon Dislocation of the Vertebræ?

As a distinct and peculiar mode of practice has been lately founded on the idea that distortion depends on dislocation of

the individual vertebræ, it is of much consequence to enquire into it.

There has been no example of actual displacement of one vertebra from another producing distortion, similar to those that may be daily seen, recorded by a person of any authority. The last, and certainly the best authority upon this question, Sir Astley Cooper, says, "It has been generally stated by surgeons, that dislocations of the spinal column frequently occur. But if luxation of the spine ever does happen, it is an injury which is extremely rare; as in the numerous instances which I have seen of violence done to the spine, I have never witnessed a separation of one vertebra from another, through the intervertebral substance, without fracture of the articular processes; or if those processes remain unbroken, without a fracture through the bodies of the vertebræ. Still I would not be understood to deny the possibility of dislocation of the cervical vertebræ, as their articulatory processes are placed more obliquely than those of the other vertebræ; but from the vicinity of our hospitals to the river, sailors are often brought into them

with injuries of the spine, by falls from the yard-arm to the deck; and as there is almost always an opportunity of inspection in these cases, a dislocation must be extremely rare, since I have never met with a single instance of it, they having all proved to be fractures with displacement."

I may refer to the Appendix to shew that the instances of injuries of the spine, preserved in Mr. Bell's Museum, corroborate the opinions expressed by Sir Astley Cooper.

Although there is no instance on record, of dislocation of the vertebræ producing distortion, but also the evidence of the first authorities, in proof that the accident of displacement of the vertebræ without fracture scarcely ever occurs, still the opinion, that dislocation is a common cause of distortion, is received and acted upon.

As, by chance, I have had peculiar opportunities of judging of the nature of the evidence, which has been offered in support of the assertions which a physician has lately made upon this question, the enquiry into it may be useful; although I will at the same time admit, that it may by some be con-

sidered unnecessary, since the fallacy of the opinion, that lateral distortions of the spine depend on dislocations of the vertebræ, must be obvious to every one who examines a distorted skeleton.

The following note is taken from the private catalogue of the preparations: — "The preparation marked I. 3 M. 79. is part of the spine of a child who had been knocked down by a Hampstead stage-coach, about eleven months before its death. This is the case which has been referred to as a proof of the correctness of the opinion, that distortion is generally caused by a displacement or dislocation of some of the vertebræ. Upon this opinion it may be observed, that even had there been dislocation and consequent distortion of the whole spine, as was asserted to have taken place in this child, still authorities might be brought forward to shew that dislocation of the vertebræ, producing distortion, is a most rare occurrence. But as the nature of this child's case was completely mistaken, we are still entitled to believe that a dislocation of the vertebræ will never produce a distortion of the spine, except at the point where the

bones are displaced, and that there will always be total paralysis of the parts below the dislocation." I had attended the child alluded to for some time; but as it was a hopeless case, I had ceased to visit it. A short time after, I was surprised to find a history of its case given in the Medical Journal. The description appeared to me very extraordinary, and very unlike what I considered the state of the spine to be. By a curious coincidence, the father of the child called on the same evening I received the Journal, to tell me that his boy had died suddenly of croup, and that, as he knew I was interested in his case, I might examine the spine. I immediately accepted the offer; for, independent of my desire to inquire into the case, I could not believe that the spine was in the condition described by the Reporter, who says, "Upon examination I found the first lumbar vertebra wholly dislocated and driven into the left loin. The right transverse process is sunk downwards; the opposite one has risen, and can be distinctly felt below the skin. The last dorsal and second lumbar vertebræ were also displaced by the acci-

dent. Several other dorsal bones are also suffering spontaneous luxations from the want of vertebral support below them." *

On examining the body previous to opening the spine, I could not discover any of the dislocations described above, but only the same appearance as that which I had always observed while the child was alive. The note I made at the time, and the correctness of which is proved by the preparation, is the following: — "There is a fracture in a horizontal line in the middle of the first lumbar vertebra, the lower half continuing attached to the other lumbar vertebræ, the upper to the dorsal. The two portions are united together obliquely by a ligamentous matter, so that, at this part, there is an appearance of dislocation; but there is not the slightest displacement of any of the other vertebræ. The spinal marrow is completely destroyed at the fractured part." It is, however, to this case that we are referred at page 367. in the

* See a Paper by Edward Harrison, M. D. in the 44th vol. p. 449. London Medical and Physical Journal.

same volume of the Medical Journal, as a proof of the accuracy of the Reporter's opinions and principles; by following which, according to his own account, Medical Journal, vol. xlv. page 113., "In all the cases hitherto treated, agreeably to these principles, the success has been complete." In proof of this, he has given several cases; the following may be taken as an example: —

Miss L. K., æt. 27. — "On examination, the last cervical vertebra was observed to be too prominent. * Five of the upper dorsal and four of the lumbar vertebræ are protuberant. Her back and shoulders have been gradually growing outwards for more than a year, and now make an unsightly curve. About three years since, she hurt her back; and from that time she has always felt uneasiness and inconvenience in it, after much exercise or great exertion. These symptoms have considerably in-

* To those who are conversant with diseases of the spine, or even with the anatomy of the skeleton, it is unnecessary to point out the mistake into which the Reporter has fallen in supposing the long spinous process of the VERTEBRA PROMINENS to be a dislocation.

creased, in consequence of a fit of illness which she had in the spring. Appetite good; menses regular; bowels and pulse natural. She is five feet one and a half inches in height. She underwent the usual process for half an hour this afternoon; and all the vertebræ were observed to recede from the frictions, especially that in the neck. October 26. 1820. — The cervical bone disappeared the first day, and she has no longer any inconvenience in swallowing. The four lumbar vertebræ have already retired into their natural situations, leaving a groove where the loins were too full. For several days afterwards, she had not the smallest ability to elevate or move her feet from her. The power is fully returned; and she now uses them with perfect freedom. All the dorsal vertebræ are much fallen. On Saturday last, the two upper dorsal bones, in particular, were observed to sink more than usual during the friction; for the remainder of that day she was troubled with violent palpitations, with great weakness of her arms and extreme debility. They are already gone, and she feels unusually well. Nov. 5. — The ver-

tebræ being still more depressed, the debility and palpitations returned, in a smaller degree, during the afternoon of Monday, after the friction of that morning; and still less in degree on Wednesday. Nov. 15. — The two upper dorsal bones were this morning nearly forced into their natural places. She was, in consequence, seized with great difficulty in breathing; a strong apprehension of strangulation, and became violently hysterical. These distressing symptoms went off gradually, after a few minutes of quietness. Dec. 29. — All the vertebræ are entirely replaced; and it now appears that every one of them has been more or less protuberant, so that at first the spine appeared like an elevated ridge. It is now sunk into a marked groove. The unsightly fullness between the shoulders is converted into a graceful hollowness, and the small of her back is beautifully shaped. The sternum and ribs are quite restored. The health is very good. She has gained a great deal of colour, and looks extremely well. She has increased three inches in consequence of her back getting straight, and is much heavier since she begun her cure. Jan. 20.

1821. — Miss J. K. continues to enjoy the best state of health. Her figure preserves its beautiful form and shape, as when she first arose from her couch. She walks about, and erect, several hours daily. The remainder are still passed in lying down, from a fear that the spine and chest may not yet have fully recovered their healthy actions and tone. May 24. 1821."

Such a case, although it be detailed by a physician, and in a respectable medical journal, requires no comment; and perhaps I ought not to take notice of it, because there can be but few of our profession who are so credulous as to believe that, had the vertebræ been dislocated, the spinal marrow would not have been irrecoverably injured; much less can they believe that two of the bones could, in one morning, be forced into their places. — "The two upper dorsal vertebræ were, this morning, nearly forced into their natural places; she was, in consequence, seized with great difficulty in breathing, a strong apprehension of strangulation, and became violently hysterical. These distressing symptoms went off gradually, after a

few minutes of quietness." — These effects, however, the author would have us believe, were in consequence of the change which he produced on the spinal marrow by his operations!! In the next report we are told, "all the vertebræ are entirely replaced." We may ask if the *vertebra prominens* was also driven in.

Similar ideas upon the cause of distortion seem to have prevailed about a hundred years ago; and the danger of such opinions is well exemplified in the history given by Le Vacher, in the Memoires de l'Academie de Chirurgie, and alluded to by Portal, in the Memoires de l'Academie des Sciences. Madame de Montmorency consulted Ranchin, chancellor of the university of Montpellier, for a distortion of the spine: he pronounced it to be caused by a "*luxation des deux vertebres par un catarrhe tombé du cerveau sur l'epine!!*" — After ineffectual attempts to reduce the prominent vertebræ by the old methods, M. Ranchin proposed to try the effect of a linen press, in pushing the bones into what he considered their proper places. Madame Montmor-

ency agreed to submit, and was put into the machine, and squeezed between the two beams; but, as the respiration was impeded by the screwing down of the press, (a difficulty which M. Ranchin, with some simplicity, admits was not calculated upon,) the operators were obliged to desist before the vertebræ were replaced. But, notwithstanding this, neither the patient nor the doctor were disconcerted by the failure of the experiment, and the lady had the courage to submit to the proposal of pushing the bones into their places, by the assistance of a "cric," a machine used for raising the wheels of carriages "embourbées."

The remainder of this history is so incredible, that I dare not translate it, but will quote Le Vacher's words: — "On garnit l'extremité de cette machine qui devoit pousser les vertèbres; on appuyoit l'autre contre une muraille; on fixoit la malade par le moyen des deux hommes robustes, qui la tenoient par les épaules; ensuite on allongeoit la crémillère jusqu'au point où la malade, ne pouvant soutenir les douleurs, obligeoit de lui donner du relâche."

M. Ranchin, however, tells us, that after several ineffectual attempts, he at last put the dislocated vertebræ into their places.

This extraordinary method of treatment seems to have been the precedent for that pursued in the following case, by the physician to whose wonderful cures I have already alluded.

Colonel Sibthorpe was overturned in his carriage on the 23d of February, 1821. His spine was injured by the fall, as was proved by a slight degree of paralysis, and by his suffering pain when pressure was made on the first dorsal vertebra. In April the Colonel was able to walk about, but he had paralysis of the left arm. This continuing, he was induced to go to London in September. From Mr. Swan*, of Lincoln, under whose care the Colonel had been while in the country, we have the following report: — "He was advised by the medical man he there consulted to submit to a peculiar mode of treatment, in consequence

* See Observations on the Nervous System, by Joseph Swan, Surgeon of the Lincoln County Hospital.

of being told by him that several of the vertebræ were dislocated, or compressed inwards, and that the paralysis of the arm depended on this dislocation; that, by the peculiar process recommended, and the use of lubricating liniments, the bones might be restored to their proper places, and that then the paralysis would cease. As part of this mode of treatment, the patient was pulled and pressed, for about an hour, almost daily, for several weeks; and such was the violence of the pressure, that, on one occasion in particular, something cracked; and it was believed at the time that a rib was broken, for immediate pain was produced, which continued for several days."

Mr. Swan further informs us, that the Colonel died within four months after returning from London; and, in the account which he gives of his condition during that time, he seems very justly to consider that the Colonel, instead of having received any benefit from the treatment pursued in town, suffered much from it. He also thinks that the consequences of the injury were much aggravated by the violent means

used to *replace* bones, the dislocation of which Mr. Swan could never discover, either in the examinations which he made during the patient's lifetime, or on dissection. The following is copied from the report of the appearances observed after death : —

" The posterior parts of the vertebræ were denuded, both of muscle and periosteum, but no vestige of dislocation or fracture could be perceived. The spinal canal was laid open from the atlas to about the last dorsal vertebra, before the dura mater was opened. The spinal canal was perfectly natural in every part, and no pressure could have been made on the medulla by any part of it." *

To contradict the clear and distinct account given by Mr. Swan, a statement has

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* The history of this case is very interesting, in a point of view unconnected with the present question. It will be considered at length in the division of the work containing the Observations on the Injuries of the Spine. At present, I shall merely state, that it seems to have been very similar to several cases, in which, upon examination after death, the membranes investing the spinal marrow were found to have partaken of the inflammation which naturally follows a slight sprain of the ligaments of the spine.

been published in the 289th number of the Medical and Physical Journal, containing certificates, or affidavits, that when Colonel Sibthorpe first applied to the physician, in London, " he laboured under the effect of great depression in six of the dorsal vertebræ ;" and " that this depression was entirely removed by the process adopted for that purpose." However, the following extract, explanatory of the process of " altering the arrangement of the distorted vertebræ and ribs," would lead us to imagine that Chancellor Ranchin's method of pushing the bones into their places by the linen press, and by the lever for extricating wheels, was the precedent for the practice pursued in this instance. The description will also prove that Mr. Swan had sufficient grounds for suspecting that one of the ribs had been broken by the operation.

" I caused the spine to be stretched daily, for an hour at a time, in order to draw out, and, in some degree, to separate the vertebræ from each other. This operation was performed by means of the shoulders being pulled by one person placed behind the head, and the feet, at

the same time, by another, in opposite directions, the Colonel all the while lying on his back. During the period that this process was going on, I continued to make, with my own hands, firm pressure upon the sternal ends of the ribs, first on the one side, and then on the other. By this contrivance they were forced to act powerfully, at the other end, upon the depressed vertebræ. This was done to drive them outwards, and towards their proper situation in the column."

To shew how completely the operator was deceiving himself, it is only necessary to quote two of the subsequent reports upon the effects of this mode of treatment.

"*September 27th.* — The third vertebra is entirely replaced; the other five are sufficiently elevated for their spinous processes to be easily distinguished, and also the turn of them, which was made from the right side, occasioned, as there is every reason to believe, by the fall above mentioned."

"*October 10th.* — A progressive advancement of the affected vertebræ hath been distinctly perceived, after every operation.

In six weeks they were declared to have entirely gained their natural stations, and the process was discontinued."

The most charitable inference we can draw, on reading such histories as that given by Ranchin, or the one just detailed, is, that the attendants, being ignorant of anatomy and pathology, have not only mistaken the nature of the cases, but have been farther deceived by their mode of treatment being occasionally useful, although the extraordinary histories which they detail, induce us to believe that they were not aware of the manner in which these rude operations acted. The danger of such empirical practice has been already stated, at page 27, where the true cause of the success occasionally attending it, is attempted to be explained.

I should here point out a circumstance which may occasionally lead persons to suppose that there is displacement of some of the vertebræ. It occasionally happens, that the spinous processes of one or two vertebræ are so mis-shapen, as to give the appearance of dislocation in the middle of the spine. I had observed this in several pa-

tients, but my attention was more particularly directed to it, in consequence of a young lady being sent to me, with a note from the gentleman whom she had first consulted, stating that he suspected it was an instance of a very peculiar and dangerous species of distortion. Finding in this case, as in the others, that the symptoms did not at all correspond with what might be expected to be the result of a partial dislocation, or even of so acute a turn as the spine seemed to take, I was led to suspect that in such cases there was a malformation of the spinous processes. In this opinion I was confirmed by the examination of a body last winter. The appearance of dislocation of the vertebræ was so distinct, that I took a cast of the back previous to exposing the spine. (The cast is numbered in the Appendix I. 3. M. 81.) On denuding the bones, the appearance of dislocation was found to be produced by the spinous process of the third dorsal projecting towards the left, and that of the fourth projecting towards the right side. The bodies of the vertebræ were quite natural, and regular in their

form. A similar state of the dorsal vertebræ may be seen in another skeleton preserved in the collection.

Had such an appearance been discovered by a quack, in a patient reduced and much emaciated, in consequence of suffering from rheumatism, or from the weary pain that is often dependant on general bad health, he might, with some shew of reason, have asserted that it was the cause of all the suffering. Knowing the good effects often produced by rubbing and shampooing, we can imagine that a patient might be induced to believe that the improvement in her health was in consequence of the bones being restored to their proper places; the increase in flesh consequent upon the rubbing would probably conceal the apparent displacement of the bones.

INQUIRY INTO THE OPINION THAT LATERAL DISTORTION IS CAUSED BY DISEASE OF THE VERTEBRÆ.

It is very necessary to examine how far the opinion is correct, that lateral curvature of the spine depends on disease of the vertebræ, as it is very generally entertained by the best informed in our profession. The circumstance of its being supported by the most eminent surgeons, would alone be sufficient to excite enquiry; but the interest in the investigation is increased, on discovering that this idea of the origin of the disease, which at first view appears to be safe to proceed upon in practice, is not only often the cause of a patient being subjected to unnecessarily severe treatment, but also of an increase of the distortion.

As so many instances of distortion consequent on disease of the vertebræ are recorded in the Appendix, it cannot be supposed that I deny that disease of the spine will produce distortion; but, on re-

ferring to those instances, they will be found to be examples of distortion very different from that generally denominated lateral curvature, being either consequent upon caries of the vertebræ, or upon *rickets*, an affection which there is every reason to believe especially attacks the osseous system.

Although it is generally safe, in an enquiry into the causes of disease, to draw conclusions from the facts observed upon dissection, it is necessary, in almost every case, to examine whether the appearances discovered should be considered as the causes or consequences of the disease.

In the reports which from time to time have been made on the condition of the vertebræ of persons who have died with lateral curvature of the spine, it is generally stated that the bodies are softened, and full of a scrofulous substance; but on investigation this will be found to be incorrect; for, in the greater number of instances, the internal structure of the bodies of the vertebræ has a natural appearance. It is easy to account for the mistake. If the vertebræ of a patient, who has long been confined to bed,

be examined, the appearance described above is found; but if the person has been in the habit of taking exercise a short time previous to death, the bodies of the vertebræ are discovered to be as firm and compact as those in a perfect spine. I trust that it is now almost unnecessary to add, that instead of admitting that the softened condition of the vertebræ affords a proof of the existence of a scrofulous disease, that it should be considered as merely shewing the bad consequences of confinement and want of use. The wasted appearance of the muscles, which is occasionally observed in cases of lateral curvature, and which has been confounded with their state during the inflammatory stage of the carious diseases of the spine, also depends on the same causes as the softening of the bones.

It is well known that the shape of the vertebræ is materially altered in cases where the spine is much distorted; but as no mark of disease is discovered when a section of the bones so mis-shapen is made, we may infer that the change of form is a consequence that may be produced inde-

pendent of any specific disease existing in the bones, especially as it is found to correspond to the direction in which the pressure has been made.

In the sections of the spine marked in the Appendix 11. 12. and 13., although the bodies of the vertebræ are much altered in shape, their internal structure is not in the slightest degree different from that of vertebræ in a natural state; there are scarcely even any marks of anchylosis on them, while some of the transverse and articulatory processes, and even the ribs, are not merely anchylosed, but studded with exostosis. As similar results have been observed in many other instances, they may be considered as additional proofs that the bodies of the vertebræ, in cases of lateral curvature, are seldom affected with a specific disease, and are not even so liable as the more solid bones to be inflamed by the irritation caused by pressure.

As general observations, I am confident that the above are correct; but exceptions will be often found, as it is not unusual for a patient of a weakly constitution, and who has lateral distortion, to be attacked by the

common carious disease of the vertebræ; but the difference in such cases, from those consequent upon the lateral curvature, is at once obvious.

The observations which I have made do not correspond with the statement that there is generally pain in the back and wasting of the muscles in cases of lateral distortion. On examining a patient, I always enquire whether she suffers pain when I press upon the spine; but in no case similar to that described at page 49, have I found that the patient suffered more from the pressure, than she should have done had any other prominent bone been firmly pressed upon. There is, however, occasionally, a weary pain in the back; but this, in cases of slight distortion, I attribute to weakness, as it is quickly relieved by certain exercises which would tend rather to increase than diminish a pain consequent on disease of the vertebræ. I have, however, in the explanation of the first plate, shewn that certain changes occasionally take place in the bones of the spine, which may perhaps account for the

pain that is sometimes experienced at particular periods of the distortion.

The consequences that may result from a patient being treated according to a plan founded on the idea that distortion depends on a disease of the bones, will be stated in another place. I shall now pass to the explanation of some of the plates which are illustrative of the varieties of distortion; and this will afford an opportunity of stating several circumstances which have been omitted in the general description of distortion in the preceding pages.

THE VARIETIES OF DISTORTION FURTHER ILLUSTRATED BY DESCRIPTIONS OF THE EXAMPLES REPRESENTED IN THE PLATES.

In the following pages, I shall endeavour to describe the varieties of distortion of the spine, in such a manner as to form explanations of the plates, and of many circumstances which have only been slightly alluded to in the preceding pages.

In the first plate, six examples of distorted spines are represented. None of them are exactly similar, but there are certain characters common to all.

The first figure is taken from the preparation which is numbered in the Appendix, I. 3 M. 5. It forms a good illustration of distortion of the whole spine, although the change in the shape of the individual vertebræ is so slight as to be scarcely observable. But on examining it closely, it will be found, that from the third lumbar to the twelfth dorsal, the right sides of the intermediate vertebræ are

deeper than the left. From the eleventh dorsal to the fourth, the inclination of the vertebræ is in the opposite direction; but still there is little difference in the size of the two sides of the bones. Such a change in the form of the column appears of little moment when only the spine is examined; for as all the vertebræ above the fourth dorsal are nearly in a straight line, the upper part of the spine becomes almost perpendicular to the sacrum; but on comparing this figure with the sketches in the second plate, the effect which such a slight curve has on the form of the body, is apparent.*

As in this specimen there is no mark of disease of the bones, and as little change has taken place in their form individually, we may consider it as one, which by properly directed efforts, might have been restored to its natural state.

In the next figure, in the same plate, we have an example of a deviation from the common distortion exhibited in the first figure.

The first bend towards the left is very

* See the explanation of the second plate.

short, a sudden curve taking place towards the right side, as low down as the twelfth dorsal vertebra. This second curve is also more abrupt than what is commonly found, especially in the space occupied by the three lowest dorsal vertebræ. At the seventh dorsal, the curve is again changed to the left, and continues up to the third, so that there is necessarily a slight curve in the cervical vertebræ, to bring the head into a line perpendicular to the pelvis.

