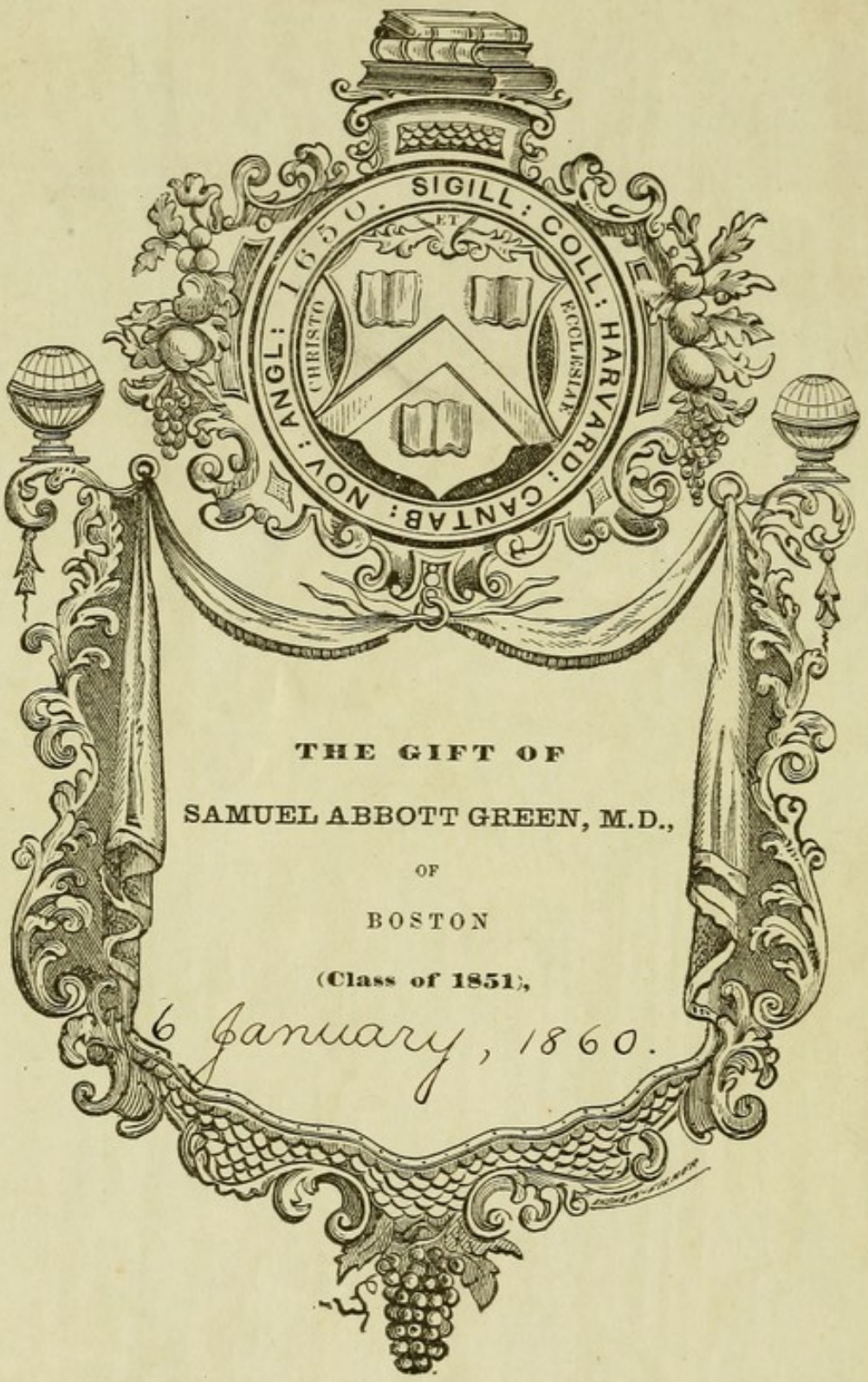
A probationary chirurgical essay on paralysis of the lower extremities from diseased spine : submitted, by the authority of the president and his council, to the examination of the Royal College of Surgeons of Edinburgh, when candidate for admission into their corporation, in conformity to their regulations respecting the admission of ordinary members / by John Abercrombie, M.D. ; November 12, 1804.

Bd. Jan. 1872.