The appearance of a person with the spine distorted in this serpentine form, would be different from that produced by a distortion similar to fig. 1. It would nearly correspond with that described at page 60. The four lower ribs on the right side would be prominent, the next five or six on the same side would be compressed together, and the two upper would be rather elevated. On the left side, a contrary disposition of the several ribs would be found; and hence it is, that when the spine is so curved, the shoulder may be prominent, while the same side of the neck is flat; nor is there the usual depres-

sion, but rather a fulness at the loin of that side on which the shoulder is elevated.

Although the necessity of attending to the effects produced by this serpentine form of the spine must be obvious, there are other practical questions illustrated by the preparation represented here. The lower dorsal and the upper lumbar vertebræ are not only much altered in form, but are also partially anchylosed; and even a considerable quantity of exostosis is thrown out on their sides.

Two circumstances most important to be recollected in the treatment of distortions, are proved by this condition of the spine; first, that a considerable degree of inflammation occasionally exists in the vertebræ in such cases; and, secondly, that it is sometimes impossible to cure even a slight distortion of the spine.

The danger, of a person ignorant of pathology, attempting by violent means to restore a spine so affected to its natural condition, is obvious. It is unnecessary to make any remarks on the consequences of an operator succeeding in his efforts to break through the anchylosis.

We have another proof in the condition of the transverse processes of the last lumbar vertebra, which are turned up, apparently from being compressed between the superincumbent weight of the body and the sacrum, of the bony system of this spine having been much affected during the progress of the distortion. To shew that this occasionally occurs, and particularly in the lower vertebræ, I might refer to the preparations marked in the Appendix, I. 3. M. 1., I. 3. M. 2., I. 3. N. 3., I. 3. M. 4. In each of these specimens, there is union between the last lumbar vertebra and the sacrum; and in the one marked I. 3. M. 2., the sacrum is slightly curved, the right side of each portion being deeper than the left. I am, however, induced to believe that this change in the form of the sacrum seldom happens except in cases of ricketts, or where the distortion commenced at a very early age.

Although the third figure at first view appears very similar to the two last, it is in many important points different; for it is the spine of a skeleton, in which all the bones were affected by ricketts.

There is a circumstance which I shall particularly dwell upon, in the explanation of the fourth plate; but I allude to it now, as it may occasionally be observed in those who are not affected with ricketts. I mean the projecting forwards of the last lumbar vertebræ into the pelvis, so as to diminish its capacity. This is not of frequent occurrence when the distortion depends on the causes enumerated at pages 49 and 54; and luckily, when it does occur, it can be easily discovered. But it is an important circumstance to be recollected, because it forms one of the marks by which we distinguish the distortion consequent upon ricketts, from that produced by weakness and the causes already enumerated. In ricketty patients, the distortion generally falls on the lower part of the spine; but to this, there are many exceptions. In this specimen, the upper part is so little affected, that on comparing it with the other figures, and especially with those in the second plate, we might be induced to suppose that the shoulders had not been much distorted. Had the person not been ricketty, this wou d have probably been the case, as

both scapulæ were nearly on the same level; but the deformity was in this instance very great, for the scapulæ themselves were mis-shapen, a thing which never occurs except when there is a specific disease of the bones. Indeed, the circumstance of the figure of the shoulders not having relation to the form of the spine or ribs, may also be considered as a distinguishing mark of the distortion having been caused by ricketts. In common cases of lateral curvature, the arrangement and form of the ribs correspond with the condition of the spine; but it is not so in ricketts, for the ribs being softened in common with the other solid bones, are mis-shapen in a very irregular manner by the action of the muscles attached to them, and by any pressure to which they may be subjected. This question is further discussed in the explanation of the fourth plate.

The fourth figure is a sketch of the preparation marked in the Appendix, I. 3. M. 7. It affords a good example of the curve beginning at the lower part of the spine, and continuing gradually upwards, in a manner similar to that represented in the first

figure. In this specimen there is not only a curious provision to prevent the further increase of the curve, but also a circumstance in proof of the impossibility of remedying certain cases which, to a superficial observer, might appear to admit of cure. A splint or stayband of solid bone has formed on the convex side of the curve.

This anchylosis does not in general form in cases of lateral distortion, except when the curve has been permitted to become very great. Anchylosis and exostosis are more frequently found in cases similar to that represented by the fifth figure; but as they sometimes occur in cases which resemble the common lateral distortion, we ought always to attend particularly to any symptoms denoting local inflammation (which is generally the cause of anchylosis). The plan of practice suited to many cases may be very detrimental when the process of anchylosis is going on.

The pathology of anchylosis is very obscure, it sometimes proceeds to a great extent without the patient suffering; indeed it has been often considered to be a

process natural to old age. In aged horses, anchylosis of the spine is so common, as to be supposed, by many veterinary surgeons, to be the natural effect of old age. To this opinion, however, there are many objections.

I am induced to believe that anchylosis between the vertebræ seldom takes place without the necessary increased action of the circulation of the bones producing a certain degree of pain. And in the numerous examples which are seen of spines anchylosed, without any curve or other mark of disease, I think we have an explanation of the cause of those anomalous symptoms of weary pain in the back, of pains in the parts within the pelvis, and in the thighs and legs, which many patients suffer, although they have not any curve of the spine, and do not even wince or shrink unless the vertebræ be rudely pressed. * We know that patients in such a condition cannot bear the slightest exer-

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* The late discoveries on the functions of the spinal nerves, may assist us in tracing many of the above symptoms to their source.

tion, and that they are relieved by constantly lying in one position.

In the next volume I shall bring forward many examples of different degrees of disease in the bodies of the vertebræ, which will perhaps be considered as corroborating these views.

The fifth figure is introduced to shew the degree to which the vertebræ in an old person may be anchylosed; the intervertebral substance is wasted, and all the bodies of the vertebræ are united together by ossific matter. But it may be also taken as an example of the curve which is very common in old age, and occasionally in young people, in consequence of an habitual stoop.

Of the Distortion which is consequent upon Disease of the Vertebræ.

As the distortion consequent upon disease of the bodies of the vertebræ is often of a character that may lead those who are ignorant of pathology, to suppose that the prominence near the middle of the

spine is caused by displacement or dislocation of the vertebræ, I have considered it necessary to introduce the sixth figure, which is one of the many examples contained in the Museum, illustrative of the change produced upon the spine by the disease generally called scrophulous caries. As the consideration of this disease will form the principal part of the next volume, I shall not enter into a particular description of the preparation represented by this figure. I merely offer it as sufficient to shew that, although certain vertebræ are prominent and altered in shape, the parts which form the boundaries of the cavity for the lodgement of the spinal marrow keep a proper relation to each other; so that the canal is free and regular in its form. The sketch also shews, that if the prominent vertebræ could be pushed inwards, the spinal marrow would be compressed by them; and that, consequently, if the rubber who promises to restore a spine in this condition to its original shape could succeed in pressing in the prominent vertebræ, he would kill his pa-

tient. The good effects which occasionally follow the treatment, by which it is pretended the situation of the bones may be altered, have already been considered at page 27.

The danger of any attempt to remove this deformity by machines, when the disease producing it is in an active state, is alluded to in the Appendix, in the description of the examples which are numbered from 49 to 70. The impossibility of restoring the spine to its original form, after the bodies of many of the vertebræ are wasted, and anchylosis has taken place between their remains, must be obvious. Here I ought to state a circumstance which is highly important to be recollected at the present moment, when the system of *gymnastics* is becoming so common in schools; viz. the danger of a boy who is distorted by caries of the vertebræ being killed, in endeavouring to imitate the feats performed by his school-fellows. As the spine is no longer elastic or limber, but actually brittle, it may, by

a sudden exertion or leap, be snapped through at the part where it is anchylosed.*

* I ought, however, in justice to Mr. Clias, who superintends the exercises in several of the great schools, to mention, that he is fully aware of the danger, to which boys in this condition are subjected by the performance of his exercises.

THE CONDITION OF THE SPINE AND RIBS, IN THE COMMON CASES OF LATERAL CURVATURE, FURTHER ILLUSTRATED BY THE SKETCHES IN THE SECOND PLATE.

The manner in which distortion in the common cases of lateral curvature of the spine is produced, has been already shewn. I now propose to enter more fully into the consideration of the condition of the bones and muscles in such cases; but to follow the description, it will be almost necessary for the reader to refer to the second plate.

By comparing the two figures in the plate, it will at once be evident, that the cause of the "large and high shoulder" on the right side, and of the "hip being out" on the left, is not any change that has taken place in the bones of the shoulder, or of the hip, but the curvature of the spine. The sketches also shew that the enlargement of the right side depends on the manner in which the ribs project from the convex part of the spine, while the fulness in the left loin is, in a great measure,

formed by the muscles lying on the lateral projection of the transverse processes of the lumbar vertebræ. It is, however, scarcely necessary to enlarge upon these questions, as they have been already discussed at page 49. I shall therefore describe the manner in which several other circumstances, dependant on distortion of the spine, may be discovered.

If a plumb-line be suspended opposite to the middle of the back of the head, while the patient is standing firmly on both feet, and as erect as she can, it will hang nearly perpendicular to the centre of the pelvis. If we now rub the skin over the spinous processes, rather roughly, with the finger, a red mark will distinctly shew the course of the spine. By comparing this with the perpendicular line, we can form a correct idea of the sort of curvature which is formed. Above the point where the perpendicular line crosses the red mark, there will probably be a curve to the right side, while below it, there will be one to the left.

This friction on the spine may, perhaps, not be very agreeable to the patient, but it is the most accurate way of shewing the

curve, and is better than marking the skin with ink or rouge. It is also of advantage in enabling us to discover whether there be any undue tenderness in the different parts of the spine.

Although the deformity of the figure depends principally on the state of the spine, it is necessary to attend to the condition of the muscles of the back; for some of them are occasionally so displaced, as to add very much to the deformity.

The sacro lumbalis and longissimus dorsi are generally so elevated by the convexity of the curve, as to produce the appearance of a large tumor on the left loin; indeed, I have known the prominence mistaken for such, and instruments applied to repress it: and the same appearance has already been noted at page 69, as having been considered the effect of an increase in the size of the muscles. The corresponding muscles on the right side are necessarily on a lower level, and when put upon the stretch, form such a distinct line between the pelvis and the ribs, as to be occasionally mistaken by machine-makers for part of the spine.

The individual muscles of the back can-

not be distinguished, in a weakly girl who is distorted in a manner similar to the sketch, unless they are brought into strong action. When this is done, we may observe that the trapezius has a peculiar appearance, its outer margin, on the right side, being much more distinct and rounder than is natural. This is owing to the displacement of the scapula, the base of which, instead of being nearly parallel with the spine, stands obliquely; the lower angle is also so far removed, and at the same time so elevated, that the edge of the latissimus dorsi, instead of lying upon it, as in the natural condition of the chest, lies below it. This is one of the causes of the lower angle of the scapula being occasionally so elevated, and at the same time, so loosely bound down to the chest, as to permit the hand to be passed between the scapula and ribs. The deformity thus produced is very great, and is often increased from the other muscles, which are connected with the shoulder, being so much deranged by the change in their relative positions, that they become almost incapable of acting, and thus appear paralytic.

The very remarkable changes which take place in the position of the scapula, and consequently in that of its muscles, when the distortion increases, or when attempts have been made *to push in* the shoulder by instruments, are demonstrated in the two next plates. The fulness of the right side of the neck, and the apparent increase in the size of the muscles, have already been shewn to depend on causes similar to those which produce the swelling of the left loin.

CERTAIN VARIETIES IN THE CHARACTERS OF LATERAL DISTORTION, ILLUSTRATED BY THE FIGURES IN THE THIRD PLATE.

The figures contained in the third plate are illustrations of varieties of distortion, which, though not so common as the cases of lateral curvature already described, are frequent enough to be entitled to particular observation.

Lateral Curvature, where the whole of one Side is larger than the other.

The first figure represents a kind of lateral distortion, which is liable to be formed by a continued habit of standing or sitting in a slightly-bent position. In this example, the left side is larger than the right; but, in the greater number of cases, the right is the larger of the two.

It is easy to distinguish this species of curve from the common lateral curv-

ature*; for the head is not carried perpendicular to the pelvis, and all the ribs of the one side are expanded, while those of the other are confined. On comparing the sketch with the preceding figures, it is evident that these effects are in consequence of the spine not being curved in a serpentine form.

This kind of distortion (but with the right side large instead of the left) is very common among persons who are in the habit of using the right arm more than the left, and are at the same time obliged to stoop. It is therefore most frequently seen in certain workmen; but it may occasionally be observed in girls who, from an early age, have been accustomed to play on the piano-forte or harp.

The first mark of this deformity is a bend in the spine, a little higher than the middle of the back; the second is a greater

* If this kind of distortion was more common than the lateral curvature already described, it might afford some foundation for the opinion that all distortions were caused by the undue contraction of the muscles of one side over those of the other.

rotundity of both shoulders than is natural, and a slight elevation of one; the third is a fulness of the same side of the neck as the high shoulder.

Elderly persons very frequently have the spine distorted in this manner, but to a much greater degree, and especially if they have been accustomed while young, to wear stiff stays or instruments, to conceal a slight distortion. The cause of this is explained in the observations upon wearing artificial supports, in the chapter on the treatment.

In such cases, anchylosis often takes place between the bodies of the upper dorsal vertebræ. When this happens, the head is generally inclined in an oblique direction towards the left shoulder. The preparations numbered I. 3. M. 19. and 20., in the Appendix, are good examples of this. In 19, a slight projection of the spines of the second and third dorsal vertebræ has taken place, in consequence of the wasting of the intervertebral substance.

As the person, from whom the skeleton represented in the sketch was taken, died

of consumption, I shall again refer to it in discussing the question of the effects of distortion upon the lungs.

Effects produced on the Ribs by Distortion of the Spine.

The second, third, and fourth figures in the third plate, are intended to illustrate the changes produced upon the ribs by the increase of curvature in the spine.

The second and third figures are examples of rather an unusual kind of deformity: the lumbar vertebræ are scarcely affected, the distortion having fallen almost entirely upon the dorsal, and consequently very much on the ribs. We can easily imagine how much more deformed a person appears with the spine in this condition, than when it is of a serpentine form, for the figure is tall, the difference in the size of the shoulders is very great, and the head, instead of being nearly perpendicular to the pelvis, is directed to one side. On examining the condition of the bones in this example, there can be little doubt of the distortion having been originally similar

to that in the upper part of a spine affected with the common lateral distortion. We may therefore suppose that, at first, the right side was more capacious than the left. But now it is evident that the area of the right side is much diminished. It is highly important to attend to this, for although it may be the consequence of the natural progress of the distortion, still it may also be produced by the misapplication of instruments which have been used with the intention of pushing in the projecting shoulder. It is easy to demonstrate that the application of an instrument with this intent, not only diminishes the area of the chest, but increases the distortion; for the shoulder is pressed against the flat part of the ribs, and consequently the unnatural angle, which even in cases of slight distortion, is to a certain degree formed in the ribs, is increased. When the ribs are thus distorted, the size of the chest is very much diminished, for the middle of the rib is necessarily brought nearer the spine. This effect is demonstrated distinctly in the fourth figure. In it we may also observe, that instead of the middle of the bodies of the

vertebræ being in a line with the sternum, they are turned round so as to be nearly in the natural situation of the spinous processes. This is more clearly seen in the fourth plate. It is scarcely necessary to dwell upon the diminution of the length of the rib between the sternum and spine, as it is seen in the third figure, and must obviously be the case, when we consider that the spine is turned round, and that the head of the rib remains attached to the articulatory process. I may merely state, that on measuring the distance from the middle of the sixth rib to the spine, in the specimen, of which figure 3. is a sketch, I find it to be an inch and a half, while the distance between the same points, in the skeleton of a well-formed person, is more than five inches. This will be again referred to, in considering the effect of such a distortion upon the heart and lungs.

The fourth figure is a back view of the skeleton which is represented in the fifth plate.

It is unnecessary to say that a distortion, such as this sketch represents, is incurable; but certain points, which have

been often misunderstood, are so strongly marked, that perhaps the sketch will assist in preventing us from committing mistakes in the treatment of cases where the distortion is in a slighter degree.

In examining a person distorted in this manner, I have seen a machine-maker, and one who is considered to be well acquainted with his business, make two serious mistakes, and adhere to them with the pertinacity natural to such persons.

In the first place, he mistook the projection of the right shoulder for an enlargement of it and of the ribs; to remedy this, he applied firm pressure with an iron plate upon the shoulder. After what has been said, it will be obvious that by this pressure the ribs would be farther distorted. He next mistook the projection formed by the angle in the ribs for the displaced spine; and this, of course, he endeavoured to make straight. This latter is a very common mistake, at least the projection formed by the acute angle in the ribs has been frequently pointed out to me as the spine. We cannot be surprised at an ignorant person falling into this error, for the ribs

project, and the scapulæ are so approximated, that the spine itself is almost hid.

Many observations might be offered upon the condition of the bones represented by the fourth figure; but as the consideration of the next plate affords a better opportunity for stating them, I shall now pass to the explanation of it.

THE SPINE MAY BE DISTORTED TO THE GREATEST POSSIBLE DEGREE, ALTHOUGH THE BONES ARE NOT AFFECTED WITH RICKETTS.

IN SUCH CASES, THE PELVIS IS SELDOM OR NEVER AFFECTED.

THE PELVIS IS NEVER DISTORTED BY THE APPLICATION OF INSTRUMENTS, IN CASES WHERE THE DISTORTION IS INDEPENDENT OF RICKETTS OR MOLLITIES OSSIUM.

As we cannot at present enter fully into the subject of ricketts, it will be very difficult to prove satisfactorily the correctness of the assertions contained in the title, which are directly at variance with the opinions hitherto entertained on the subject of distortion. But still I venture to make them; for even should I fail in establishing the truth of conclusions drawn from the observation of a considerable number of facts, I hope that the investigation

will tend to improve the treatment of distortions.

The specimen represented in the fourth plate is offered as an example of the extent to which the spine may be distorted, independently of any specific disease of the osseous system. The proofs upon which this opinion rests were first drawn from a comparison of a number of distorted skeletons. It was often found, that although the spine and ribs were distorted to the greatest possible degree (as in the specimen before us), there was no deformity of the limbs; while on the other hand, the limbs were often much distorted, although the spine was little affected. From an observation of these facts, I was led to conclude, that among the great varieties of lateral distortions, there were two distinct classes, differing most essentially from each other. On farther investigation it was found that in the one, the distortion seemed to be owing, or at least to accompany a specific disease of the osseous system, which evinced itself in some of the long or solid bones; while in the other, no marks of disease were found, and the distortion was

confined to the small bones * which are bound together by ligaments, and are dependant on a muscular apparatus for the preservation of their form.

From these facts, I drew two conclusions, which, if correct, will be acknowledged to be of some importance in practice. 1st, That unless some of the long bones, or the bones of the head, be affected, however distorted the spine may be, we are not to consider the disease as ricketts, i. e. that the distortion does not depend on a specific disease of the bones; and, 2d, That the spongy bones (as of the spine, carpus and tarsus) are not so liable to be affected by ricketts as the long bones and those which are more compact in their structure.

I might give many examples in support of these views, but I shall reserve them, and the arguments which might be offered against certain objections that have been made to them, until the next volume, in

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* I have in another part entered into the question of the vertebræ *appearing* to be diseased, in the common cases of lateral distortion. See page 94.

which the subject of ricketts will be fully considered.

It cannot, however, be supposed that I deny the existence of distortion of the spine in ricketts, since so extraordinary a specimen as that represented in Plate V. is before the reader; but from various circumstances, it appears to me, that in such cases, the curvature of the spine is not in consequence of a morbid change in the substance of the vertebræ, but in the general weakness of the system that frequently attends the constitution in which ricketts prevails.

I shall now consider the second opinion, which will afford an opportunity of offering further proof in favour of the first.

The State of the Pelvis in Cases of Lateral Distortion.

This question ought not to be reserved, for it is of much consequence to a numerous class of patients, and can be decided only by the testimony of experienced practitioners in midwifery.

If we examine the outlines of the pelvis

in the fourth plate, we see no mark of distortion; nor do we see it in any of the plates, except in the third figure in the first, in the fourth figure in the third, and in the fifth plate, all of which are representations of the skeletons of persons who had suffered from ricketts. So far we have proofs that there are many cases, in which, although the spine be distorted, the pelvis is not affected. But I shall even venture to say, that on prosecuting the enquiry further, we shall be induced to conclude, that in whatever state of distortion the spine and ribs may be, the bones of the pelvis will not be found distorted, unless there be at the same time, marks of ricketts in some of the long or solid bones.

These ideas, so contrary to public opinion, and to the authority of the most eminent pathologists, have not been hastily formed; for, although I at first drew my proofs principally from a comparison of the condition of the skeletons in Mr. Bell's collection, in which, I ought at the same time to observe, that there is a complete series of distorted pelves, yet I can offer certain facts in favour of the opinion, from some of the

first authorities in our profession. I shall first adduce that of Sandifort, of Leyden, who is entitled to be an arbiter in this question, not only from the estimation in which his works are deservedly held, but because he does not appear to have been biassed by any theory in the descriptions he has given.

Sandifort has, in his splendid publication, entitled MUSEUM ANATOMICUM LUGDUNO BATAVÆ DESCRIPTUM, given plates of the distorted skeletons contained in the museum attached to the university of Leyden. Several of those skeletons which I have seen, are very similar to some in Mr. Bell's collection; the spine and ribs being much distorted, while the pelvis is not diminished in size. But I will not state this merely upon my recollection of the specimens, as it is some years since I was in Holland; but offer the following extracts fom Sandifort's description of the same skeletons. In describing ccix., he observes, "Pelvis ampla est, et distantia inter os sacrum et nexum ossium pubis seu conjugata equalis est diametro transversali." In the description of ccx., which is very similar to

the skeleton represented in the third and fourth figures of the third plate, Sandifort's expression is, " Ampla pelvis ;" and in that of ccxi., which is still more distorted, he says, " Truncus integer feminæ adultæ *quæ aliquoties feliciter pepererat.*"

Several more instances, in support of my opinion, may be found in the work alluded to. It is also further corroborated by the state of the distorted skeleton represented in the splendid work of Chesselden, and by the authority of the celebrated Walther, who, in the description of almost all the distorted skeletons contained in the Royal Museum of Berlin, uses the expression, " Pelvis naturalis."

But notwithstanding the support derived from the above authorities, I am ready to admit, that there may be instances of distortion of the pelvis accompanying lateral curvature of the spine, although there be not, at the same time, any distortion of the long bones ; for as a weakly constitution may be considered as one great cause of distortion, both of the spine and of the pelvis, it is not improbable that the two affections may be combined in the same

person, in various degrees. I am, however, of opinion, that although none of the long bones be obviously affected, we may, by other marks, determine whether the pelvis is distorted.

The above opinions have been, in a great measure, proved to be correct, by the concurring testimony of the most eminent accoucheurs in London. Several of these gentlemen have told me, that it was not unusual for ladies who had distortion of the spine to have easy and natural deliveries, although they had been sent up to town for their first accouchement, under the idea that there would be a necessity for the assistance of instruments; while, on the other hand, the pelvis was often so deformed, in cases where there was no curvature of the spine, as to require the aid of instruments.

I was much gratified to find, that the mark which I had been led to consider as affording the best criterion, by which we may judge of the probability of the pelvis being distorted, corresponded with the experience of the same gentlemen; viz. the condition of the thigh bones, or tibiæ. Having been lately in Edinburgh, I had an

opportunity of conversing with Professor Hamilton on this question. He told me that he had frequently met with instances similar to those mentioned in the preceding page. He moreover made an observation which I consider highly valuable, as affording another mark, by which we may discover the condition of the pelvis: — He seldom or never found the pelvis affected, unless the distortion of the spine had commenced in early infancy. To those acquainted with the disease of ricketts, the value of this remark will be obvious; for they must recollect that it is generally between two and five years of age that the first effects of ricketts upon the bones are observed. It is scarcely necessary to state, that the common lateral distortion seldom takes place until a child is nine or ten years old.

The next question is of much importance in considering the mode of treatment most proper to be pursued, in cases of lateral curvature; viz.

The Liability of the Bones of the Pelvis to be distorted by the Application of Instruments.

Upon this question I shall be bold enough to assert, that unless there be a specific disease of the osseous system, and which shews itself in other bones besides those of the spine, we need not be under any apprehension of distorting the pelvis by instruments. In this statement, I am aware that I express an opinion quite contrary to that generally received, and to the authority of my friend, the late Mr. Wilson, who, in his lectures before the College of Surgeons*, has spoken in a very decided manner against the use of instruments, in consequence of the bad effects which he believed they were likely

* Lectures on the Structure and Physiology of the Parts composing the Skeleton, and on the Diseases of the Bones and Joints of the Human Body, preceded by some Observations on the Influence of the Brain and Nerves, delivered before the Royal College of Surgeons of London, in the Summer of the Year 1820, by James Wilson, F. R. S. Professor of Anatomy and Surgery to the College, Lecturer on Anatomy and Surgery at the Hunterian School in Great-Windmill-Street.

to produce on the pelvis. But Mr. Wilson was also of the opinion generally entertained, that *lateral* curvatures of the spine are always a consequence of ricketts:—"Incurvations of the spine are of two kinds, one arising from ricketts; in this the bend is usually to the sides: the other, from caries of the bodies of the vertebræ, the bend in which is forwards. It is to the first of these incurvations that the following observations are intended to apply." Page 172. "In the application of all the instruments that I have seen, which would admit of locomotion to the body, the weight, although removed from the vertebral column, has been thrown upon the pelvis, either professedly so, or in a way a little disguised; and as the bones of the pelvis are not so hard in such patients as in persons who have no ricketty disposition, the upper part, or spine of the ilium, on each side on which the weight is generally made to rest, is bent forwards; in consequence of which, the pubes and ilia, where these bones form the forepart of the pelvis, bend inwards, and diminish the aperture of that cavity so much, that the head of a child cannot

even enter it, which, to be born naturally, should pass gradually through it. The preparations which I now produce are frightful, but useful examples of this distortion of the bones of the pelvis.

"I have examined very many cases of incurvated spines happening in women in that class of life which would not admit of the purchase of expensive instruments, in which I have found the pelvis so perfectly well formed, as to have allowed of the birth of several living children, although the incurvation of the spine had been very considerable, and long confirmed. I have examined others happening to women, where I had the means of ascertaining that instruments had been used; in all of these, and in others where, from similarity of appearance, I could not doubt but that instruments had been used, I found the bones of the pelvis irreparably injured, by having yielded to the additional burthen thrown on them where they were never intended, and were therefore not calculated, even in a healthy state, to bear much weight: but the examination of

the pelves before us speaks more than volumes," &c.

The pelves to which Mr. Wilson alluded, were principally from Mr. Bell's museum, and of which I have given a short description in the Appendix. The others, which belonged to the College Museum, I have also examined; but they were likewise examples of distortion from ricketts; in consequence of which disease, it is well known, the bones of the pelvis become distorted, and often in such a manner as to have the appearance of having been compressed by machinery, although no instruments had ever been worn. Supposing that Mr. Wilson might have alluded to some of the specimens contained in Dr. Hunter's museum, I took the liberty of asking Dr. Baillie whether there were, in that collection, any pelves in which the distortion could be attributed to the application of instruments; his answer was, that he could not recollect any such instances. *

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* Since these pages were written, we have to lament, in the death of Dr. Baillie, the loss of one of the most zealous promoters of the sciences of anatomy and patho-

I have since had an opportunity of examining Dr. Hunter's collection, which is now in Glasgow; and although there are many instances of distorted spines preserved in it, there was not, among the specimens which I saw, one instance of distortion of the pelvis.

The cause of Mr. Wilson's mistake is shewn in the first quotation which I have made from his work; for he confounded

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logy. The sincerity with which that loss is felt, proves how little his memory stands in need of panegyric. The following circumstance may serve to shew, that the infirmities of age and sickness had not abated Dr. Baillie's zeal for the promotion of science. The week preceding his retirement into the country, he in the kindest manner gave me an opportunity of freely discussing with him the subject of these papers, and entered into the enquiry with all the openness and eagerness of a student; and on informing him that I should soon have an opportunity of examining the specimens to which in the course of the discussion he often referred, he charged me with the commission of reporting to him the state of the anatomical preparations bequeathed by Dr. Hunter to the college of Glasgow.

The report I had not an opportunity of communicating; which I regret the more, as it would have been a source of gratification to him to learn that the preparations, in which he took so much interest, are now preserved with the greatest care.

the lateral distortion consequent upon weakness, with that dependant upon or accompanying a specific disease of the bones.

Upon the question of the propriety of the application of instruments, I will not say any thing here, as it is discussed in the chapter on the treatment, and in the remarks made on the comparative value of the different machines; but I may be permitted to assume, that the above facts form additional proofs of the importance of distinguishing between the two kinds of lateral distortion. It is obvious that one of two faults was liable to be committed, as long as the common opinions on the cause of distortion continued;—either that no assistance was taken from the application of instruments, where they were at least harmless, as far as the bones of the pelvis were concerned; or that mechanics, finding that no bad results followed the application of instruments, in certain cases in which surgeons had predicted that the pelvis would be distorted, have been emboldened to use them in every case, and of course occasionally in ricketts.

The consequence of their application in

such cases must be obvious, and perhaps affords an explanation of the condition of some of the instances to which Mr. Wilson alludes; for there can be little doubt, that if an instrument be fastened upon the pelvis of a ricketty cilild, the soft bones may be compressed by it. It will, however, be difficult to find any case to prove that this has happened, because a pelvis distorted by ricketts has often the appearance of having been moulded into a particular form by the application of machinery, although no instrument has ever been worn.

ON THE EFFECTS WHICH DISTORTION OF THE BONES OF THE TRUNK PRODUCES UPON THE VISCERA.

If we consider the condition of the viscera, when the bones of the trunk are distorted in a manner similar to the specimen represented in Plate IV., we can scarcely imagine how it is possible for their functions to be performed.

In the specimen alluded to, the space between the first dorsal vertebra and the symphysis pubis is only twelve inches, while the breadth of the chest at the widest part is only seven inches. In the skeleton represented in Plate V., from the angle of the jaw to the pelvis, there are only twelve inches; from the sternum to the spine, four inches and a half; the breadth of the chest being greater in proportion, as it measures seven and a half inches.

It is unnecessary to state, that when the viscera are confined within such boundaries,

they must be very much altered in form; but as their shape depends on the peculiar character of the distortion, it seldom happens that we find two instances where the form of the viscera is the same.

Although the solid viscera are often so mis-shapen, that it is scarcely possible to find words to describe them, still it rarely happens that their internal texture is changed so as to constitute what is termed, in morbid anatomy, diseased structure.

Indeed we have often proofs, that although the viscera are not only altered in shape, but also in their relative position to each other, they still perform their functions properly; and that, contrary to the generally received opinion, persons who are much distorted, often attain a good old age.

The explanation given of the slight effect produced upon the functions of the viscera by the distortion of the skeleton, is, that in consequence of the alteration in the form of the bones coming on slowly, the viscera gradually accommodate themselves to the change.

This is probably correct; but there are often symptoms, the source of which can

be distinctly traced to the effects of the distortion on individual viscera. A case is recorded by Portal, in which, from the pressure of the ribs upon one of the kidneys, the secretion and flow of urine were affected; and in the chapter on the treatment of the worst cases of distortion, I have mentioned the case of a young lady who suffered severely in consequence of the pressure of the ribs on the liver.

These cases, however, seldom occur; it is more usual to find patients complain of pains in the thighs and legs, the nature of which they have difficulty in describing. By a correct knowledge of the course and origin of the several nerves, we may trace such symptoms to their source; for they are generally dependant on some particular nerve being pressed upon by a distorted bone.

I shall not enter upon the question whether distortion produces a remora in the circulation, and is thus a cause of apoplexy, because the idea is antiquated, and does not seem to have been founded on correct data. I ought however to mention, that in the examination of the body of which the trunk

is represented in the fourth plate, I found a clot of blood in the brain. But succeeding enquiries led me to consider the apoplexy of which this patient died, as unconnected with the distortion.

When the distortion is in a less degree than is represented in that plate, or even when it is so slight as to be liable to be overlooked, it is important to attend to the changes that are produced upon certain organs.

I had, at the same time, two patients who were supposed to be dying of disease of the heart. The one was a young lady who certainly had all the symptoms of disease of the heart, for she had great palpitations, with an irregular pulse, and she used frequently to faint; but these symptoms came on after she had been long confined nearly in a horizontal posture on the inclined plane, without being permitted to take the slightest exercise. Such a debilitating plan of treatment was sufficient to account for the source of most of the symptoms; and on examining the condition of the spine, it was easy to explain the cause of the palpitations of the heart being more

distinct than usual, for the spine was so twisted, that the heart was carried forwards, and its apex seemed to pass between the ribs. That this was the true explanation was easily proved, as there happened to be at the same time, another young lady under my care, in the same house, whose spine was curved in the opposite direction. In her, the natural pulsation of the heart could not be felt on the left side.

The other patient to whom I have alluded, was a gentleman whom I had known for some time. He came to take leave of me, as he was going down into the country, convinced that he was to die within a few months of disease of the heart. I could not at the time persuade him that there was no organic disease of the heart; for he was in a low and desponding state in consequence of bad health, and his melancholy ideas of his condition had been strengthened by the joint opinion of two physicians, in whose judgment he put considerable trust. But as he is still in good health, although it is two years since he consulted me, I believe he is now convinced that I was correct in the explanation which I gave him of the

cause of the beating of his heart being so distinctly felt. *

Effects of Distortion upon the Lungs.

Although it must be admitted that distortion of the chest has an influence on the functions of the lungs, still the numerous cases which may be daily seen of great deformity of the chest, without any symptom of disease of the lungs, induce me to attach less importance to the effects produced on the lungs by mere distortion of the ribs, than is generally done.

But notwithstanding this view of the question, the enquiry is most important; for there can be no doubt that disease of the lungs and a distorted chest, are often combined. In many cases which I have examined, where the lungs were affected, it has appeared to me that the malformation of the chest was a consequence of disease of the lungs at an early period of life. This

* Since the above was written, I have been consulted by several patients, who had been treated for disease of the heart, though all the symptoms were caused by distortion of the spine.

opinion I founded on the belief that there is the same correspondence between the lungs and their external apparatus, viz. the bones and muscles of the chest, as there is between the brain and the skull.

Laænnéc, the latest French author on the diseases of the chest, gives many examples of the alteration in the form of the body in consequence of disease of the lungs. This is not a new observation; but as Laænnéc has attached considerable importance to it, I shall quote part of his work; however, it should be noticed, that the drawings he has given of his patients rather diminish our faith in his descriptions. The figures are distinctly ideal; the body and limbs being quite Herculean, which is certainly not likely to be the condition of patients suffering under disease of the lungs.

"The subjects of this morbid alteration are sufficiently distinguishable even by their external shape, and by their gait. They seem always to lean towards the affected side. This is always manifestly narrower than the opposite side, there being frequently more than an inch of difference,

when they are both measured by means of a cord. The length of the chest is equally diminished; the ribs are closer to one another, the shoulder is lower, and the muscles, especially the pectoral, are only half the size of those on the opposite side. The difference of the two sides is so remarkable, that, at first sight, we should think it much greater than it is found to be by admeasurement. The spinal column generally remains straight; sometimes, however, it at length yields through the effect of the habitual leaning towards the diseased side. This habit gives to the individual the appearance of being somewhat lame." (I may here refer to the first figure in the third plate, see page 117.)

" The greater number of individuals, in whom I have detected this deformity, attributed it to some severe and long-continued disease of the chest, the exact character of which had never been ascertained. I have more than once pointed out this alteration of the form of the chest to individuals, in whom it existed in a great degree, who were not themselves at all aware of its existence. All these had experienced a severe

disease of long duration, the principal site of which had seemed to be the thorax. In several, the disease appeared not to have been very violent. Some had had pleurisies, or pleuro-peripneumonies, with very marked symptoms, and which had been long in getting well. I was long aware of this state of the chest, before I had an opportunity of ascertaining its cause by dissection. Most of those patients were short-breathed, yet could not be said to have habitual dyspnea. Cases of very great contraction are rare; but those of a slight degree of it are very common." *

Although it may be doubted whether distortion actually produces disease of the lungs, or whether a disease of the internal organ can be the cause of an alteration in the form of the chest, after a certain age, there can be no question of the practical benefit to be derived in considering the lungs and the chest as mutually dependant. The almost immediate good effect which results from a patient, who is nearly on

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* See Dr. Forbes's Translation of Laænnéc's Work, p. 160.

the verge of consumption, regularly going through exercises, by which the muscles of respiration especially are brought into action, is so obvious, that the most sceptical theorist must, on observing it, be convinced of the close connection that exists between the external and internal organs.

Having stated the principal points connected with the pathology of distortion, I shall proceed to an examination of the different means which have been proposed for the cure of the common lateral curvature of the spine.

ENQUIRY INTO THE SEVERAL METHODS OF TREATMENT AT PRESENT IN USE, FOR THE CURE OF DISTORTIONS OF THE SPINE.

ON THE PROPOSAL TO CURE DISTORTIONS OF THE SPINE BY FRICTION, THUMBING, AND SHAMPOOING. *

It will perhaps be admitted that the stiffness of the joints and the contraction and

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* *Friction*, or *rubbing*, may be considered as operating immediately on the surface; unless done with considerable force, it produces only a change in the circulation of the skin, which, however, is of great use in many diseases that are dependant on weakness or torpidity of the system of the part.

Shampooing, as practised by the Indians, is more efficacious than friction, in removing deep-seated pain or in relaxing contracted muscles; for the skin is acted upon, under very advantageous circumstances (the use of the warm bath is preparatory to the manipulation), and the fibres of the muscles are called into activity by the operation, and by the friction of the internal surfaces upon each other.

Thumbing is a more violent and a coarser mode of shampooing, and is consequently often more efficacious. Indeed, no one, unless he submits to a trial of

rigidity of the muscles, which are consequent upon chronic inflammation, or on severe attacks of rheumatism, are often neglected; or at least, that sufficient means are seldom employed by the regular practitioner to restore the limbs to their natural state. From neglect on our part, patients in this condition frequently have recourse to persons who propose to cure distorted and contracted limbs by some particular manner of rubbing or shampooing. Although much mischief occasionally results from the attempts made by rubbers, who cannot distinguish between a distorted joint, in which a specific disease is still dormant, and a lameness that is merely consequent on the contraction produced by inflammation, still we must admit that wonderful changes are often produced by

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the practice upon himself, can imagine how severe this mode of treatment is at first. But, notwithstanding, a delicate patient will in a short time submit with apparent pleasure to the discipline.

Pinching, *percussion*, *kneading*, may be all considered as varieties in the modes of giving exercise. The effect of each being to produce an increased action in the part operated on.

each of the processes named at the head of this chapter.

Indeed, any one of the modes is often of such use in relieving the stiffness and contraction of a limb, and even in restoring strength and vigour to a weakly person, with slight distortion of the spine, that we cannot be surprised at the credulity of those who are unacquainted with the cause of the good effects produced, nor that they should put faith in the promise made by rubbers, that the most crooked spine shall be eventually remedied by the continuance of the same process.

It is unnecessary to dwell upon this question after what has been stated in the first chapter. I may, however, repeat, that although the facts discoverable by examination of the skeleton of a person who has had distortion of the spine, are sufficient to prove that such means as friction, shampooing, &c. cannot restore the distorted spine to its natural condition, still we ought not to neglect nor despise these processes, for they are most essential aids in the treatment of certain stages of many diseases of the joints, and especially of those of the spine.

We have only to witness the operations of a professed rubber, to be convinced, that if the practice were superintended by one acquainted with anatomy and pathology, much benefit would result from it, while there would be no risk of the patient's life being endangered by its indiscriminate application.

ON THE PROPOSAL TO REMEDY DISTORTIONS OF THE SPINE BY REDUCING VERTEBRÆ SAID TO BE DISLOCATED.

The views of the anatomy and pathology of the spine, upon which the proposal to remedy distortions by reducing vertebræ said to be dislocated, has been founded, are already (see page 75.) shewn to be so very erroneous, that it is almost unnecessary again to take up the question, or to offer fresh facts in proof of the fallacy of the opinion, that the situation of the individual vertebræ, in a distorted spine, can be changed. But it is incumbent on me to endeavour to explain the cause of the degree of success which occasionally results from the mode of practice followed in the attempts made to change the places of the vertebræ.

As the process has not been made public, but has been as much as possible kept secret, it cannot be fully canvassed; from the descriptions given by those who

have witnessed the operations, we may conclude that the occasional good effects result from the patient's being confined to the horizontal position, while the muscles of the spine are at the same time kept in such a state of activity by the friction and pressure (to soften the bones!!), as to be prevented from wasting. By this mode of giving exercise to the muscles of the spine, the bad effects of close confinement to the same position are to a certain degree obviated. But upon this question I shall not dwell longer here, as the discussion in the next chapter is applicable to it.

ON THE PROPOSAL TO CURE LATERAL DISTORTIONS OF THE SPINE, BY CONFINEMENT TO THE HORIZONTAL POSITION, OR ON AN INCLINED PLANE.

The practice of laying a patient on the back, and in the horizontal position, without intermission, for months, and even for years, has of late prevailed very much, in the hope of curing lateral curvatures of the spine. The arguments offered in favour of the plan have been founded on the idea that the distortion depends on an undue contraction of the muscles of the spine, and on a diseased state of the vertebræ. Taking this view of the cause of distortion, it was imagined that by keeping a patient constantly resting on an inclined or horizontal plane, the irritation proceeding from the supposed disease of the bones would be relieved, and the muscles of both sides being kept in a state of quietude, would be gradually reduced to the same standard of strength, so that after a certain

time the equilibrium in their actions would be restored.

It is scarcely necessary to repeat the arguments that have been already offered in refutation of these views, nor are proofs now required to shew that every part of the body is weakened and deteriorated by lying dormant. But I may state, that it is scarcely possible to imagine any means so effectual, in preventing parts from performing their natural functions, as the plan proposed for the cure of a disease originally proceeding from weakness. Indeed, this now begins to be discovered, and the use of the inclined plane is gradually falling into disrepute. For it is found, that although a girl who is slightly distorted may become more straight after having been confined to the horizontal position for months, she does not gain strength, but, on the contrary, becomes so weak, that she can scarcely walk or stand; and when she attempts to sit up without some artificial support, she sinks almost double, or at least into a state worse than she was in when she first lay down. These are sufficient objections to the practice, but the effects which a long continuance in the

system has upon the general health, are still more serious. We find that girls who have been long confined to the reclining board are delicate and liable to all the worst symptoms of hysteria; and I have already mentioned an instance of a young lady having so many symptoms of diseased heart, that she was treated accordingly, although they were afterwards proved to have proceeded from the weakness caused by long confinement to one position.