THE GIFT OF

SAMUEL ABBOTT GREEN, M.D.,

OF

BOSTON

(Class of 1851),

6 January, 1860.

A. Ramsay Esqr.
With the best wishes of his
friend & Pupil the Author

ESSAY

ON

PARALYSIS

OF THE LOWER EXTREMITIES

FROM

DISEASED SPINE.

A

PROBATIONARY

CHIRURGICAL ESSAY

ON

PARALYSIS

OF THE LOWER EXTREMITIES

FROM

DISEASED SPINE;

SUBMITTED,

By the Authority of the PRESIDENT *and his* COUNCIL,

TO THE EXAMINATION OF THE

ROYAL COLLEGE OF SURGEONS OF EDINBURGH,

when candidate

FOR ADMISSION INTO THEIR CORPORATION,

IN CONFORMITY

TO THEIR REGULATIONS RESPECTING THE ADMISSION

OF

ORDINARY MEMBERS,

BY

JOHN ABERCROMBIE, M. D.

" ———————— *Ultimus arte medendi :*
" *Et, mea si nosces tempora, primus eram.*"
AUSONIUS.

NOVEMBER 12. 1804.

EDINBURGH:
PRINTED BY A. NEILL AND COMPANY.

1804.

" *Haud tamen arma meis malè congrua moribus ausim*
" *Imbelli tractare manu.*" VANIERIUS.

ESSAY, &c.

CHAP. I.

GENERAL REMARKS.

FROM the very intimate connexion which exists between the muscular system and the nervous, any compression of the latter which interrupts the proper discharge of its functions, produces in the former, to a greater or less degree, a loss of the power of voluntary motion, or paralysis.

Paralytic affections may be divided into two classes, which in their nature, progress and cause, are remarkably different.

These may be termed *GENERAL* and *TOPICAL*.

By *GENERAL PARALYSIS*, I mean that which proceeds from a compression of some part of the brain, the great centre of nervous influence. The part, thus paralysed, is often very small, and at a great distance from the head; perhaps a single finger, or a single joint of a finger. But however trifling at the time, the disease may appear, it carries in its nature this leading character, that it depends on a cause existing in the brain; and shews in the system a disposition to more extensive affections of the same nature, which may render the individual for ever a burden to himself, and useless to society.

In what I have termed *TOPICAL PARALYSIS*, the cause is confined to the nerve, or set of nerves leading to a particular part. This form of the disease may, in the part affected, be more extensive than the other; but differs from

from it materially in this, that it depends on an affection of these nerves alone, and may exist in one part without any disposition to spread to others.

Palsies of the *FORMER* kind generally come under the care of the physician; those of the *LATTER* frequently admit the assistance of surgery.

Topical Paralysis is met with under a variety of forms. One of the most remarkable is that which I have chosen as the subject of this Essay,—a paralysis of the lower extremities, depending on a disease of the spine.

If we take a short view of the structure of the spine, and the parts with which it is connected, we shall see how readily various affections of it may induce this disease.

The spine is a hollow column of bone, composed of twenty-four vertebræ, supporting the head

head and parietes of the thorax, and containing the spinal marrow, which extends into a corresponding cavity in the os sacrum which lies below. From the spinal marrow are sent out a number of nervous trunks, which pass through the interstices between the vertebræ, to supply the adjacent parts. Those from the cervical portion are sent chiefly to the superior extremities: Those from the dorsal portion supply the parietes of the trunk: and both send branches to various viscera. The lumbar nerves, besides giving branches to the abdominal viscera and adjacent parts, send out a number of branches, which, after various junctions among themselves, give rise to two new nervous trunks on each side, namely, the obturator and crural. These pass downwards, and are distributed on the thigh and leg. The former descends through the opening in the obturator ligament; the latter accompanies the femoral artery, through the passage under Poupart's ligament. From the sacral portions of the spinal marrow, are sent

out,

out, through the openings in the sacrum, five pairs of nerves; from the three uppermost of which is formed one new nervous trunk on each side, namely, the great sciatic nerve. It passes downwards, through the sciatic notch; and is distributed over the whole thigh, leg and foot.

Thus it appears, that the lower extremity is supplied with nerves from those trunks, which are sent out from the lumbar and sacral portions of the spinal marrow; and, from the manner in which this is connected with the spine, it will appear, how readily a morbid state of the latter may derange the nervous influence over the whole lower extremity.

The affections of the spine, which produce paralysis of the extremities, may be referred to two heads; those arising from *EXTERNAL VIOLENCE*, and those that take place *SPONTANEOUSLY*.

To

To the *FIRST* class belong fractures and dislocations of the vertebræ. The disease, of which we propose to treat, belongs to the *SECOND*.

Of this disease there are *TWO* forms, which, though similar in their nature, differ somewhat in their symptoms, and probably proceed from a different cause. From these circumstances, and the farther consideration, that the one is much better known than the other, it will probably contribute to distinctness, if we consider them separately. In the *ONE*, there is an evident disease of the spine; no disease of it is apparent in the *OTHER*. To treat of the latter, under what I have set down as the general title of this Essay, may appear a contradiction, or at least an inaccuracy. My reasons for doing so, will appear in the sequel.

CHAP.

CHAP. II.

OF THE PARALYSIS OF THE LOWER EXTREMITIES WITH EVIDENT DISEASE OF THE SPINE.

SECT. I. *Symptoms.*

THIS disease most commonly occurs in children, but adults are by no means exempt from it. As the symptoms of the complaint in the former, are somewhat different from those in the latter, it may be proper to describe them separately.

In children, the attack of the disease generally takes place, soon after they have begun to walk. The child is observed to be listless

less and inactive, not disposed to move about briskly as children usually do, and to be easily fatigued. Sometimes the first symptom observed is a disposition, as often as he can find an opportunity, to support himself on his elbows. Soon after these, an awkwardness is observed in his way of using his legs and feet. In walking, the knees totter: the legs, from an involuntary or spasmodic action of their muscles, frequently cross each other: and the toes are bent downwards. From such motions as these, the child is often observed to stumble, and fall when no obstacle is in his way, especially when he moves hastily. In standing, the knees, without any external cause, sometimes bend suddenly, so that the patient falls to the ground. If old enough to express his feelings, he complains of pains and startings of his thighs, especially during the night; and soon after this, he entirely loses the use of his limbs. If the spine be now examined, a curvature will be observed, formed by the projection of one or more

of

of the dorsal or lumbar vertebræ. Sometimes it is an extensive uniform curvature : at other times a small angulated protuberance. Sometimes, but not always, it is painful, when pressed. In its progress it is various : In one patient, it is not observed till the disease is considerably advanced ; in another, it is taken notice of before any disorder of the limbs has appeared. The disease, in its progress, is frequently attended with disorders of the stomach, cough, laborious respiration, and hectic fever ; but, in many cases, these symptoms are entirely wanting.

In the adult, the approach of the disease is marked by a sense of weakness, and a dull heavy pain in the back, and general lassitude. Sometimes the pain is more violent, and extends from the vertebræ downwards along the spines of the ilia, and upwards along some of the lower ribs. After these symptoms have continued for some time, the patient begins to take notice of an unusual coldness of his

thighs, with some degree of numbness and diminished sensibility, and stiffness and weakness of his knees and ankles. In walking, his legs sometimes cross each other involuntarily; and, by a spasmodic action, his toes are often bent downwards, so as to prevent him from setting his foot flat on the ground, and sometimes to endanger his falling. These symptoms are followed by pains and spasmodic twitches of his limbs, which are most troublesome during the night. Soon after, not only paralysis of both lower extremities supervenes, but generally also an incontinence of urine and feces; and, in many cases, the penis becomes incapable of erection. Sometimes, instead of incontinence of feces, there is an obstinate costiveness.

The spasmodic twitches are generally in the muscles of the thighs; but sometimes they extend upwards, and affect those of the abdomen, so that these are drawn violently inward with great pain, and formed into balls,

as

as they frequently are in colic. Attacks of this nature are attended by an involuntary discharge of urine; and they are frequently met with, even when the disease has made considerable progress. Generally, from an early period of the disease, the patient is affected with a sense of tightness about the stomach, dyspeptic symptoms, and sometimes a degree of dyspnœa; and these continue to harass him, during its whole progress. On examining the spine, a projection of one, two or three, either of the dorsal vertebræ, or of the lumbar, is observed, which sometimes forms an angulated tumor, and, in some cases, gives acute pain on pressure.

The disease generally takes place equally on both sides, but, in some cases, it is confined to one. The patient complains of pain of one side of the spine, often affecting the spine of the ilium, and the lower ribs of the same side; and soon after, his body is observed gradually to bend towards that side, while the corresponding

sponding extremity becomes paralysed. When this, however, happens, the other side is generally soon after affected in the same manner. Sometimes, when both extremities are affected, the loss of feeling is much greater in the one, than in the other.