But in making these observations, I beg it may be distinctly understood that they have reference only to the common notion, that close and strict confinement to one particular position is the most probable mode of remedying distortions. Indeed, in the chapters descriptive of what I suppose to be the best means of treating distortions, it will be found that I consider the use of the inclined plane as essential to the cure of lateral curvature. Nay, I would even recommend that a delicate girl, although she may not be in the slightest degree distorted, should lie for some time every day upon the plane. When a girl is growing rapidly, and is at the same time

delicate, the weight of the upper part of the body is obviously so much more than the lumbar vertebræ can support beyond a certain time, that common sense dictates the necessity of giving ease and rest to the spine; and this cannot be more effectually or easily done, than by lying down occasionally on the inclined plane. * But this, like many other useful remedies, has been abused, from not paying sufficient attention to the great variety of affections to which the spine is liable. †

I shall now pass to the examination of the proposal to cure distortions of the spine by the application of such instruments as are intended to stretch and sup-

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* It cannot be too often repeated, that the spine of the most delicate girl will not suffer by the upright position, while she continues in activity or exertion; it is during a state of lassitude and relaxation of the muscles that the horizontal posture is necessary, as it is then that the ligaments and bones yield.

† It would be easy to prove, that the cases in which the health and strength are improved by lying on the inclined plane, are quite different from those at present under consideration. This question will be discussed in the next volume.

port it. In the course of this enquiry, several observations are made which are also applicable to the question of the propriety of attempting to cure distortions by confinement to one position.

ON THE MODE OF TREATING DISTORTIONS OF THE SPINE BY MACHINES FIXED TO THE BODY.

The application of instruments to stretch and support the spine, is generally supposed to be the only means used by Mr. Chesher, of Hinkley, in the treatment of diseases of the spine.

The idea that a complicated machine is all that is necessary to cure a distorted spine, and the celebrity which Mr. Chesher attained, has induced many ingenious mechanics to follow what they supposed to be his mode of practice. But I have reason to believe that Mr. Chesher's method has been misunderstood; for, having had the advantage of conversing with him on the subject, I discovered that I had, with many others, been led to form a very erroneous idea of the plan which he pursued. Indeed, Mr. Chesher told me that the reputation of his system had suf-

fered much, from persons whom he had employed as mechanics, leaving his service, and giving out to the world that they had been his assistants, and that the plan of practice which they followed was the same as his.

Although my views, both on the pathology and on the mode of treating distortions, are very different from Mr. Chesher's, yet I feel myself bound, in this enquiry, to state, that the following arguments are offered more in opposition to the opinions which, at this moment, generally prevail, than to the system followed by Mr. Chesher.

To enable us to enter fully into the enquiry, a slight sketch of the instrument, which is known by the name of Mr. Chesher's Collar, and of another which is called an improvement upon it, are given in the sixth plate.

The objects generally proposed to be attained by the application of such machines, are,—to stretch the spine when it is curved; to keep it stretched; and finally, to remove the cause or source of the distortion.

In considering the instrument merely as a piece of mechanism, we may enquire how far it is calculated to effect the objects proposed. As it is not furnished with any mechanism by which the spine can be gradually, or even forcibly extended, after the instrument is fixed to the body, it is in that respect defective.* But there can be no doubt of its sufficiency for the second intention, viz. that of keeping the spine at the degree of extension to which it has been forcibly brought by another power.

Before examining into the third effect, and which, being the ultimate object, is the most important, we may enquire how far the acknowledged property of the instrument will be beneficial to the patient.

The machine is fixed firmly on the pelvis; and when the body is elevated, by pulling upon the head-piece with the cord and pulley (the straps being under the chin and the back of the head), the upright bar is fixed. As there is no elasticity in this bar, nor any provision for its being elevated

* The patient is drawn up by a cord over pullies, previously to the application of the instrument.

or depressed, in correspondence with the motions of the body, the head must be invariably kept at the same distance from the pelvis; and as the head was forcibly elevated before the application of the instrument, great part of the body must be hung as an appendage to it, the whole weight being supported by the straps under the chin and the back of the head.

Independently of the objections that may be made to the pain which necessarily attends the operation of the instrument, when applied in the manner supposed to be necessary to stretch the spine, it may be stated, that there is no longer any exercise of those muscles by the action of which the spine is supported in a state of health; and consequently, they become gradually weaker, and every day less able to support the spine.

As a natural result of this, we find, after the instrument has been worn for some time, that either it, or a machine similar in effect, is indispensably necessary to the patient's comfort, unless the spine has become a solid and immoveable column, by the process of anchylosis. I have al-

ready alluded to the effects of the want of exercise upon the muscles, and even upon the bones (see page 6.); I shall therefore now enquire how far the points d'appui are affected, by the necessary pressure of the several parts of the machine.

The objection most frequently made to the use of the machine, is, that there is danger of the bones of the pelvis being compressed, and of the natural openings being diminished, from which the most serious consequences may result, when the patient arrives at a certain age. As this opinion is very general, and as my friend, the late Mr. Wilson, stated it in his lectures before the College of Surgeons, in words which show that he was quite convinced that such was the effect of instruments, I have been at considerable pains to investigate its truth. * My enquiries have

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* This question has been already considered at page 133.; but I may here, in addition, state that the fear of hurting the pelvis has been the cause of much of the complicated machinery connected with that part of the *collar* which is fixed upon the pelvis; the additional supports being intended to make equal pressure on the different parts of the pelvis.

led me to believe, that although the form of the instrument seems calculated to distort the bones of the pelvis, the machine will not have this effect, except in certain cases, which may be easily distinguished from the more common ones. Another objection to the use of the instrument is better founded, viz. the bad effect it produces upon the form of the face. The bones of the face are supposed to be always altered in shape by the pressure of the straps, on which the whole body is suspended; but this is not altogether correct. When the machine is applied to children, before all the teeth have risen, or before the several bones are firmly united together, the pressure may have some effect upon them; but unless the bones be unnaturally soft, the instrument is not so hurtful as is generally supposed. The idea that the face is always distorted by the straps, has probably arisen from its not having been observed, that the lower jaw is often of a peculiar form in certain distorted persons, whether they have worn a machine or not; but there can be no question as to the effect produced by the straps on the muscles

of the face, and on the skin below the chin. By the pressure, the muscles of the cheeks are wasted, thus encreasing the character of deformity; and from the same cause, the skin of the chin, after being repeatedly ulcerated, becomes at last hard and thickened.

This wasting of the muscular flesh is not confined to the face; for the muscles, at all the points on which the machine presses, are so absorbed, that in some patients there is absolutely nothing to be felt between the skin and the bones. I have even found two of the largest muscles of the body, the pectoralis major and the deltoid, almost cut through by the pressure of the shoulder-straps, which, though not always used, are occasionally applied.

This wasting of the muscles is liable to deceive persons into the belief that the machine is doing good. The swelling in the left loin, which is particularly described at page 113., in the explanation of Plate II., is partly produced by the muscles which lie upon the transverse processes of the distorted vertebræ. After the machine has been worn for a certain time, the muscular

substance wastes, and consequently the swelling is diminished; but such a change should be considered disadvantageous, and as being a proof of the diminished power of the muscles, by which the spine should be supported.

One of the advantages said to be gained from wearing this machine, is, that it presses in the protruding shoulder-blade. To a person ignorant of the changes which the ribs undergo in lateral curvature, this may appear to be an advantage, but it is quite the reverse, and by examination into the cause of the protrusion of the shoulder, as exemplified in the plates, and described at page 120., the bad effect consequent upon any attempt to push in the shoulder will be evident.

In several patients who have worn this machine I have observed a sinking in or depression of the dorsal part of the spine, which produces an unnatural degree of hollowness between the shoulder-blades. This must be referred to the use of the instrument, as it is seldom seen, except in those who have worn it, or some one similar, which presses on the same points.

The most important part of the enquiry still remains; — Are patients frequently cured of lateral curvatures merely by wearing such machines?

The first difficulty which we have to encounter here, is, that the proofs of the efficacy of the instrument are generally offered by persons who are not aware that there is a great variety in the affections of the spine. To get rid of this difficulty, I shall at once admit that many patients may have been benefited by merely wearing the collar; that they may have felt stronger, and have got into better health; that perhaps they may have become more straight, and after having received the most marked benefit from its use, have been enabled to give it up, and still continue well and comfortable.

But I wish to confine the enquiry to the effects which have been produced by the instrument, in the common cases of lateral distortion; and as the circumstances just stated induce me to suppose that erroneous notions have been formed, regarding the use of the collar, perhaps the best mode of

enquiry will be to put the following questions:—

After a girl has worn the instrument for one or two years, is her spine straight, and at the same time so elastic and mobile that she can stoop or move from side to side with the same degree of freedom as other girls? If the spine has not become stiff and almost fixed, can she sit or walk without the assistance of strong stays or some similar contrivance?

In answer to these questions, I could offer instances of persons who are still wearing the collar, although it is more than twelve years since its first application; and of others who have given it up, and are now more distorted than they were previously to using it.

That this is likely to be the case will be admitted, when it is considered that the effect of the instrument is to obviate all necessity for the action of the muscles of the spine, and consequently to render them so feeble as to be incapable of supporting the weight of the head and shoulders.

The wasted condition of the muscles may be judged of by every one; but by the

study of pathology we discover, that in proportion to the diminished power of the muscles, not only are the ligaments by which the vertebræ are bound together weakened, but even the character of the bones is changed.

In making these observations, I have to beg it may be recollected that they have reference only to the attempts made to cure lateral curvatures of the spine by the constant wearing of such instruments. Certain cases of disease of the vertebræ may be benefited by the collar; and in the chapter on the treatment, it will be found that I consider it, or rather a similar but more simple instrument, to be necessary to the cure of lateral distortion.

In the second figure of the sixth plate, there is the side view of an instrument which is called an improvement on Mr. Chesher's collar. As pieces of mechanism, both instruments are worthy of admiration; and if complicated machinery is to be considered an excellence, this one certainly excels the last. The sketch of the contrivance by which the instrument is fixed

to the pelvis, gives but an imperfect idea of its complication; indeed, had I not received the instrument from a young lady who was under my care, I could not have believed, that with the most determined resolution to endure pain, any person would have submitted to the punishment of carrying such a machine on the back for twelve months.

As the principle of the instrument is nearly similar to that of the last, the same objections may be made to its use. By the lateral view of it, we can more easily understand how much force must constantly operate on the chin; for it will now be evident, that if the patient is fatigued, the whole weight of the shoulders and body must be suspended by the straps which are fixed to the chin and the back of the head. The degree of torture which patients in this state suffer, is evinced by the ulcerated state of the chin, and by their frequently putting their hands to the straps that they may take off some of the weight from them. It will also be evident that the neck is the only part of the spine which can be much stretched; for the shoulders being sus-

pended merely by straps, fall, and thus weigh down that part of the spine to which the ribs are attached, although it is the portion which is generally the most affected.

One of the *improvements* in this machine must increase the patient's suffering, viz. the contrivance for allowing the arch of the instrument to fall back, and which is intended to prevent the patient from stooping forward. Independently of the pain necessarily caused by the bending of the neck against the flat part of the machine, there is the objection, that the more the spine is pulled back by mechanical means, the more will the muscles, by the action of which stooping is prevented, be weakened; by the same contrivance also, the hollow in the upper part of the spine will be increased.

They who have visited the rooms of machinists who propose to cure distortions, must have observed many other contrivances, besides those already described, for stretching the spine.

When we reflect on the condition of the

spine in persons whose deformity proceeds from a carious disease of the vertebræ, and recollect the exulting and self-satisfied manner in which the machinist talks of the efficacy of his instruments, we cannot but fear that dangerous consequences may result from the powerful engines of which he makes use. The *stretching chair* is sufficient to alarm us for the safety of a patient who enters into a machinist's room; for the windlass by which the crane is elevated, and to which the patient's head is proposed to be attached, is so powerful that it might almost tear the head from the body.

This apparatus is occasionally used, but not so frequently as the rope and compound pulley, which is also so powerful that a grown-up person can be easily raised from the ground by it. This is used not only to raise patients from the ground, but to suspend them for some time. Until I saw several patients undergo this experiment, I could not believe that it was ever put into practice, for it is quite obvious, that while a child is suspended by the chin, the ligaments of the neck must be stretched to a

dangerous degree, while the lumbar portion of the spine, where the principal curve generally is, is scarcely affected.

This will at once be admitted, when the degree of weight necessarily supported by the ligaments of the neck is considered; but on examining girls who have been daily swung up for months, other objections, though not so important, present themselves, viz. so great an increase in the bulk of the muscles that pass from the head to the shoulders, as to form even a new species of deformity. This obviously comes from the frequent attempts naturally made by the patient to elevate the shoulders, in order to relieve the ligaments from the strain caused by the load they sustain, while the body is hung by the head. *

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* Had I not been told by a friend who witnessed the circumstance, I could not have credited that in one of the institutions which has been rather famed for the treatment of distortions, it is usual for patients who have recovered from carious disease of the vertebræ to be pulled up by the chin nearly to the ceiling of the room, and to be left dangling there for some minutes, in the hopes of remedying the curvature produced by anchylosis of the vertebræ. See the explanation of the sixth figure in the first plate.

The method just described is so cruel, that few mothers submit to its being put into practice while the child is under their own observation; but they seldom object to the child being raised to a certain height against the wall by a cord and pulley, and to let her stand there for some time. This plan of practice is nearly the same as the last described, and may be easily refuted. But it is generally defeated by the patient; for as she is unable to bear the pain of the pressure of the straps on the chin, she raises herself on her toes, and if this is not sufficient, she takes hold of the hoop to which the straps are attached, and then elevates her body by her arms.

Although I have offered these objections to the attempt made to cure distortions by forcibly elevating the spine, one of my plans of treatment is to stretch the spine. The means of doing this will be described in the chapter on the treatment; and it will perhaps be admitted, that although they are entirely different in principle, they are even more efficacious than the plans described above.

ON THE PROPOSAL TO CURE DISTORTIONS OF THE SPINE BY CARRYING A WEIGHT UPON THE HEAD.

The practice of carrying a weight upon the head has of late years been much praised, and stated to be a certain cure for distortions of the spine. But we shall be much disappointed if we trust entirely to this method of treatment; for although it is (if properly managed) an useful adjunct in slight cases, still it is not of itself, effectual in curing distortion. And even in this apparently simple means of treatment, there are several circumstances which should be particularly attended to. If a light weight is used, scarcely any harm can ensue; but if even a few pounds be not carefully adjusted on a particular part of the head, the sterno cleido mastoidei and the other muscles on the fore part of the neck, are liable to be brought too much into action. When it is supposed (as by some practitioners) that the heavier the weight, or to use their

own expression, "the more the spine is loaded," the greater will be the benefit produced; there is danger, not only of the lumbar part of the spine being carried inwards and bent (as may be observed in those men who carry large baskets of china on their heads), but even of the pelvis being diminished, in consequence of the two last lumbar vertebræ and the upper part of the sacrum being driven inwards.

The manner in which milk-maids carry the pail is generally offered as an example of the good effects of the system proposed; but, in fact, the weight of the pail, when compared to the muscular strength of these women, is so trifling as to require them only to balance the head to support it without the slightest exertion. To be satisfied that the benefit derived from carrying a weight on the head does not depend on the heaviness of the substance, but rather on the difficulty of balancing it, we have only to compare the figures of the women who carry heavy baskets of fruit from Covent Garden market, with those of the dairy-maids in the country.

I shall here quote a passage from a curi-

ous book, the "*Orthopædia*," which was published in 1723, by Andry, Professor and Dean of the Faculty of Physic in Paris. It will prove that the plan of curing distortions by putting a weight on the head, is not a modern discovery. The principle upon which Andry proceeded, seems also to be more correct than that on which the practice has been resumed.

"But no despicable expedient to make a child that is come the length of five or six years old hold the head straight, is to lay upon the fore-part of the head any thing that will easily fall off, such as a powder-box or the like, and desire him to walk so as not to let it fall off. This may be made a sort of play to him, which he should frequently repeat; and it will be proper to reward him when he does right, by way of encouragement. Thus you will soon see the child hold his head upright; but you must conceal your design from him if possible, which will make it succeed the better. It will be proper to have several children engaged in the same pastime, to raise an emulation among them who shall do it best.

"Children, when they are grown up, play at different sorts of games: propose this to them gravely; and tell them that the law of this game is, that whoever lets the powder-box fall shall forfeit a pledge, which cannot be recovered again without undergoing a certain penalty, such as the keeper of the pledges shall think fit to impose, in the same manner as is usually done in other games.

"Thus the child, by playing at this game frequently, will very soon acquire a habit of keeping his head straight. You will seldom see a milk-maid that does not keep her head straight, which is to be attributed to the *little* burdens which they carry upon their head, and which would fall unless they took care to carry their head erect."

ON THE PROPOSED PLAN TO CURE DISTORTIONS OF THE SPINE BY EXERCISE.

No single method of treatment is so effectual in counteracting or curing slight distortions of the spine, as properly regulated exercises. This plan, though often neglected, has of late years been so useful in certain cases, that some practitioners have supposed it to be the only means necessary for the cure of every kind of distortion; and it has been also imagined, that the more violent and severe the exercises are, the more probability there is of success. But the numerous facts offered in the preceding pages, to prove the variety of affections, on which distortions of the spine depend, shew that the indiscriminate use of violent exercises may be useless or injurious in some cases, and even dangerous in others.

Many persons who attempt to cure distortions are so ignorant of the causes which

produce the different curvatures of the spine, that it is not too much to suppose that they may be entirely unacquainted with the state of the vertebræ in cases of distortion, that are consequent on caries of the spine. The danger to which patients are exposed by the experiments of such persons may be readily conceived; but it is not unusual for some, who are even aware of the condition of the vertebræ after caries of the spine, to prescribe violent exercises to their patients, under the idea, that where the spine is consolidated by bone, it is stronger than any other part of the column, and is therefore in no danger of being broken, even by the most violent exertion.

The opinion, that the spine is strongest where it is anchylosed, is founded in error of the structure of the spine; for it has been proved, by various experiments, that the strength of the whole column mainly depends on the elasticity of the peculiar matter by which the vertebræ are united.

To demonstrate that the spinal column is not strengthened but weakened by an-

chylosis, we have only to try the comparative degree of strength in the several parts of a spine, similar to that represented in the sixth figure of the first plate. In such an experiment we shall find that the anchylosed part is so weak and brittle, as to be fractured by the slightest jerk, while it is very difficult to break the column at any part where the intervertebral cartilages are entire. In further proof of the above, there is a fatal instance of fracture described in the Appendix, where the spine was broken at an anchylosed part, by a comparatively slight degree of force. *

These facts will, perhaps, be considered sufficient to shew the danger of indiscriminately permitting patients who are distorted to go through such violent exercises as climbing up ropes, &c. Indeed, we can

* In cases of lateral distortion, it is not unusual for anchylosis to take place at several points in the column; but it occurs chiefly in those cases of distortion that are consequent on inflammation of the vertebræ. In fact, it scarcely ever happens that a person who has had caries of the spine is able to walk, unless the vertebræ be firmly united by bony matter.

scarcely believe that they who advise such a mode of cure, can be aware of the cause of some distortions; for they would not intentionally allow a patient to run the risk of being killed by the slighest slip, or accidental jerk.

The distinctions made in the course of the preceding pages, between the cases of distortion that depend on ricketts, and those which are merely consequent on debility, will perhaps account for the discrepance of opinion that has hitherto prevailed on the propriety of exercise in cases of lateral curvature; for as long as no proper distinctions were made, the effects of exercise were very perplexing. In some cases, certain exercises were evidently beneficial; while in others, apparently similar, the distortion was increased by them, and even the bones of the pelvis were misshapen.

The method of treating distortions by exercising the muscles, has been considered a modern discovery; but the older authors were acquainted with it, and in their writ-

ings we find a variety of exercises described, as suitable to different diseases. *

Portal, in his work upon ricketts, after some observations on the condition of the muscular power and shape of men who follow different trades, says, " Do not these afford so many lessons which should be remembered when we endeavour to restore the shape of children, whose figure or limbs have become distorted? We ought to consider the effects caused by using particular classes of muscles, as examples in favour of such exercises as will strengthen those muscles which are weakest."

In pursuance of these principles, he recommends a variety of exercises; some in the form of games, and such especially as are calculated to act upon certain muscles, as pulling weights over wheels fixed in particular situations, &c. But, although Portal has given us many useful hints,

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* Ut caliditas excitetur, et caro augeatur, et vires restituantur. Caput erectum fricato —— Quin et exercitationes ad cervicis usus et ad manuum agilitatem faciunt, si scienter fiant, &c. — Aretæus Cappad. *de curat. morb. diuturno.* lib. i. cap. iii.

he has allowed erroneous views of the pathology of the disease so far to affect his plan of practice, as to make it sometimes hurtful. *

As there can be no question regarding the effect of exercise in increasing the strength of muscles, I shall not enter into the almost useless enquiry, how the effect is produced. In Portal, as in many of the older authors, it is explained on the principles of the humoral pathology; — "Les cours des humeurs nourricieres y deviennent plus reguliers, et ils prennent un plus grand accroissement."

It is unnecessary to make any further remarks on the danger of violent exercises, in certain cases; and the gradual and almost imperceptible changes which take place

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* "Je consentis qu'on frotta l'épine de la jeune malade tous les matins avec un pommade composé de savon noir, de moëlle de bœuf, de pulpe d'enula campana, de raifort sauvage et de camphre. On faisoit faire à la jeune personne les mouvemens les plus variés de la danse, des armes, du jeu de volant, et elle soulevoit à diverses reprises, pendant environ demi-heure, un petit poids attaché à une corde passée dans une poulie fixée au plancher." — PORTAL *sur le Rachitisme.*

in the form of the individual bones of the trunk, in those who are deformed, prove that, if the exercises are indiscriminately used, they may be injurious, even in cases of lateral distortion, which proceed from want of exercise. Under these circumstances, it may be affirmed, that unless the exercises are superintended by a person thoroughly acquainted, not only with the natural actions of the several classes of muscles, but also with the causes of certain changes in the form, they may be more detrimental than useful. When there is only a degree of lassitude, and before distortion has actually taken place, a variety of exercises are safe and useful; but when the spine has become in the slightest degree distorted, it is necessary to pay strict attention to the effects produced * by each kind of exercise.

The benefit to be derived from the exercise of particular classes of muscles will

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* It is by attention to this, that Mr. Jenkins, the celebrated teacher of dancing, has been so successful in preventing, and even in remedying, slight degrees of distortion.

be further considered in the following chapters, where it is proposed to enquire into the most effectual modes of restoring the spine and ribs, when distorted, to their natural form.

DESCRIPTION OF THE MEANS WHICH HAVE BEEN FOUND USEFUL IN THE TREATMENT OF LATERAL CURVATURES OF THE SPINE.

From the facts stated in the preceding pages, it may be inferred that the modes of practice for the cure of distortions, should be as numerous and as varied as the causes upon which the different cases depend. So far the inference is correct; but in each case, there are so many distinct stages, that during the progress of the treatment, it is sometimes necessary to use means which appear opposed to each other in principle.

Proceeding upon these facts, we may assume that the chief difficulty in the cure of distortions, consists in the proper application or combination of the several modes of treatment.

It is not possible to enter into all the minute but important circumstances which ought to be attended to; but I trust that the pathology has been sufficiently con-

sidered to enable the reader to comprehend the principles upon which the modes of practice I have to propose are founded.

To illustrate these principles, I shall draw up short sketches of the manner of treating common cases in their several degrees or stages.

If a lateral curvature of the spine be observed at its commencement, it may be easily cured, or at least prevented from getting worse, unless it depends on some specific disease of the bones. But certain erroneous notions on the means of preventing distortion are now so prevalent, that although the practice founded on them is not only inefficacious, but even injurious, it is often impossible to overcome the prejudices of parents until the distortion of the spine has proceeded to a considerable degree. Another source of difficulty consists in this, that when the spine is distorted only so far as to produce what a mother calls a bad carriage, the means commonly used to correct it are exactly such as tend to increase it.

For example, if one shoulder projects

rather more than the other, or if one side seems a little larger than the other, a pair of stiff stays and a collar to brace the shoulders back are immediately applied; and this plan is persevered in, for every person in the family is delighted to see how much the child's figure is improved. But although the evil may be concealed for a while, its cause is increased by wearing stays or a collar, for the child can no longer take that sort of exercise which is necessary to keep the muscles of the spine in such a state of activity, as to fit them for their several uses.

The examples to prove the necessity of exercise to the proper developement of the different parts of the body, afford conclusive arguments against this plan of cure, and also against the practice of encasing children from morning to night in stiff stays. It is not necessary to bring these examples forward a second time; but as it may be well to shew how much the system of using artificial supports has been deprecated by men whose experience and whose characters as anatomists, entitle them to be considered authorities on all ques-

tions relating to the human form, I refer to the works of Riolan, Haller, Winslow, Van Swieten, and Portal.

Portal has entered at considerable length into the enquiry; among other facts, he states, that the muscles of the back are larger, redder, and stronger, in women who have not worn stays, than in those who have used them. He says, indeed, that it is scarcely possible to demonstrate the muscles of the back in those who have worn stays or any similar contrivances to support the spine.

Van Swieten is even more distinct than Portal, in condemning their use. But the name "lorica" (coat of mail), by which he designates them, and the observations which he makes on the ill effects of wearing them, would induce us to believe that the stays in his day were even stiffer and stronger than those at present in use.

All the writings of Portal are so full of good sense, and shew such powers of observation, that we are induced to place great reliance on his opinions. Although he strongly objects to children always wearing stays, yet he advises their occasional

use in those who are weak, and especially in old people. Such was also the opinion of the celebrated Winslow, who was the first anatomist of the age he lived in.

Portal's observations upon the consequences resulting to those who had been accustomed from infancy to the use of tight stays, leaving them off at a certain age for greater comfort, are also exceedingly good, and applicable to the present question. "Such persons," says he, "are sure to become distorted; for the muscles of the spine have been so weakened by want of use, that when the artificial props are removed, they are no longer capable of supporting the body." *

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* "Il est trés important d'observer que les personnes qui n'ont fait aucun usage des corps ont les muscles du dos plus fort et plus volumineux que les autres. On peut même dire qu'on a peine à démontrer les muscles du dos dans les femmes qui se sont distinguées à porter des corps étroits; cependant, les dames moins jalouses pour l'ordinaire de leur taille, lorsqu'elles sont parvenues à un certain age, abandonnent l'usage des corps ou en prennent de plus grands, et de plus laches, et comme alors les muscles du dos sont prodigieusement affaiblis elles se voutent ou elles s'inclinent sur les côtes. Plusieurs qui sont devenues bossues vers leur temps critique,

So much has already been offered to shew the bad effects of depriving any part

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rapportent la cause de leur distorsion à la cessation du flux périodique, tandis que ce n'est qu'à la cessation de l'usage des corps, ce qui prouve qu'il est pernicieux d'en faire contracter l'habitude aux enfans. Les muscles sont chez eux assez forts pour maintenir et pour mouvoir l'épine; les bains froids, l'exercise même et les frictions sur le dos, pourroient suffire à la redresser; mais dans un age avancé, les muscles du dos, à force d'avoir été comprimés et d'être restés dans l'inaction, sont devenus incapables de maintenir le tronc en equilibre."

PORTAL *sur la Nature du Rachitisme.*

" Unde miseræ mulieres, quæ a prima juventute his loricis (coats of mail) usæ fuerunt, illas postea deponere nequeunt, quin antrorsum collabatur totus truncus corporis, musculis dorsi inertibus redditis, qui, in valido et exercitato corpore, spinam dorsi erectam et firmam tenere possunt, licet grave pondus humeris imponatur, uti in bajulis videmus. Vidi non sine commiseratione miseras tales feminas, quæ nequidem somni tempore deponere audebant loricas expertas jam sæpius, quod vix se vertere in lecto possunt, multo minus corpus in lecto erigere vel erectum sustinere." — VAN SWIETEN.

In a work entitled " A Comparative View of the State and Faculties of Man with those of the Animal World," dedicated to Lord Lyttleton, I find the following passage; and being the opinion of a sensible and observing man on the question at issue, I am induced to quote it.

" Some nations have fancied that nature did not give a good shape to the head, and thought it would be

of the body of the power of performing its natural functions, that it would be unnecessary to dwell longer on the inutility or mischief of the attempt, to cure, by artificial supports, the distortions of the spine that proceed from weakness. But in an enquiry of this kind it would be unpardonable not to attend to the observations made

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better to mould it into the form of a sugar-loaf. The Chinese think a woman's foot much handsomer, if squeezed into a third part of its natural size. Some African nations have a like quarrel with the shape of the nose, which they think ought to be laid as flat as possible with the face. We laugh at the folly, and are shocked with the cruelty of these barbarians, but think it a very clear case that the natural shape of a woman's chest is not so elegant as we can make it, by the confinement of stays. The common effect of this practice is obstructions in the lungs, from their not having sufficient room to play, which, besides tainting the breath, cuts off numbers of young women in the very bloom of life. But Nature has shewn her resentment of this practice in a very striking manner, by rendering above half the women of fashion deformed, in some degree or other. Deformity is peculiar to the civilized part of mankind, and is almost always the work of our own hands. The superior strength, just proportion, and agility of savages, are entirely the effects of their hardy education, of their living mostly in the open air, and their limbs never having suffered any confinement."

by intelligent persons, although they may not have studied either anatomy or medicine. If we may trust to the experience of elderly people, distortion of the spine is more common now than it was thirty years ago; and when we ask what they imagine to be the cause of its frequency, they in general say that it proceeds from too much care being taken to preserve the shape; for the number of distortions seems to bear a proportion to the attention that is paid to the figure. This opinion, I believe, is partly true, because many of the means that are used to correct the tendency to become twisted, are exactly such as increase it. But this is not the only cause; for it must be admitted, that more attention is now paid to the various accomplishments of writing, drawing, and music than formerly; and consequently girls are more liable to be kept in positions which are prejudicial to the shape. If a girl is naturally strong, and is permitted to have enough of active exercise, she may counteract the ill effects of long continuance in a bad position; but if she be weakly, and have not proper exercise, the lower part of

the spine must yield to the weight of the upper part of the body. Taking this view of the causes of distortion, I would concur in part with the opinion of those who believe that stays are useful: however, they should be worn only by weakly children, to prevent the spine from sinking while they are obliged to sit up; for stays will never cure a distortion, nor give strength to the muscles. We have only to observe the fine figures of the peasant girls, to be convinced that stays are not absolutely necessary; but if children are brought up artificially, they must have some artificial support.

I shall now describe what may be the progress of a common case of slight distortion, and the most likely means to stop it.

Notwithstanding the attempts made to remedy, or rather to conceal the bad figure, the disproportion in the size of the two sides of the chest becomes at length so remarkable, that the mother is induced to consult a surgeon; the attention being then directed to the state of the spine, the cause of the displacement of the shoulder,

and of the enlargement of one side, is no longer enigmatical.

Although I have already dwelt at considerable length on the most frequent causes of that slight curvature of the spine which, to a superficial observer, is apparent only in an enlargement of one shoulder, it may be useful to recapitulate them shortly here. The first, is the habit of balancing the body on one leg, as demonstrated in the first marginal plate. The second, is in sitting awry, as depicted in the sketch of the girl writing, or in playing the harp. The third, is in the position when sleeping on a soft bed and with a high pillow. The fourth, is in using the right side of the body more than the left. But the inability of a weakly girl, while sitting at work or practising for hours at the piano-forte, to prevent the lumbar portion of the spine yielding to the weight of the upper part of the body, may be considered as the most frequent source of distortion.

Such causes may produce distortion, even though a girl be at the time in good health; but they operate in an increased

degree if she be ill, or in the weak condition that generally follows fever or measles.

As it has been frequently observed that air and exercise produce the best effects on the slight lateral curvature to which boys who are much confined, are subject, some practitioners have supposed that they are all that is necessary to the cure of every case of distortion. But they are seldom sufficient to counteract the curve after it has once decidedly formed in girls. I have known an instance of a young lady being sent into the country to play the romp as much as she chose, in the hope that free air and exercise would remedy the state of the spine; but she returned home with the distortion much increased. However, I ought to state, that in this case, and indeed, in general, the distortion in girls has proceeded so far before the cause is discovered, or at least before proper means are used to correct it, that the curve cannot be remedied, unless strict attention be paid to the management of appropriate exercises.

If the causes described above be admitted to have a tendency to produce distortion, it

naturally follows, that in any attempt to cure the disease, they should be guarded against or counteracted. Those which have been enumerated as the first and second, may be prevented by attention on the part of the mother or governess. To the means of correcting the habit of lying crooked in bed, I shall refer presently.

When the distortion of the spine is to the degree described in the explanation of the second plate, very effectual means must be used to prevent the lumbar portion of the spine from yielding to the weight of the upper part of the body; but attention to the manner of sitting and resting will perhaps be sufficient in cases, where the spine is but slightly distorted.

To be aware how difficult it is for a young and weakly girl to sit upright on the seats generally used by children, we have only to try a chair (without a back) which has the same proportion to our hips and legs as those upon which young girls are placed, have to theirs.

If the seat or surface on which we rest, is small in proportion to the body, the chest will, after a time, either fall forward or to

one side, unless we exert ourselves to a degree that is very fatiguing. Indeed, if the seat be at the same time so high, that the feet do not rest fairly on the ground, but dangle under the chair, a forward position of the head is almost necessary to preserve the balance of the figure.

Young girls are often obliged, while at their music lessons, to sit upon chairs with high backs, long legs, and small seats. Such curiously formed chairs must have been intended, by some supposed operation on the spine, either to prevent distortion, or as the most effectual means of supporting the body. I cannot imagine how a chair of this description can effect the first purpose; and to discover how far it is calculated for the second, I beg my reader to make the experiment on a chair of the same proportion to his figure, as the chair in question is to that of a little girl.

My objections to these chairs have been met with the assertion, that girls feel remarkably comfortable in them. This is no argument in favour of their use, for it is not uncommon for a girl who has seven or eight pounds of iron strapped upon her

body and next to her skin, to say the machine annoys her so little, that she does not care how long she wears it.

But leaving the question whether the chair be a pleasant or disagreeable seat, we may consider whether it is calculated to give much proper support to the body.

It will perhaps be admitted, that the chair which we feel to be the most comfortable, that is, the chair which affords most support to the body, should, if made in proper proportions, be the best for a weakly girl. In such a chair, the seat should be scarcely higher than the knees (thus permitting the whole of the foot to rest on the floor), and of such a size, that on sitting back, the upper part of the calves nearly touch it. This form of seat is very different from that of the chair to which I have alluded. The back is also equally objectionable, for, instead of being in some degree shaped to the natural curves of the spine, it is made nearly straight, and projects so as to push the head forwards.

As the stoop described at page 63. is frequently combined with a slight lateral dis-

tortion, and as the means commonly used to counteract it are often prejudicial, or even tend to increase the lateral twist, the enquiry into the mode of curing it will not be out of place here, especially as the method of treatment proposed is very effectual in removing a slight degree of lateral distortion.

When the chest and the head fall forward, the most common method of trying to counteract the stoop, is to put on some instrument by which the shoulders and the head will be held back. To operate upon the shoulders, the common back collar which is sketched in the sixth figure of the sixth plate is used; and to hold back the head, a ribband is brought over the forehead and fastened to the collar behind.

While these instruments are kept on, the figure looks well, though stiff and constrained; but the moment they are taken off, both the head and the shoulders fall more forward, than before their application.

If we consider, that by forcibly pulling back the shoulders, we relax the muscles by which they are naturally supported, and that, at the same time, by operating

against the muscles by which they are drawn forward, we excite the latter to greater action, we must admit that the principle upon which this treatment is founded is incorrect. Many examples might be offered to show the bad effects of artificially supporting the head. I shall merely give one; and although it is to be observed in the figure of a horse, it is very demonstrative. When the rein (called the bearing-rein), by which the head of a carriage-horse is reared up, with the intention of giving him a showy figure, is loosened, the head immediately falls forward, and the neck, instead of having the fine arch that is so much admired, droops between the shoulders. Looking to this effect, we should at first be inclined to condemn the practice which is often followed by horse-dealers, of reining up the head of a young horse in the stable, by means of the apparatus called a dumb-jockey. But on examining into this mode of fixing the head, it will be found to operate on a very different principle from the bearing-rein. Instead of a simple bit, such as the horse in harness can lean his head upon, without suffering any pain,

a bit, calculated to teaze and fret, is put into the young horse's mouth. To relieve himself from the irritation produced by this, and which is increased by the constant pull of the elastic piece of iron to which the rein is fastened, he curls up his neck, and thus brings all the muscles of the back of the neck into strong action, instead of allowing their power to be superseded by the artificial support afforded by the bearing-rein to the horse in harness.

Many different contrivances, but all acting nearly on the same principle as the *bearing-rein*, have been proposed as means for obliging a girl to keep her head erect.

There is one which, to a person ignorant of anatomy, seems to be particularly well adapted for this purpose, but it is in fact more objectionable than the plan of tying the head back with a ribband. A piece of lead of some pounds weight is slung over the back in such a way that it must be supported by a ribband put around the head. The bad effect of this may be easily demonstrated; for if, while the weight is on, we put our finger on the two sterno-cleido muscles (muscles by which the head is

pulled towards the breast), we shall feel them tense and in strong action; and if we raise the lead without the girl being aware of it, the head is immediately poked forwards.

Many other examples of the bad effects of similar plans might be offered. All the porters who carry their burdens with the assistance of a band round the head have the muscles on the fore part of the neck so increased in strength, as to pull the head towards the chest; but the most remarkable proof is to be seen in the women who carry salt in the streets of Edinburgh, for they are at once known as much by the miserable sardonic grin caused by the constant action of the platysma myoides, as by their stoop.

The peculiarly erect figure of those who carry baskets before them, suspended by a band over the back of their neck, or of women in the last month of pregnancy, or even of corpulent men, should have been sufficient to lead to a suspicion that the proposal to cure a stoop, by pulling the head back by a weight placed behind, was not founded on correct principles.

However, although the collars and the lead weight, as they are generally used at present, are not only inefficacious but even hurtful, they may be of considerable use in keeping the shoulders in a certain position, after they have been brought to it by such exercises as tend to strengthen those muscles of the back by which the shoulders and head are naturally supported. But so completely do I differ from the opinions commonly entertained, as to the means of counteracting an habitual stoop, that I would almost recommend the position of a tailor sitting on his shop-board, as more advantageous than the systems generally followed. This at first appears ridiculous; but the manner in which a tailor holds his body when he walks, proves that there is something in his habits which tends to the correction of a stoop; for he is quite a caricature of a strutting erect figure, especially in the way he bends in his loins and carries his head.

The peculiarity of the tailor's gait depends in a certain degree on the bent position in which he sits; but this explanation is not at first satisfactory, since it may be

observed that other tradesmen, who also stoop while at work, generally have their head inclined forwards, and have also a distinct and habitual bend in the neck; such, especially, may be seen in persons who sit at a table and stoop forwards, as watchmakers, engravers, &c. It is not difficult to explain the cause of the difference, and the enquiry will assist in directing us to the principles which we ought to recollect in our operations upon the spine.

In the sitting position of the tailor, the head hangs so low, and so complete an arch is formed between it and the pelvis, that the muscles of the spine are called into strong action to support the head; the necessary consequence of this is, that these muscles become even unnaturally strong, or at least so as to predominate over those by which the spine is pulled forward. But the bent position is not the only cause of increase in the strength of the muscles, for it depends also on the exercise given by frequently jerking the head backwards. In those who stoop from the middle of the body, as in writing or working at a table, the muscles of the spine are not called into

similar action ; for while the head is in this position, it rests or is supported by the ligamentum nuchæ. The ligament being thus kept constantly on the stretch, becomes lengthened ; and hence the stoop is increased. When this is combined with the consequences of the want of muscular action, the deeper ligaments which bind the cervical vertebræ gradually yield ; if the operation of these causes continues for a certain time, the vertebræ themselves become altered in shape, and consequently an almost irremediable stoop is produced.

These ideas are corroborated by what may be observed in the shape of the tailors in some parts of Germany, who instead of having the erect figures of London tailors, are quite bent. On enquiring into the cause, we find, that instead of their sitting as tailors do in this country, a hole is cut in the table, and a seat is placed within it ; so that their position, while working, becomes nearly the same as that of persons who sit at a table.

It may, perhaps, be objected, that labourers, and especially the vine-dressers in France, are remarkable for the complete

arch which their body forms, although they bend while at work as much as the tailor does. This may also be explained; for, in the labourer, the bend is produced by the pelvis rolling on the head of the thigh bones, while in a person sitting as a tailor, the pelvis continues nearly fixed, and the bend is in the vertebræ on the pelvis. I have not had an opportunity of ascertaining the cause of the erect figure of the Turks who are occasionally seen in London; it perhaps depends upon the manner of sitting which is common among the eastern nations. *

The shoemaker is also a little in caricature, but he carries himself better than the tailor; and the cause is obvious; for although the tailor's figure is very erect, the right shoulder is generally a little higher or larger than the left, from the constant exercise given to the right arm, while the left rests upon the knee. This inequality

* The heavy turban, and the manner in which the box of rhubarb is slung upon the neck, may perhaps account for the erect figure of the Turkish Jews who frequent London streets.

of the shoulders is not observed in the shoemaker, as he not only uses both arms equally, but the constant habit of jerking back the shoulders so strengthens the muscles by which the scapulæ are supported, that his shoulders always appear more braced back than those of any other class of persons. Indeed, so characteristic are the figures of tailors and shoemakers, that they are easily distinguished in a crowd.

I have mentioned these circumstances, because they afford familiar examples of the principles, on which we ought to proceed in endeavouring to correct deformities; but it would be ridiculous to propose the position either of the tailor or of the shoemaker, as the best adapted to correct a stoop or falling forward of the shoulders; though, indeed, in very young patients, I have found it useful to put all their playthings on the ground, and to recommend such games as will induce them, while sitting, to bend the body and raise the head alternately. In patients farther advanced, much benefit has been derived from the use of an instrument which was planned

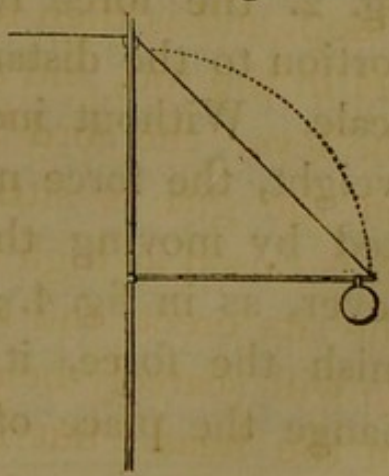
with the intention of bringing the muscles of the spine into action.