Of the disease when advanced, and as it usually first becomes the object of practice, we observe two forms. In the one, the muscles, as in ordinary palsy, are soft, flaccid, and so motionless, that the patient is unable to turn himself in bed, or to make the smallest exertion. In the other, the muscles retain a considerable degree of firmness, and are frequently affected with spasmodic actions of a singular nature. When the leg is extended perfectly straight, the extensors become so spasmodically contracted, that it requires considerable external force to bend it. When it is bent, the flexors become contracted in the same manner: the leg is so violently bent backwards, and the heel drawn upwards to the

the buttocks, that considerable force is necessary to extend them. At the same time, the toes, by a similar spasmodic contraction, are bent downward; and the whole is attended with a considerable rigidity of all the joints. The affection of the toes frequently takes place by itself, attended with pain in the course of the muscles, and rendering it impossible for the patient to put his foot flat on the ground.

Such are the principal symptoms of the disease, as it appears in children and in adults. In its subsequent progress it is various. In many patients it continues, for a great length of time, with little or no variation: in others, the body, in a short time, grows lean; the strength is exhausted; and a hectic fever supervenes, which soon proves fatal. But the prognosis is not always so unfavourable; for, by a timely application of the remedies, to be afterwards mentioned, the disease has frequently been checked in its progress, and, by perseverance, completely cured.

SECT. II. *Causes.*

FROM all which we know of the disease, no doubt can remain, that the paralysis of the limbs is produced by a disease of the spine. This, as we learn from dissection, is a caries of the bodies of sometimes more, and sometimes fewer of the vertebræ. In some instances, the disease seems to begin with an inflammation of the bone itself. This is succeeded by a spongy enlargement, and thickening of the ligaments, which soon degenerate into caries. When the disease is fully formed, and has produced palsy, the bodies of the vertebræ, as we learn from dissection, are often very extensively eroded; the intervertebral cartilages disappear; and, in many instances,

ces, a sanious fluid is collected in the cavity of the spine.

In other cases, the disease seems to begin in the ligaments, and afterwards spread to the bone; and sometimes the erosion seems to have been produced by a collection of matter in contact with the vertebræ.

The vertebræ, from the loss of their substance which this caries produces, yield to the pressure from above; and, as their posterior parts are not decayed, the spine is necessarily curved gradually forwards. From these affections, the spinal marrow cannot but receive injury. The nature of the injury is a disputed point, as we shall have occasion to observe in another place; but, whatever it may be, there is no room to doubt, that it is the immediate cause of the paralysis of the extremities.

Of

Of the predisposing and exciting causes of the disorder, very little can be said. The children most liable to it, are those of a weak, rickety, or scrofulous habit. In adults, the particular predisposition has not been accurately determined. In some there seems to be an hereditary disposition to it, as all the members of their family have been seized with it, as soon as they attained a certain age.

It attacks children soon after they begin to walk, but may occur at any after period. Mr Pott never saw it after the age of forty; but since his time, it has been observed at a more advanced age.

The attack has sometimes been thought to proceed from external violence; but the exciting causes have not been accurately determined. A particular predisposition seems always to exist, and is perhaps connected with scrofula. The disease of the vertebræ,

in

in its nature and progress seems to bear a considerable resemblance to those scrofulous enlargements, that often attack the heads of bones.

SECT. III. *Ratio Symptomatum.*

THE spine being in the state above described, the spinal marrow will necessarily suffer. But in what manner it is affected, is, as I formerly mentioned, a disputed point. Most writers on the subject seem disposed to maintain, that the disease of the limbs is not the effect of compression of the spinal marrow, but a sort of irritation of it. This, at best, must be considered as a very vague kind of reasoning, and liable to numerous objections. We have frequent examples of acrid matter formed in the vicinity of nerves in other parts of the body, without inducing such symptoms as we have described; and it is contrary to analogy to suppose, that here

here acrid matter alone irritating the spinal marrow, should produce them in such violence. That such irritation of the spinal marrow, may induce some of the symptoms of the disease, I do by no means deny; and, perhaps, certain parts of it being more exposed to the irritation than others, may give rise to the pains and spasmodic twitches of particular muscles, which frequently take place in the course of the disease. But the leading symptoms seem to admit of explanation, on the simpler and more precise principle of compression. I have described the disease as existing under two forms: the one completely paralytic; the other attended with spasmodic affections of a singular nature. That compression may induce the first, will be readily allowed. How it may prove the cause of the second, is not so evident. Perhaps it may be explained on the following principles.