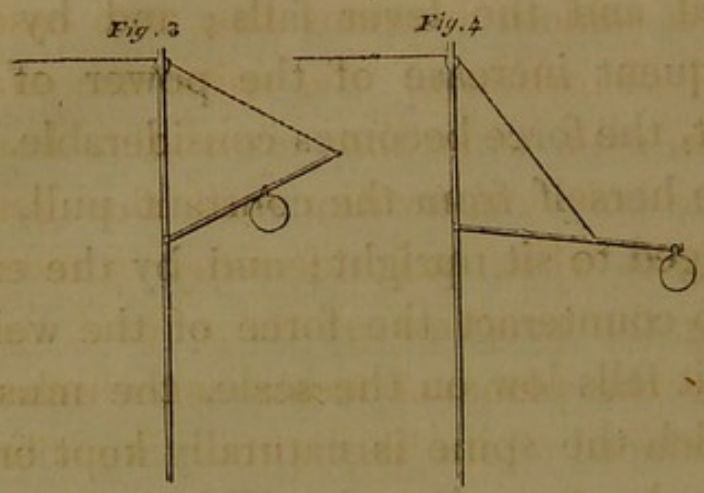
There is a sketch of the application of the apparatus in the seventh plate. It consists of an upright rod, four or five feet high, and similar to the pole of a common fire-screen. In the upper part of the rod, a small wheel is placed, and about sixteen inches below the wheel, a lever eleven inches long is *let in*, and moves upon a pin; the opening in the rod being so cut as to permit the lever to rise and fall. To the end of the lever, a certain weight is attached. This apparatus may be fixed by a small wooden vice to the table, directly opposite to the girl as she sits at her lesson, or at work. A riband, with a loop or ring in front, is to be put round her head; a silk cord is to be attached to the loop, and is then to be carried over the wheel in the rod, and to be fixed to the end of the lever, the cord being so adapted that when the girl is sitting quite erect, the lever is raised as high as possible. As long as she sits erect, the lever being kept up, there will scarcely be any weight dragging upon the head; but if she stoops or lets the spine fall to one side, then the cord is

relaxed and the lever falls; and by the consequent increase of the power of the weight, the force becomes considerable. To relieve herself from the constant pull, she is obliged to sit upright; and by the exertion to counteract the force of the weight when it falls low on the scale, the muscles by which the spine is naturally kept erect, are much strengthened. This instrument is very manageable; by moving the cord back upon the lever, the force or weight will be much increased, while by keeping the cord attached to the end of the lever, and moving back the weight, the force will be diminished. The adjoining plans will assist in the demonstration of the uses of the apparatus.

Fig. 1.

Fig. 2.





The cord A passes over the pulley B, and is attached at C to the end of the lever E, which moves upon a pin in the upright rod at D. To the end of the lever the weight F is hung. It is evident that as long as the lever is in the position of fig. 1. there will be little difficulty in supporting the weight by pulling upon the cord; but as the lever falls to the position in fig. 2. the force required will be in proportion to the distance it reaches down the scale. Without increasing the size of the weight, the force may be greatly augmented by moving the cord back upon the lever, as in fig. 4.; and if we wish to diminish the force, it is only necessary to change the place of the weight, as in fig. 3.

As it seldom happens that two cases of lateral distortion of the spine are exactly similar, even when they are slight, I must confine my observations to the general principles which it is necessary to recollect during the progress of the cure. By following the plans of treatment which may be deduced from the preceding observations, much good may be done; but it is also necessary to use other means. Balancing a light weight upon the head will be found very useful*; but appropriate exercises are, perhaps, the most effectual means of curing slight distortions; however, even in cases of slight curvature, it is absolutely necessary, that the exercises should be superintended by one familiar with the effects of the different modes.

Were the curve of the spine in one direction only, it would be easy to describe the sort of exercise proper to remedy it; but as in all common cases of lateral curvature, there are several curves, the exercise that is useful in counteracting the one may increase the other; and therefore few exercises can be performed without the superin-

* See page 177.

tendence of a person who fully comprehends the subject. There is, however, one exercise which is very good, and by which, I believe, no patient can be hurt. It is that of bowing the head as low as possible, and rising slowly with an exertion. In order to make this exercise more effectual, I use a particular apparatus, which is described in the enumeration of the means for remedying a confirmed twist. But when the distortion is slight, the exercise may be increased, by a very simple contrivance, being in fact only a door-spring, arranged in a particular manner.

The simplest form of the apparatus is given in fig. 1.: A the wall; B the lever;

Fig. 1.

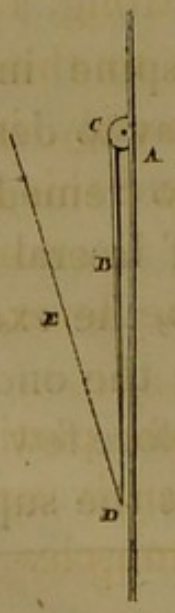
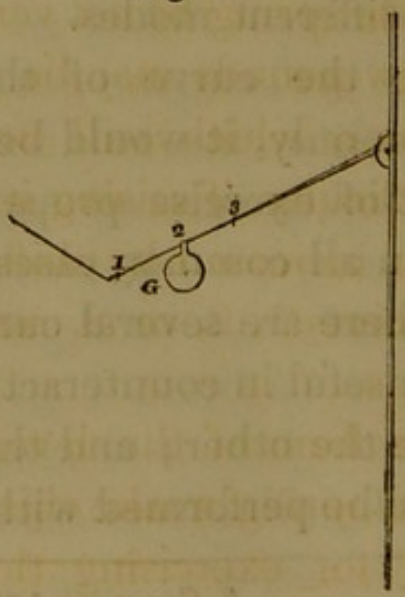


Fig. 2.



C the plate by which the lever is screwed to the wall. Upon this plate there is a spring, by the action of which, the lever is kept close to the wall. E is a cord fastened to D, the end of the lever.

To use this, the patient should lean over the back of a chair, placed opposite the apparatus. The cord E is to be fastened to a band round the head. The patient, after stooping as low as she can, ought to raise the head slowly, bringing herself to the erect position. She ought again to bend as low as possible, and continue rising and bowing alternately for some time. This exercise will operate more on the muscles of the spine, if the patient sits, so as to prevent the pelvis rolling on the thigh-bones.

If the spring be not very strong, a weight of a few pounds may be put to the end of the lever, which will necessarily increase the difficulty of raising it; and this may be farther increased by shifting the cord E to the points 1, 2, or 3. on the lever, as in fig. 2.

The form of the lever, and particularly the *roll spring*, make this contrivance more useful for exercising the muscles of the

spine than that of pulling a weight over a wheel; for the power necessary to be overcome, increases in proportion as the head is raised, and consequently, when the muscles of the back are more capable of acting. This, it may be observed, is just the reverse of the instrument described at page 214.

The third figure is a more complicated form of the instrument, but still it is sufficiently simple, and is so far better than the others, that the power may be regulated to almost any degree. The lever is

Fig. 3.

to be fastened to a piece of wood, B, about four feet long; a small pulley, or wheel, is to be put on at D. The apparatus (with the lever reversed) may be tied to a strong bed-post, or screwed into the wall A. A cord is to be passed through the pulley, and to be fixed to the end of the lever; the other end is to be, as in the preceding figures, fastened to a band round the head.

It requires considerable force to draw the end of the lever towards the pulley; indeed, so much force is requisite, that if the lever touches B, it will be almost impossible to raise it by the cord. To prevent the lever passing completely down, a peg may be put into the wood, or a knot may be put on the cord, so as to keep it from going beyond a certain extent through the pulley.

As the exercises intended to be performed with this apparatus, are such as must act equally on all the curves, there cannot be any bad effects produced by them; but the danger of one or other of the curves being increased, by any exercise in which the spine is pulled to one side, is

obvious on examining the figure of the skeleton, in the second plate. For example, when the head is bowed down, and the left hand is forcibly extended towards the right foot, (which is done with the intention of expanding the left side of the chest,) the curve at the loins must be increased. How this may be avoided, will be shown in the description of the manner of using the rollers on the inclined plane, in cases where the distortion is confirmed.

Previous to describing the means that are necessary to cure a confirmed twist, I may state, that although, in slight cases, properly regulated exercises are very beneficial, still comparatively little good will be derived from them, unless strict attention be at the same time paid to the patient's manner of sitting and standing. Particular care ought also to be taken that she should not lie crooked in bed, and that she should use a mattrass instead of a feather-bed, with the head as little elevated as possible. Although the practice followed of confining patients with slight distortion to the inclined plane for months, without intermission, has been shown to be bad, yet,

lying for a certain time on the plane, and especially after having gone through the proper exercises, is of the greatest use to those who are slightly distorted. With reference to the question of the propriety of rubbing, or shampooing, I would say that it is a species of exercise, of which a patient cannot have too much.

ON THE METHOD OF TREATING THE CONFIRMED LATERAL DISTORTION OF THE SPINE.

When called to a patient whose back and chest are distorted nearly in the same manner as that represented in the second plate, and described at page 112., we should, previous to examining the spine, put a few questions, with the view of discovering whether the distortion depends on a specific disease of the bones, or on general constitutional debility.

We may enquire whether the patient suffered any severe illness during infancy? — what was the condition of her first set of teeth?—if she ever was liable to swellings in the neck?—in what state of health she has been lately?—if she has been weak and listless, or had a fever within the last few years?—at what age the distortion was first discovered? — what were her amusements and occupations about that time, or previous to it?

We may next look to the form of the head and face, and examine whether the thighs and bones of the leg are perfectly straight.

In examining the spine, we should request the patient to stand in the position she is most accustomed to; and, after looking at the general form of the spine and chest, we should mark the situations of the spinous processes of the several vertebræ, by dotting the skin over them with ink or rouge, at intervals of about an inch.* The patient ought then to raise herself with an exertion, and while she stands fairly on both feet, and as erect as she can, we should observe whether the positions of the spots, by which the situations of the vertebræ were marked, are altered. We may now request her to stoop forward, and to bend the spine as much as she can. While she stands so, we may, by rubbing firmly with the point of the finger upon the spinous processes, make a red line along the course of the spine. This may be the first thing

* If the plumb-line is used in the manner described at page 112., a correct idea of the deviations of the spine may be easily formed.

done, or the apices of the spinous processes may be dotted with ink, while the body is bent as much as possible; the intention in marking the back, being not only to shew the exact situations of the several vertebræ, but also to assist us in ascertaining whether the curves can be affected by a change of position.

If the spine be made straight by the patient endeavouring to stand erect, or if the lateral curves are lessened by the bent position, we may consider the case favourable.

We should not omit to enquire whether any pain is felt, when particular vertebræ are pressed upon. If the patient complains, (which on the first examination she is very apt to do,) we should try whether rubbing on any other prominent bone is equally painful.

By the above manner of conducting the examination, we may gain nearly an accurate idea of the state of the vertebræ; but the characters of the curves will be more satisfactorily ascertained by elevating the head so as to stretch the spine. If the patient is very young, a servant standing on a chair may raise her by the chin and back

of the head; but it is more convenient to use a double pulley, which by a simple contrivance, may be temporarily fixed to the top of a door.

The patient should sit on a chair, and the cord being fixed to soft straps under the chin and back of the head, is to be steadily pulled (by the surgeon), so as gradually to elevate the head. This should be done with great nicety and gentleness, as there may possibly be anchylosis between some of the vertebræ. The symptoms of inflammation or caries of the spine are so distinct, that no surgeon could mistake them for those of lateral distortion; and consequently would never propose to examine a spine so affected, in this manner.

If there be no anchylosis, the spine may be brought nearly to a straight line.* This is a satisfactory exhibition to a mother;

* When this is done by machine-makers, the friends of a patient are easily deceived into the belief, that stretching the spine is the most effectual means of curing the distortion; and they at once accede to the proposal that the patient shall wear a machine to produce the same effects as the pullies. In their delight to see

as she is at once able to comprehend, that the high shoulder and breast, and the enlargement of the hip, depend on the curvature in the spine: for when the cord is slackened, the spine falls, and the shoulders and hips resume their usual form.

If the patient be laid at full length on a plane surface, and the position of the heels compared, one leg will appear longer than the other. But, in fact, there is not any inequality in the length of the limbs; the apparent difference, being a consequence of the position into which the pelvis is thrown, by the curve of the lumbar vertebræ. That this is the cause of one leg appearing longer than the other, may be demonstrated, by laying a person whose spine is quite straight, on the back, and desiring him at the same time to raise one haunch higher than the other. When the lumbar portion of the spine is distorted, the position of the pelvis is necessarily

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the child's spine made straight, they do not seem to attend to an effect equally obvious, — that when the artificial support is removed, the spine again falls into the same position.

twisted; and therefore a patient in such a condition cannot, either in standing or lying, keep both haunches exactly on the same level; and hence it is, that while the patient is in the upright posture, one hip appears to be enlarged, and, when lying, one leg seems to be longer than the other.

A patient with distortion of the spine, generally walks in a peculiar manner, one side being carried rather before the other. The cause of this may be discovered, by examining the condition of the lumbar vertebræ of a distorted skeleton. It will be obvious that the origins and course of the psoæ muscles (the principal ones by which the limbs are carried forwards) must be altered, and correspond with the direction in which the bones are curved.

This is important to be remembered, as it proves the necessity of attending, during the progress of the treatment, to the actions of the limbs. Exercises of the legs, properly directed, have as much effect in remedying the curve in the loins, as those of the arms, have on the curves in the upper part of the spine.

In the description of the various kinds of

distortion, I have dwelt at considerable length, on the changes which take place in the relative distance of the shoulders from the head, and on the alterations in the form of the individual ribs. These ought to be particularly attended to, as the plan of treatment is in a great measure regulated by them. The importance of making a careful examination of all irregularities in the form, is shewn by the history of the case in the foot-note, which also affords a good example of the suffering to which girls with slight distortion of the spine are subjected, in consequence of the erroneous notions that prevail on the causes and symptoms of distortion. *

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* A young lady, about sixteen years of age, on returning to the country, after a winter spent in town, was observed to have a swelling and fulness on the right side of her neck. The family apothecary being consulted, applied leeches, and afterwards a blister. As this treatment did not reduce the swelling, another gentleman was consulted, who ordered it to be rubbed with liniments. But the swelling not being removed, the lady came up to town, and an eminent surgeon informed her that it was a mere fancy. Seeing that so little importance was attached to this swelling, she left town under the idea that it would gradually disap-

In considering the possibility of curing a distorted spine, it may be stated, that if

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pear; but unfortunately it became every day more distinct; and at length, a machine-maker being applied to, proved at once, to the friends that all the *doctors* had been wrong; that they had mistaken the swelling caused by a slight distortion of the upper part of the spine, for a tumor.

Since this person had discovered the cause, it was natural for the friends to believe that he would more certainly remove it, than they who had been deceived; she was therefore given up entirely to his charge. But he failed in his promises, and the poor girl was doomed to suffer much, by injudicious plans of treatment. She was encased in a machine similar to that represented in the second figure of the sixth plate; and she submitted, for nearly twelve months, to such tortures, as it may be easily imagined such a horrid invention must produce. Her medical attendants at last interfered, and the machine was laid aside; but she then was condemned to lie for a year on the inclined plane, without being allowed to take the slightest exercise. In consequence of this treatment, she became weak and nervous, with frequent palpitations of the heart, and was again sent up to town, but in such a state of debility that it was doubtful whether she could go through the day's journey. It was now too late to restore the spine to its proper shape; but by putting her on a plan of treatment similar to that described in this chapter, the alarming symptoms vanished, she became strong and muscular, and the curve which had been hitherto getting worse, though not removed, was prevented from increasing.

the patient is young, and if there be no anchylosis, nor any symptoms of ricketts or disease of the bones; if the cervical or upper dorsal vertebræ are not so much distorted as to form a large swelling on one side of the neck, and if the middle of the ribs are not yet become angular, we may safely promise to make the patient much better; but in justice to ourselves, we ought to state, that all our attempts will be ineffectual, unless the patient assists by submitting cheerfully to the rules laid down. A girl, even so young as thirteen, with a distorted spine, has no time to lose, and if she expects to have her shape restored, she must consider the attempt to remedy it, as her sole object for many months.

There is one argument in favour of making the attempt as early as possible, and the correctness of which is established by every day's experience;—after a distortion has proceeded to a certain extent, it becomes rapidly worse, if neglected or mismanaged; and the longer it continues, the less susceptible it is of remedy.

In urging the necessity of attending strictly to the cure, I am happy in believ-

ing, that the means I have to propose, will not only be found conducive to the health of the patient, but that they will interfere very little with the principal branches of education. I trust also, that when they are compared with the plans generally put into execution for remedying distortions, they will be considered as comparatively agreeable to the patient.

Such a case of distortion as that described at pages 49. and 111., is too far advanced to be remedied by any *one* of the plans of practice which have been discussed in the preceding pages. In the attempt to cure such a case, we must endeavour to combine them all; or, at least, to use such, as will be likely to attain the following objects: —

First, to act upon the spine so as to alter the present position of the vertebræ, and consequently of the ribs and shoulders.

Secondly, to keep the vertebræ in their new and improved position.

The third and most essential object is, to bring the muscles of the back into such a condition, that they will after a certain

time, be capable of retaining the *spine* in its natural position, without the aid of any artificial support.

In the description of the manner of examining the spine, the possibility of altering the position of the vertebræ, by merely pulling upon the head, was shewn; but experience has led to the proof, that to stretch the spine effectually, and at the same time usefully, its ligaments and muscles must be previously brought into a certain condition.

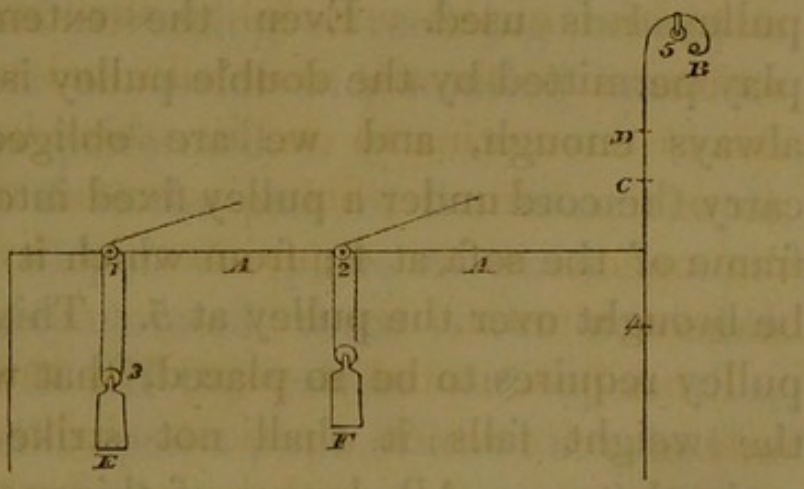
For this purpose, all the different means of excitement, as friction, shampooing, pressure, percussion, &c. are useful; but the restoration of the muscles to their natural actions is by far the most effectual mode. But in attempting to do this, there is danger of the deformity being increased, unless the operations be superintended by the surgeon himself.

It has been stated at page 217., that the only exercise which a patient, slightly distorted, can perform with safety, is that of bending the body and raising it again with an exertion. This is also very useful for the kind of distortion at present under consideration.

In addition, or instead of the apparatus which has been described, as calculated to assist in performing this exercise, I have to recommend another, which is very convenient; indeed, so many exercises may be performed with it, as to make it useful in almost every stage of a distortion, and it at the same time forms a better reclining board than those generally used.

A drawing of the apparatus is given in the seventh plate; but the following outlines will shew how simple it is, and how easily it may be added to a common sofa.

No. 1.



Upon the frame of a sofa, the board A, is placed; it is now horizontal, but it may be made an inclined plane, by raising the up-

per end to C or D. But I shall not, at present, make any observations on its use as a plane. I wish first to shew how the simplest exercises may be performed.

The patient should stand at the upper end of the sofa, and lean over it. With a band fixed to the head, in the manner described at page 218., she should raise the weight E, until her body becomes erect; she is then to bend the head, so as nearly to touch the board, and to go on for some time alternately rising and stooping. It is necessary to use the double pulley 3, as the sofa is seldom high enough to allow of sufficient play, when only the single pulley 1 is used. Even the extent of play permitted by the double pulley is not always enough, and we are obliged to carry the cord under a pulley fixed into the frame of the sofa at 4; from which it is to be brought over the pulley at 5. This last pulley requires to be so placed, that when the weight falls it shall not strike the patient's toes. All danger of this may be avoided, by putting a small piece of wood across.

If we wish to exercise one or both arms, we have only to use another set of pullies, by which we may operate on the weight F.

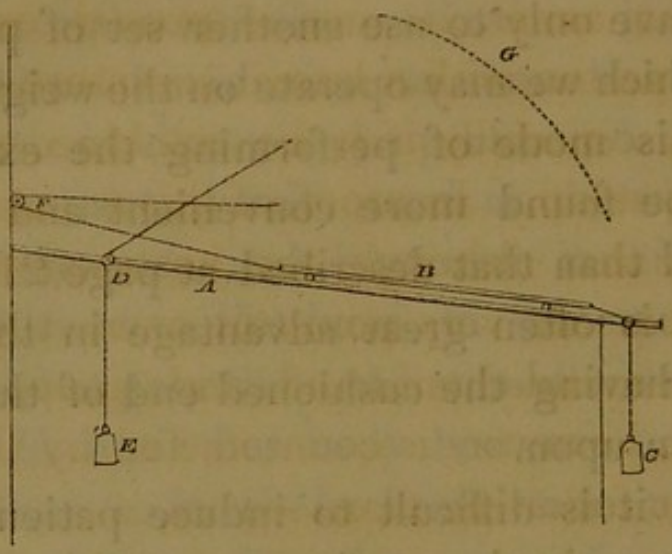
This mode of performing the exercise will be found more convenient and more useful than that described at page 218., as there is often great advantage in the patient having the cushioned end of the sofa to lean upon.

As it is difficult to induce patients to persevere in the performance of one exercise, I have endeavoured to contrive a variety of them, to effect the same object.

By means of an additional board to the plane, (which is absolutely necessary to it, as a stretching or reclining board,) a number of useful and amusing exercises may be performed.

No. 2. is the plan of the most simple form. Upon the plane A, which is considerably elevated, there is the moveable board B. If the patient sits upon this, and pulls upon a piece of wood attached to a cord, which, after running through a pulley, F, is fixed to the board B, she will draw up the board; and if the arms be at

No. 2.

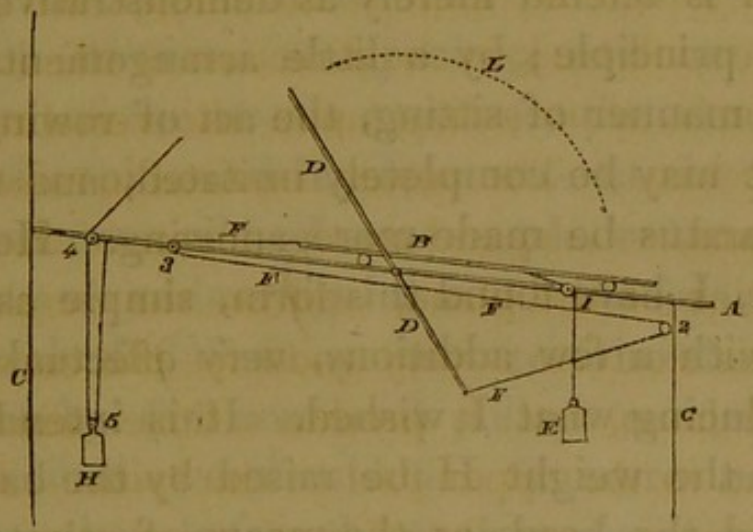


the same time kept at full length, the body must fall back in the direction of the dotted line G, thus acting upon the vertebræ of the loins. The power required to raise the board, will depend on the degree of the elevation of the plane, and on the weight C. This exercise is very good for the curve in the loins, but it produces little effect on that, in the upper part of the spine. This, however, is easily effected, by putting in a pulley at D, and raising the weight E with the band round the head.

The exercises, even with this simple form of the apparatus, may be usefully varied, and with a few additions, *rowing* may be imitated. But here I ought to

state, that rowing, unless done in a particular manner, is not a proper exercise for a person with a lateral curvature of the spine, especially if it be combined with a slight stoop. In proof of this we may observe, that although the boatmen on the Thames are very powerful men, they are often round-shouldered and stoop. This effect, however, is counteracted by the use of the following plan: —

No. 3.



Upon the plane A, as in No. 2, there is the moveable board B; the weight E is attached to it by a cord passing over the pulley 1; a staple or ring is fastened to the board A, through which an iron rod passes in the form of an axle. Attached to

the axle, there is a lever or oar, D. A cord, F, is attached to the lever, passes over the pulley 2, then up to the pulley 3, and is fixed to the moveable board B. A person sitting on the board B, will, by pulling back the lever D in the manner of rowing, raise the board B, the strength required being in proportion to the height of the plane and the weight of E, and by the combined power of which the board will return to its original position. This plan is offered merely as demonstrative of the principle; by a little arrangement in the manner of sitting, the act of rowing a boat may be completely imitated, and the apparatus be made more amusing. However, I have found this form, simple as it is, with a few additions, very effectual in producing what I wished. It is intended that the weight H be raised by the band round the head, as the means of counteracting the stoop, that is liable to be formed, if the head is bent forwards, without being at the same time operated on by the muscles of the back.

This apparatus may be used in a variety of ways; but I shall mention only another,

as it is especially useful in the contracted form of the chest; it is that of sitting with the feet towards the lower end of the board, and pushing against the oars, so as to raise the board B. This mode of exercise acts on all the muscles of the fore part of the chest, and expands the ribs, bringing the sternum forwards, and, consequently, is very useful in those cases of affections of the lungs which seem to depend on malformation of the chest. (See page 146.)

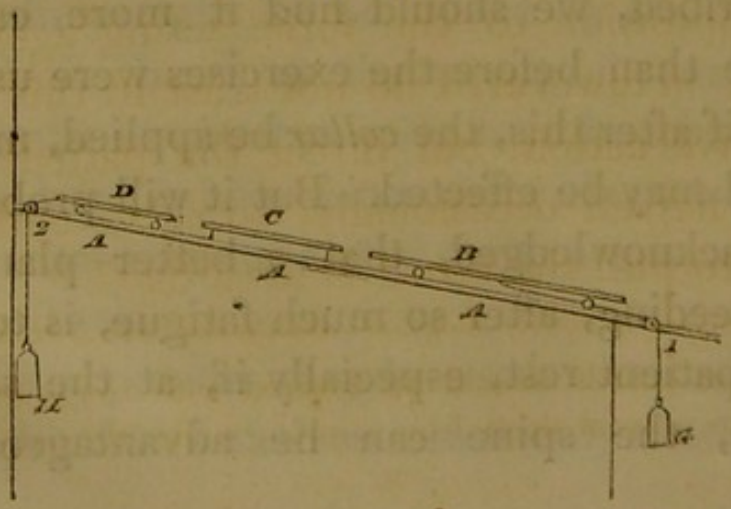
By friction, shampooing, and one or more of the above exercises, the muscles of the spine and the ligaments of the vertebræ are rendered more supple, or brought into a very advantageous condition for being stretched. Were we now to raise the patient by the cord and pulley, as already described, we should find it more easily done than before the exercises were used; and if after this, the *collar* be applied, much good may be effected. But it will probably be acknowledged, that a better plan of proceeding, after so much fatigue, is to let the patient rest, especially if, at the same time, the spine can be advantageously

stretched. This may be easily done, and on the same apparatus.

The mode of doing it, will be understood by the plan No. 4.

Two additional boards are used; C, which is to be very short, not more than ten inches long, (it need not be on rollers); D, to be about twelve inches, upon which is to be fixed a cushion, or the socket that is generally used on the common inclined plane, for the head to lie in. This board is to be moveable. The patient lies on the three boards, the hips being on B, the shoulders on C, and the head on D; silk cords are to be brought from each side of the sofa-frame, and to be fixed to loops that are fastened behind and before to the patient's corset (without whale-bone). The weight G is to

No. 4.



be attached to B, and the weight H to D. It is evident that the board B will fall, in consequence of the heaviness of the body, and of its being pulled by the weight H. When it falls, the portion of the spine between the shoulders (which are fixed by cords,) and the pelvis must be operated upon. The lumbar part of the spine is more effectually stretched in this way than it can be by a collar, or even by swinging the body; for the force acts gradually and constantly, which experience in the reduction of dislocations has proved to be the best way of operating upon muscles and ligaments. There is also another advantage attending this mode of stretching the spine; the muscles are not only elongated, but at the same time strengthened by the patient instinctively using them, in opposition to the force acting against them. However, I do not trust to this instinctive action, but direct the patient to exert herself occasionally, so as to endeavour to pull the board B towards C. *

* The boards should be covered with rough green cloth, to prevent them from slipping under the patient.

The principal objection to stretching the spine, by the cord and pulley, is that the force operates chiefly on the cervical vertebræ. This objection is not applicable to the plan just proposed; for the loins can be stretched without the cervical vertebræ being affected. But as it is almost always necessary to stretch the portion of the spine above the shoulders, I have made provision for doing this, by means which neither hurt nor even annoy the patient. The head lies in the socket on the board D; to keep it steady, a ribband is brought from each side of the socket and under the chin. The board D being operated on by the weight H, is drawn separate from C, on which the shoulders rest: in this way, the cervical and upper dorsal portions of the spine are necessarily stretched.

By this contrivance we may operate with any degree of force, upon a portion of the spine, and not interfere with the other parts; or we may act upon two or three portions, with different degrees of force.

These means are intended to act directly on the spine; their effect may be increased

by such exercises as have a more immediate influence on the ribs.

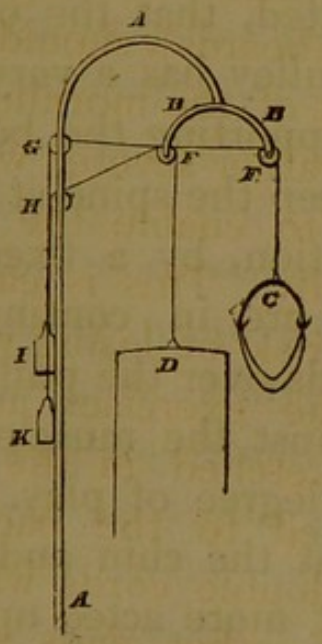
The most effectual mode of expanding the left side of the chest, (which is generally the contracted side,) is to bring the muscles of the left arm into action, and to bend the whole spine towards the right side; but an examination of the skeleton in the second plate will shew, that in doing so there is danger of increasing the curve at the loins. This may be obviated by a careful management of the exercises over the cushion of the sofa; but as it is scarcely possible to describe how these are to be done, I shall confine myself to the description of the safest, which is, at the same time, the most effectual mode.

A common pillow may be substituted for the socket upon D; the boards C and B are to be arranged in the same manner as for lying on the back. The patient should turn a little upon her right side; the left hand is to be raised over the head, and, by taking hold of the upper part of the sofa, or of a strap, she should endeavour to pull herself up. In doing this, it is evident that the ribs of the left side, which are squeezed

together, will be expanded, while the lumbar portion of the spine is still kept fully on the stretch by the receding of the board B. When the patient is fatigued by the attempt to pull herself up (which requires considerable exertion), she ought to rest for some time, supporting herself by the left arm.

These exercises, with intervals of complete rest, (which may be gained by fixing the moveable boards), should occupy a considerable part of the morning. But as the discipline is rather severe, we should contrive means to enable the patient to sit up occasionally. This is easily done, and without any risk of losing what has been gained by the exercises and rest. The apparatus sketched in the seventh plate is to be fixed to the back of a chair. To A, two double cords with springs are attached; the other ends are to be fastened to the same loops in the corset that were used for fixing the shoulders, while the patient lay on the plane. The weight B is to be sufficiently heavy to support the chest, and prevent the spine curving at the loins.

To C, a chin and head-strap are to be fixed; communicating with this, there is a weight, D, by which the head is to be supported. This may be employed, and with great advantage; but as objections have been made to its shape, I have lately used the apparatus sketched below: it appears complicated, but is in fact very simple.



A A is a steel rod, the upper part being in form of an arch; it is to be fixed into a brass socket, on an upright piece of wood attached to the back of a chair. To the

arch, the semicircle BB is rivetted; and at the extremities of BB the pullies EF are fixed. In the rod AA the pullies GH are placed; and to the head-piece C, and shoulder-piece D, cords with weights are fastened, as in the sketch of the seventh plate.

It may perhaps be said, that I am now advising the use of means to which I have already objected; but on consideration it will be admitted, that the operation of a weight and pulley has a very different effect, while supporting the body, from the attempt to keep the spine at a certain degree of elevation, by a fixed instrument. The weights are in continual operation upon the cords over the pullies, and thus, by acting against the muscles, keep them in a certain degree of play. It may also be stated, that the chin and cervical vertebræ are not more acted upon than by a weight sufficient to support the head; for the chest and loins are sustained by the straps under the shoulders. The apparatus, in consequence of the elasticity given to it by the springs, and the play permitted by

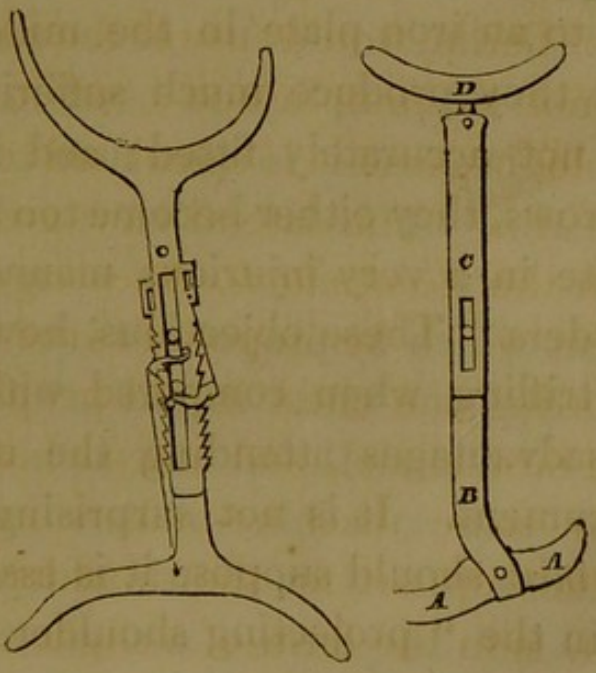
the pullies, produces so little distress to the patient, that she can, while wearing it, write, draw, or practise at the piano-forte. As this contrivance can only be used when attached to the back of a chair, I have had a moveable crane made on the same principle, which may be fixed to the wall. The cords for the support of the body are so arranged, that the patient can walk or sit in any part, within a certain circle. It is easy to make an apparatus by which a patient may have the complete range of a room, and be at the same time well supported.

We have now to consider how a patient may enjoy walking in the open air, without any risk of losing, what she gains by attention to the preceding rules. Of the importance of fresh air to the general health, and consequently, to the cure of distortion, there can be no question.

The sixth plate contains sketches of the instruments that are commonly used for supporting the body; but as they are intended, by the inventors of these machines, to be the means of curing distortion, by

stretching the spine and compressing the prominent ribs, they are all either too complicated, or so constructed as to be injurious to the form of the ribs. In most of the cases of lateral distortion, it is only necessary to have such a contrivance as is sufficient to support the shoulders, and prevent the yielding of the lumbar portion of the spine. The dread that the shape of the pelvis may be injured by the application of instruments, having been shewn to be groundless, we may, without hesitation, take the pelvis as the part upon which an instrument for the support of the shoulders is to rest. A machine used by Graefè, of Berlin, would answer the purpose, were it not so complicated; but it is objectionable, because it is calculated to compress the ribs. The lateral view given by Portal, in the *Academie des Sciences*, of the instrument which he proposed as the means of supporting the chest in old people, affords the best model, and indeed has been copied by some machine-makers in England. The support for the shoulders used by Portal, is in the form of a slight crutch,

passing from a girdle round the pelvis to the axilla. This contrivance, with some slight variations, I have found very efficient. A drawing of the instrument, in its most complicated form, is given in the fourth figure of the seventh plate; the adjoining sketches, one of which is nearly a copy from that in the *Academie des Sciences*, will shew the principal part required in common cases of lateral curvature. But when the cervical and upper dorsal vertebræ are much affected, it is necessary to use the instrument of the form represented in the seventh plate.



A, a portion of the girdle surrounding the pelvis; B, a steel plate, moving on a screw in A; C, a second steel plate that slides on B, and may be fixed at a certain height by screws; D, a support for the arm, moving on a pivot.

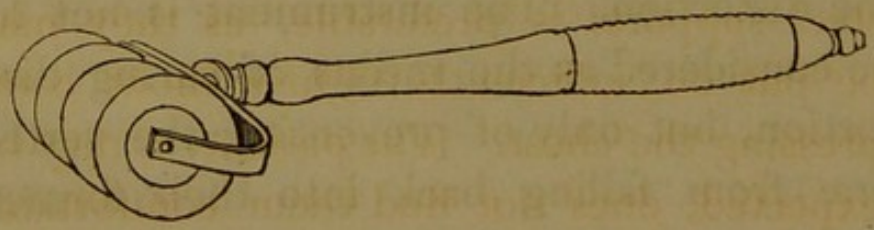
The fifth figure of the sixth plate is the sketch of an instrument, which has of late been recommended by high authority in the profession, and has consequently been much used for the cure of lateral curvature of the spine. Many objections may be made to this instrument; it is effectual in preventing the shoulders from falling; but as the supports which pass under the arms are fixed to an iron plate in the middle of the back, they produce much suffering, if they are not accurately fitted; and if the patient grows, they either become too short, or operate in a very injurious manner on the shoulders. These objections, however, are but trifling when compared with the other disadvantages attending the use of this instrument. It is not surprising that the *machinist* should suppose it is essential to press in the "projecting shoulder," and

" the hip that is out." With the intention of doing this, two lateral plates are added, by which the projecting ribs are compressed; and hence, as may be seen in the description of the third and fourth plates, the distortion is rendered almost incurable. None of these objections apply to the instrument which I have recommended. From there being little confinement of the chest, and a provision being made for enabling the wearer to stoop, it is so comfortable, that I have been obliged to object to its being worn, except during the time the patient is walking, or upon occasions when she is anxious to conceal the distortion. The instrument is not to be considered as the means of curing distortion, but only of preventing the vertebræ from falling back into their former position.

During the evening, the patient must not relax, but continue the plan of exercising and resting alternately; and when she sits up, she ought to use the support attached to the back of the chair; for although the instrument just described, sup-

ports the body, it neither does it so effectually, nor so usefully, as the weights over the pullies. Before going to bed, the spine, and the muscles on each side of it, should be rubbed and shampooed. If the skin is not very irritable, a little stimulating liniment may be used; but in general, hair-powder is better and pleasanter to the patient.

The use of the friction-roller (the idea of which I took from an instrument used by the Indians for the cure of rheumatism) is more efficacious than friction, in exciting and giving action to the deep muscles.



In describing the means of preventing or curing slight distortion, I stated the importance of attending to the manner in which a patient lies while asleep; it is still more necessary to attend to it in a case of confirmed curvature of the spine.

Patients in this condition are desired never to sleep on a feather-bed, but on a firm hair-mattrass, and without a pillow.* So far, the advice is good, and can be followed; but the order to lie in a particular manner is almost useless; for although a child may be put in a proper position before going to sleep, she will be found in another, in the course of an hour. It being essential that the patient do not lie in a crooked position during the night, some means must be used, by which the pelvis and shoulders may be prevented from approximating. This may be effected by common stiff stays; but the use of the steel supports is preferable, as they may be put on sufficiently tight without compressing the chest. The patient, as may be expected, does not find them comfortable at first, but after they have been used three or four nights seldom complains of them.

When the curve of the spine is to such

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* In patients with slight affections of the chest, it is sometiues necessary to let them use a pillow. Healthy girls, in a very short time, forget the loss of the pillow.

a degree that the ribs are considerably altered in form, it is necessary to vary the exercises, and also the application of the instruments: but as it is impossible to detail the manner of treating all the varieties, I hope that the specimens of the changes in the form of the spine and ribs, as depicted in the plates, and the observations made in explanation of their causes, will shew the general principle upon which the treatment is to be conducted.

There is one variety of the lateral curvature, upon which a few remarks may be made. In the figures represented in the second plate, the curve of the spine terminates about the sixth cervical vertebra; and the head is, consequently, nearly perpendicular to the pelvis; and in cases where the spine is distorted in a manner similar to the second figure in the first plate, (see page 100) there is a fourth curve, by which, even when the spine is almost of a serpentine form, the head is kept erect. But it occasionally happens (as explained at page 117) that the second curve does not termi-

nate in the upper part of the dorsal portion of the spine, but is continued up to the atlas. The consequence of this is, that the head is very much inclined to one side. In such cases, there are two distinct causes operating to keep the head in its new position: first, the curve of the spine; and, secondly, the contracted position of the muscles in the line C B. In wry-neck, the muscles are primarily diseased; but, in cases similar to that I am now describing, they become contracted, or shortened, from the change in the form of the spine.

In such cases, it is necessary to try every thing that will tend to relax and lengthen the muscles. The means which I have found most efficacious, are, shampooing for twenty minutes, three or four times a-day,

and afterwards keeping the head supported by the instrument described at page 245, and persevering in the use of the moveable plane. *

It is scarcely necessary to add, that, during the treatment of this, and of every case of distortion, great care should be paid to the regulation of the diet and to the state of the bowels; we should also endeavour to strengthen the system generally, by every means, which experience has shown to be conducive to health.

It may be useful to conclude the description of the different modes of treatment with the history of a case of distortion which is unfortunately but too common.

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* This condition of the muscles has probably given rise to the mistake, of supposing that all distortions depend upon the undue strength and action of the muscles of one side, over those of the other. The muscles are not in a state of *contraction*; they are actually shortened, and almost rigid, approaching in some degree to the condition, in which they are found in wry-neck. It would be in vain to expect an equalization in the condition of the muscles by keeping the patient confined to one position.

In the third plate, a variety of examples of distortion are represented. All except the first may be considered incurable; but much may be done for the ease and comfort of the patient, even when the distortion is as bad as that represented in the fourth plate, if it be independent of a specific disease of the bones.

The following history affords an example of the consequences of not endeavouring to remedy a distortion, because it was supposed to depend on ricketts; and also of the good effects resulting from proper treatment, even after the spine is distorted to the last degree.

The patient was a young lady, sixteen years of age. Her spine and ribs were distorted in the same manner as the specimen represented in the fourth plate. On enquiring into the history of the distortion, I learned that both her hands and feet had been slightly deformed while she was an infant; and that, by proper treatment, they had been cured. When she was about six years old, her mother discovered that the spine was slightly curved. Stiff stays were applied, with the intention of restoring the

spine to its proper shape; however the curvature gradually increased. The family, some time after this, travelled on the Continent, and consulted the most eminent men, both in Paris and Vienna; but by these they were told that it was useless to do more than to attend to the general state of the health. The local disease was thus neglected, and an irremediable degree of distortion was gradually produced.

The opinion that any local remedies were useless, was probably founded on the idea that the distortion depended on ricketts. This young lady's general appearance was such, that previous to examining her, I suspected the same cause; but I could not discover any symptoms which should be considered characteristic of ricketts. The limbs were perfectly straight, the pelvis was naturally formed, and there was no appearance of a ricketty affection of the bones of the head. In short, the deformity was confined to the spine and ribs.

These circumstances alone, would have led me to say that the distortion had not been caused by ricketts; but I was strengthened in this opinion, on learning

that her hands and feet had at one time been also distorted; for this latter deformity seldom or never depends on a specific disease of the bones, but on that weakness of the muscles and ligaments which frequently accompanies the ill health of children.

If it be correct to assign the distortion of the spine to causes similar to those which produced it in the hands and feet, it is fair to conclude, that the distortion of the spine might also have been corrected, or perhaps cured, by proper management at an early age.

Although this opinion is offered with some hesitation, I feel so far confident in its correctness as to induce me to hazard it, especially as it may excite others to examine into the subject. There can be but one opinion, on the importance of the question.

But to return to the case. As it was now impossible to restore the bones of the chest to their original form, the only question remaining was, Could any thing still be done for the relief of this young lady, who suffers much from symptoms that are evidently dependant on the condition of the

spine and ribs? As she suffered acute pain in the right side while standing erect, and as it was relieved by change of position, there was little doubt that the pain was caused by the pressure of the ribs upon the viscera, and especially on the liver; I therefore applied the instrument described at page 249.; by this, the chest was a little raised from the pelvis, and the pain was temporarily relieved; but as the instrument, though very light, caused a degree of pain on the parts on which it rested, it was necessary to try other means.

Finding that the lumbar vertebræ were still pliable, and that by a muscular exertion she could raise the chest considerably above its usual position, she was put upon a system of exercises by which the muscles of the spine and chest were strengthened. The good effects of this were soon visible; for she was not only freed from the local pains, but instead of continuing weak and helpless, and suffering from breathlessness and the cough which is so common in similar cases of distortion, she became strong, and could even run up stairs, without her breathing being affected.

The marked benefit derived, in this instance, from such simple means as appropriate exercises, combined with a slight artificial support, should be sufficient inducement to prevent us from dismissing a patient in such a condition, with the lamentable prospect, that nothing can be done; that she must continue in the same helpless state.

From the history of this case, I hope that the distinctions which have been drawn between the distortions consequent on ricketts, and those which are independent of any disease of the bones, will be found useful in practice. It will perhaps be admitted, that had it not been for the idea which is so generally prevalent, that lateral distortion depends on ricketts, or on a softening of the bones, the examples daily afforded us, of the activity and strength of distorted persons, in the lower ranks of life, would, long ere this, have led to rules of practice different from those at present followed in the treatment of such

cases. Hitherto, it has always been dreaded, that in the attempts to cure distortion of the spine by instruments, deformity of the pelvis would be produced; and if it were attempted to be remedied by muscular exertion, that the bones in their supposed softened condition would be twisted. The facts which have been stated in the course of this work are, perhaps, sufficiently numerous to afford reason for suspecting, that the consequence of these opinions has been, that many cases which might have been cured at an early stage, have been so mismanaged that the chest has at last been distorted in such a manner as to make the patient miserable for life. It will perhaps also be acknowledged, that even after patients have been reduced to this condition, their sufferings have been increased, in consequence of their being, from a mistaken notion, nursed, and prevented from taking such exercises as would tend to strengthen the muscles, which, even in the greatest degree of distortion, are still the natural supporters of the frame. We are, at first, induced to pity those unfortu-

nate persons in the lower ranks of life, who, though distorted, are obliged by poverty to exert themselves; but, on enquiring into their condition, we find that they are comparatively comfortable, and are even capable of exerting themselves, without suffering the slightest inconvenience.

APPENDIX.

APPENDIX.

I SHALL add, in the form of an Appendix, a short descriptive catalogue of the specimens of distortion, and of the other diseases of the spine, which are contained in Mr. Charles Bell's collection. *

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* This collection is now preserved in the room which was built in Great Windmill-street, by Dr. W. Hunter. It contains nearly three thousand preparations illustrative of the natural structure, and of the diseases of the different parts of the body.

Among the preparations of the bones, there is so numerous a collection of fractures both of the skull and of the limbs, as to afford examples in illustration of the principal practical questions which have of late years been agitated. There is also a series of dislocations and diseases of the joints, with some hundred specimens exhibiting the varieties of caries, necrosis, tumours, cancers, and ulcers of the bones. This enumeration (in which none of the specimens illustrative of the subject of the work are included,) is sufficient to shew that the pathology of the bones, has been particularly attended to in the formation of the collection.

These preparations (and which I have Mr. Bell's permission to say, may be examined by members of the profession,) afford the best proofs of the essential differences between many of the affections of the vertebræ, which have been hitherto considered the same; they are also sufficient evidences of its being almost impossible for a person who is not conversant with anatomy and pathology, to comprehend the nature of even the simplest case of disease of the spine.

The preparations illustrative of the diseases of the spine are arranged under four sets. In the first class are examples of such distortions, as seem to have been originally independent of any disease of the osseous system. In the second, are the preparations illustrative of the effects of Ricketts or Mollities ossium. Examples of that affection of the spine, which has been considered analogous to the common scrofulous disease of the joints, form the third series, and under the fourth, are classed the specimens of fracture and luxations of the bones of the spine.

No. 1. 2. 3. and 4. of I. 3. M. *, are specimens of different degrees of distortion of the last lumbar vertebræ, and which is in each specimen united to the sacrum. These are referred to in the explanation of Plate I., at page 102.

No. 5. is represented in fig. 1. Plate I., and is particularly described in the explanation of that plate, at page 98.

No. 6. is given in fig. 2., of the first plate.

No. 7. is the specimen of curvature, with anchylosis, which is depicted in fig. 4. of the same plate.

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* All the preparations in the Museum are classed under divisions, each division (being also subdivided,) includes the natural and morbid structure of one set of organs. The divisions are distinguished by Roman numerals, the subdivisions by the Arabic, and the section natural or morbid by the letter N. or M.

As the preparations, illustrative of the diseases of the spine, are in the third subdivision and section *Morbid*, of the first division BONE, they are all marked I. 3. M.; and as each specimen is numbered by an Arabic numeral placed after M., the first preparation of distortion is labelled I. 3. M. 1.

No. 8. is a specimen of distortion of the spine, in a person affected with ricketts. This preparation has been placed among the present series, for the same reason that it has been introduced as the third fig. of Plate I. See page 103.

No. 9. is the specimen represented by fig. 5., in the first plate, in illustration of the stoop acquired by bad habit.

No. 10. Although this is an example of carious spine it has been placed here, and is also represented in the first plate, to illustrate the difference between the characters of the various curves of the spine. (See page 108.)

No. 11. and 12. are sections of a spine distorted nearly to the same degree as that represented in the fifth plate. These specimens, and

Nos. 12. and 13., which are sections of a spine nearly similar to the last, are referred to at pages 72 and 95. As the two last specimens are not dried, but preserved in

spirits of wine, they are particularly valuable, as affording a demonstration of the condition of the intervertebral substance in such cases. A preparation of the common distorted foot is placed here, to shew the analogy between a lateral distortion of the spine and distortion of the foot.

No. 14. and 15. are described at page 61.

No. 16. is the specimen of which there is a front and back view in Plate III. See page 119.

No. 17. is the preparation represented in the fourth plate. See page 124.

No. 18. is a cast taken from a man 53 years of age, and who was at the time, in good health. The form of the distortion is very similar to that of the last preparation.

No. 19. and 20. are specimens of distortion, differing in several respects from the common cases of lateral curvature.

They are alluded to at page 118. in the explanation of Plate III.

No 21. is the preparation which is represented in fig. 1. Plate III. and described at page 116.

The next series of preparations, and which are preserved in a separate cabinet, are illustrative of the distortions consequent upon ricketts and mollities ossium.

No. 22., a complete skeleton of a female, in which the marks of ricketts are discernible, especially in the legs. This specimen is valuable, as it shews, that although the spinal column be scarcely affected, the pelvis is distorted. This question is particularly dwelt upon, in the description of the fifth plate, at page 237.

No. 23. The woman of whom this is the skeleton was twice pregnant; she died during the second labour. The distortion has fallen principally on the legs and pel-

vis, the spine being scarcely affected. The legs are twisted in an extraordinary manner, being nearly similar to those of the skeleton represented in Plate V.; but they were, in this instance, almost locked together. The scapulæ and the bones of the arm are much distorted by the action of the muscles, which were particularly strong, and enabled the person to move with great rapidity on crutches.

This skeleton affords an excellent example of the limbs and pelvis being distorted, without there being at the same time distortion of the spine. The pelvis is not of a triangular form, but is flattened. The distance between the sacrum and os pubis is only two fingers' breadth; the transverse diameter is four inches and a quarter. On the upper edge of the body of the os pubis there is a spine, as sharp as a paper-folder. This was the cause of the woman's death; for during labour the womb was forced against the ridge, and was eventually cut; the arm of the child escaped through the rent.

No. 24. This is the skeleton which is represented in Plate V. A short description of it, is given in the explanation of the plates.

No. 25. This skeleton differs from the other specimens, in being distorted by the disease termed Mollities Ossium. The disease continued for several years, and was attended with incessant pains in the bones, and with a deposition of phosphate of lime from the urine.

The most extraordinary part of the history of the woman, of whom this is the skeleton, is in the number of children which she had, and in the encreasing difficulty of each succeeding labour, in consequence of the distortion gradually becoming greater, until the seventh and last, in which there was an absolute necessity for performing the Cesarean section.

This operation, as performed by Mr. Charles Bell and his brother, the late Mr. John Bell, is described in the fourth volume of the Medico-Chirurgical Transactions. The mother died, but the child

lived, being the only one of seven, that was born alive.

Description of the Skeleton.

All the bones were so soft, that in endeavouring to separate the periosteum, the knife went into the bone. The spine, the thorax, and the pelvis, are the parts most distorted, the arms and legs being as long as those of a tall woman. It ought to be mentioned, that the woman had been confined to her bed for nearly three years.

The distance from the occiput to the ridge of the ilium is less than ten inches, while the thigh-bones are nearly sixteen inches long: and they are even a little shortened, in consequence of their necks being almost at right-angles to their bodies; the great trochanters nearly touch the ilia.

The last vertebræ of the neck and the first of the back project backwards, nearly at right-angles; while the last of the back and the first of the loins make a similar projection forwards. On the ribs of the right side there is a remarkable indent-

ation, and on the left they are compressed and irregular.

The pelvis is distorted in a most extraordinary manner. That which at first view, appears to be the projection of the sacrum, is the bodies of the three lower lumbar vertebræ, which have fallen forward, so as to occupy the cavity of the pelvis. From the promontory of the sacrum to the part of the brim of the pelvis opposite the acetabulum, the distance is rather less than a quarter of an inch; from the right side of the promontory of the sacrum to the linea innominata, half an inch. The fore-finger can with difficulty be introduced between the bones. From the sacrum to the symphysis pubis, two inches and a fifth. One part, and only one part of the brim, admits a ball of an inch in diameter to rest in it. The ball cannot, at any part, pass through the pelvis. Where it lies, it rests upon three points, viz. the fourth vertebra of the loins, and the body of each os pubis. The sacrum is so much bent, that its base and angle approach within half an inch of each other.

Nos. 26, 27, 28, 29, 30. are pelves of ricketty persons, distorted in different degrees; they are particularly interesting, as connected with the operations of midwifery.

Nos. 31, 32. are the bones of both arms distorted by ricketts.

Nos. 33, 34. are very fine specimens of the same affection of both legs.

Nos. 35, 36, 37. are specimens of ricketts (in different degrees) of the bones of the leg; there are several other examples, but they are arranged with the specimens of fractures of the neck of the thigh-bone, to shew that the neck of a ricketty thigh-bone might be mistaken for an instance of union after fracture.

Nos. 38, 39, 40, 41, 42. are specimens of the change produced on the bones of the head by ricketts; some of these are, at certain points, very thick; No. 42. is at one part more than an inch in thickness.

Nos. 43, 44. are specimens of remarkably thin skulls.

No. 45. is a great enlargement of the sternum of a ricketty person; it measures in breadth three inches; while that of a very strong man, six feet two inches in height, measures only one and a half inch.

No. 46. the thigh-bone, bones of the leg, and feet of a young dwarf; they are very small, and were quite soft.

No. 47. portion of the femur of a patient who had mollities ossium, and which is described in a paper by Mr. Thompson.

No. 48. club foot of the child which has been already referred to.

The preparations in the next series are of a very different character from the preceding ones, being examples of the changes produced in the bones of the trunk by the

disease which is commonly called scrophulous caries of the spine.

The specimens in this division are very numerous, and prove that there is great variety in the character and degree of the distortion produced by this disease. I shall here only introduce short extracts from the catalogue, reserving the full consideration of the diseases of which the preparations are examples for the next volume.

No. 49. is a specimen of the carious state of the vertebræ, which precedes the destruction of their bodies, and the consequent yielding to the superincumbent weight.

While the disease is (as in the case from which this was taken) only commencing, there is generally, paralysis of the legs. This is probably in consequence of the inflammation of the bone affecting the spinal marrow, as many facts could be adduced to shew that the idea generally received, of pressure on the spinal marrow being the cause of paralysis in such cases, is erro-

neous. A specimen, preserved in the museum of St. Bartholomew's Hospital, is particularly interesting, as having been taken from a patient who had been kept for some time in the Hospital by Mr. Pott, as an example of the good effects of the caustic issues upon caries of the spine with curvature. Although the patient had been cured of paralysis, and was able to walk for some time preceding his death, yet it was found, upon dissection, that the spinal marrow had actually been diminished in size by the growth of the parts in the interior of the canal.

Since the death of Doctor Baillie, some drawings, which were found among his papers, have been sent to me. Besides the value which I naturally place upon these drawings as a gift, I consider them highly important, as they afford the best evidence on the present question.

One of them represents a spine more distorted than that given in the sixth figure of the first plate. The canal for the spinal marrow is at one part so much encroached upon by the projection of the bodies of the

vertebræ, that it is scarcely half its natural size; the spinal marrow consequently appears compressed or diminished.

The patient, from whom this was taken, had been attended by Dr. Hunter, who used to say, that had he not carefully watched every symptom of the disease, he should have thought, from the state of the preparation, that all the parts below the point where the canal was diminished must have been paralyzed. The circumstance of there having been no paralysis, is proved beyond a doubt, by a note on the drawing, in Doctor Baillie's hand-writing: — "Miss Smith, aged 12. The incurvation began about four years of age. No palsy to the last."

These preparations prove that the spinal marrow, like the brain, does not suffer much from a certain degree of pressure, if it is not accompanied with inflammation. The numerous instances in which there is paralysis, although there is no pressure upon the spinal marrow, and the above examples of the existence of a certain degree of pressure, without consequent paralysis, afford a

satisfactory answer to the severe critique upon Mr. Pott that is contained in a work published a few years ago. The author of the work alluded to, seems to consider all the symptoms of paralysis, consequent upon diseases of the spine, as always referable to pressure on the spinal marrow.

In the next volume I shall enter more into this enquiry; but as an opinion prevails, that pressure on the spinal marrow is the cause of the paralysis which is consequent on disease of the vertebræ and injury of the spine, these remarks have been made in the hope of exciting others to the enquiry. This is especially necessary at present, as it has been proposed to relieve the spinal marrow from the *compression* of fluids or other matter, by an operation, similar to that lately revived, for fracture of the spine.

No. 50. In this preparation, many of the vertebræ are quite carious; a large abscess had formed on the fore part of the spine. Neither in this, nor in the last specimen, are the intervertebral cartilages

affected. This preparation is particularly illustrative of the danger of any attempt to stretch the spine, when it is distorted in consequence of caries of the vertebræ.

No. 51. In this specimen, not only the body of the bone, but also the intervertebral substance, have suffered; so that there is a deficiency of a considerable part of the spinal column, the spinal marrow being even exposed, or, at least, forming part of the boundaries of the abscess.

In this, as in the last example, the danger of the application of a machine, with the intent of raising the spine, is obvious. As there is no solid bone to resist the force applied, the spine might be broken in the attempt; and were it raised, the falling down again of the vertebræ, when deprived of the artificial support, would be probably fatal. It is only necessary to shew, that such is occasionally the state of the spine, to prove how dangerous machines may be, in the hands of ignorant persons.

No. 52. is a model of a carious spine, and of *lumbar abscess*, which is not an unusual attendant upon disease of the vertebræ.

Nos. 53, 54, 55, 56. are illustrations of the different degrees of curvature produced by the destruction of the bodies of the vertebræ by caries.

No 57. In this specimen the ribs are preserved, to shew the change produced in their position, by the destruction of the vertebræ.

No. 58. The character of the distortion peculiar to such cases, is well exemplified in this specimen.

Nos. 59. and 60. are sections shewing how perfectly the canal for the spinal marrow may retain its form, although several of the bodies of the vertebræ have been destroyed.

Nos. 61. and 62. These are perpen-

dicular sections of a spine, in which there had been caries of the lumbar vertebræ: as the skeleton is entire, they afford good examples of the peculiar curve produced when the disease has attacked the lower part of the column.

Nos. 63. and 64. are similar sections of a skeleton in which the disease had been situated in the upper dorsal vertebræ. The curve forms a good contrast with the last.

No. 65. very fine example of the curve in consequence of caries in the spine of a young person. The disease has been stopped, a partial anchylosis having taken place; the aorta, which has in a most extraordinary manner accommodated itself to the form of the spine, is preserved. The œsophagus did not correspond to the curvatures of the column, but ran direct from the neck to the diaphragm, so that it was not more than three inches long, while the aorta measures between the same points nearly nine inches.

Nos. 66, 67. are two fine casts of the body from which the above skeleton was taken.

No. 68. Cast taken from a boy eighteen years of age, who had anchylosis of the spine after caries of the vertebræ; the pelvis and scapulæ are within an inch of each other.

No. 69. Many of the vertebræ destroyed by caries. The person from whom this was taken, died hectic after a very protracted illness. The heads and considerable portions of the bodies of the ribs are carious.

No. 70. Destruction of the bodies of several vertebræ by the pressure of a large aneurismal sac.

No. 71. This preparation is placed among those illustrative of aneurism.—The sac has destroyed the lateral parts of the bodies of four vertebræ.

These preparations afford data, upon which we can argue, in considering the peculiar symptoms that are occasionally presented in the early stages of aneurism of the aorta.

No. 72. The section of several vertebræ which are anchylosed; anchylosis of the vertebræ seems, to a certain degree, to be a natural consequence of old age, but a similar state of the spine is occasionally found in young persons, and is probably the sequel of that slight chronic inflammation of the spine which is the cause of many anomalous symptoms, and is often accompanied by a dull and weary pain. We can easily understand how patients in such a condition should be relieved by rest in a recumbent posture. See page 105.

No. 73. An anchylosis and curve similar to that depicted in fig. 5., in plate I., see p. 107.

No. 74. Very fine example of anchylosis in the spine of a horse. This is so frequently found in old horses, as to be con-

sidered almost natural to them. It is certainly very extraordinary, that we should so frequently find proofs of anchylosis in the examination of persons, who never complained of much pain in the back. This is an important question, and will be further discussed in the next volume.

No. 75. In this preparation, the odontoid process of the second vertebra has fallen forward, in consequence of the destruction of the transverse ligament by ulceration. The head fell forward, and the patient died instantaneously. This is an instance of the disease being confined principally to the ligaments. This forms an important fact in the enquiry into the diagnosis and treatment of the diseases of the spine.

The preparations in the next series are illustrative of the question of dislocation and fracture of the spine.

No. 76. Subluxation of the cervical vertebræ of a man who fell headlong from a

barge at low water, and stuck his head in the mud.

No. 77. A sort of subluxation, but accompanied with fracture of the body of one of the cervical vertebræ.

No. 78. The case connected with this preparation, is given at length in Mr. Bell's Surgical Observations. It is important in shewing the difference between a sprain or wrench of the joints of the spine, and the same injury of the joint of a limb; in such a case we have not only all the effects of a common sprain to contend with, but also the consequent injury of the spinal marrow. I have at present, a very interesting case of this kind under treatment.

No. 79. This preparation is particularly dwelt upon, in the discussion of the question, whether distortion is ever caused by dislocation. It is an example of complete displacement of the vertebræ, in consequence of fracture. See page 75.

No. 80. In the body, from which this skeleton was taken, there was such an appearance as might have been mistaken for dislocation of two of the vertebræ.

No. 81. is a cast of the back, previous to the dissection being made, which shews the apparent dislocation. These two preparations are referred to in the explanation of the first plate. See page 90.

No. 82. is a cast of the fore part of the chest of the same body, and is alluded to in the enquiry into the effects of distortion upon the lungs.

No. 83. A triangular portion of a fractured vertebra, sunk into the spinal marrow.

No. 84. The vertebræ very much crushed, particularly the bodies.

No. 85. The spine fractured; although the spinal marrow was not crushed, it became inflamed, and the patient died with

the symptoms generally attendant upon injury of the spinal marrow.

No. 86. Fracture of the vertebræ; it is particularly worthy of observation, that the fracture has taken place at a part which was anchylosed. This is a fact which should not be forgotten, when violent exercises are recommended as useful to the developement of the figure. See page 182.

No. 87. Union after fracture of the vertebræ; a considerable portion of callus has formed, and projects into the spinal canal.

No. 88. A pistol ball (received in a smuggling rencontre) has passed through the body of one of the dorsal vertebræ, and lies in the spinal canal.

The preparations of fracture of the spine, coincide very much with those preserved in other collections, and form additional proofs of the inefficacy of the operation, lately revived, of trephining the spine, even if all the symptoms consequent upon frac-

ture of the spine, depended upon mechanical pressure. Many interesting observations upon these cases may be found in the first volume of Mr. Bell's Surgical Observations.

The preparations in the next series are specimens of tumors of the spinal marrow. The catalogue of them is given, merely to show the anxiety there has been to collect every fact, in connection with the present enquiry.

No. 89. The whole of the spinal marrow, with the nerves arising from it, and passing out from the bones, are prepared. A tumor has formed in the substance of the spinal marrow, about the middle of the back.

No. 90. The tubercles in this specimen are very similar in appearance to the tumors which are occasionally found in the brain of those who have had epilepsy. The brain was in this instance of a natural appearance, and from the condition of the body, which was brought into the dissecting-room, there did not seem to have been any paralysis.

No. 91. Similar tubercles in the cervical part of the spinal marrow.

No. 92. An example of monstrosity; the spine is curved, and there is also spina bifida. This and other examples prove that distortion may take place in utero. A very curious instance occurred in a double-bodied calf which was brought to us last winter for examination; both spines were quite crooked.

No. 93. Sacrum of a child which had spina bifida. The spinous processes are deficient.

No. 94. This preparation is interesting in a physiological point of view, as there is not only a deficiency of the back part of the skull and spinous processes, but also of the spinal marrow.

THE END.

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