The first form of the disease, I conceive to be produced by complete compression; the

second

second by partial compression. The effect of partial compression is to weaken the nervous energy without extinguishing it; and, upon this principle, we may probably explain the singular set of symptoms I have described above.

When one set of muscles are paralytic, their antagonists are affected with spasmodic contraction. This takes place from the constant tendency to contract which all muscles possess, and which is called their *TONIC POWER*. It is exemplified in the twisting of the mouth, and in other symptoms, that appear in hemiplegia.

We know farther, that, when muscles are stretched beyond a certain degree, they become, for a time, as completely paralysed, as they do from compression of their nerves. Such a paralysis is exemplified in the ischuria, which is caused by over-distention of the bladder.

The muscles of the extremities, in their natural state, are not liable to be affected with this species of paralysis, because they do not admit of the degree of distention necessary to produce it. If they did admit of it, we can easily conceive, what would be its effect. If the limb were so bent as to over-distend the extensors, the flexors would become spasmodically contracted; and if it were so extended as to over-distend the flexors, the extensors would become affected in the same manner.

When the nervous energy of muscles is weakened, this species of paralysis will probably take place, from a smaller degree of distention, than what is necessary to induce it in their natural state; and, the more it is weakened, the smaller will be the degree of distention necessary. If the nervous energy of the muscles of the extremities be very much weakened, we can conceive, that they may become paralysed from the degree of distention,

tion, that takes place in the flexion and extension of the joints; and this is what probably occurs in the disease we are now considering.

From a partial compression of the spinal marrow, the nervous energy of the muscles of the extremities is greatly weakened. When, therefore, by the flexion of the knee-joint, the extensors are distended to a certain degree, they become paralysed: the flexors, from the degree of tonic power which they still possess, contract spasmodically, and the leg is bent backward. When the joint is extended, the flexors become paralysed in the same manner, their antagonists contract, and the leg is retained, with some force, in the state of extension. On this principle we may probably explain the other spasmodic actions, that appear in the course of the disease. Are the spasms of the legs, which sometimes take place from excessive fatigue, to be explained on a similar principle? In these cases, it will be observed, that there may be a certain degree

gree of muscular contraction, without inconvenience, but that a little more produces a spasm.

On these principles, I would attempt to explain, how a compression of the spinal marrow may induce the symptoms above enumerated. The compression seems to be produced, not by the curvature merely, but by a diminution of the cavity of the spine, from an enlargement of all the parts. Accordingly, we often find the curvature remaining, after the paralysis is completely cured. In such cases, the means of cure have induced in the bones a healthy action, by which the eroded parts have been supplied, and the enlargement of the other parts removed; but the spine, not being supported in its natural situation, while this process was going forward, the curvature has been thereby confirmed.

The disorders of the bladder, rectum, stomach and organs of respiration, probably depend

pend on the connexions, which, through nerves, namely, the dorsal, lumbar, and sacral, and some of the branches of the great sympathetic, exist between these parts and the spinal marrow.

When the disease is situated in the cervical part of the spine, both superior and inferior extremities are affected. This affection is readily explained on the same principles.

SECT. IV.

SECT. IV. *Prognosis.*

SINCE the method of cure recommended by Mr POTT has become general, the disease has been cured in a considerable proportion of cases. The prognosis, in particular instances, will depend on the progress which the disease has made, and on the strength of the predisposition. Our judgment, with a view to practice, must rest chiefly on the former, the latter being beyond our reach.

Sect. V. *Cure.*

THE intentions of cure are two.

I. To check the disease of the vertebræ, and induce the reproductive process.

II. To give support to the spine, while this process is going forward.

I. The most effectual remedy for answering the first intention, is to make issues on each side of the spine; a practice, which was first brought into public notice by Mr Pott, and has since been found to produce the most beneficial consequences. Mr Pott used the caustic issue; Mr Earle and Dr La-

THAM have recommended setons, as establishing a deeper and more effectual drain. They should be made on each side of the curvature, as near the spine as possible, and kept open by the usual means.

When a copious discharge from the issues is established, the patient generally soon begins to mend. If the paralysis has been complete, the first symptom of improvement is the occurrence of involuntary or spasmodic motions in the affected limbs. In some cases, voluntary motion soon follows; but, in others, a considerable time elapses, without any farther amendment. At length, however, voluntary motion begins to appear, and the cure proceeds. Along with these favourable symptoms, the extremities recover their natural warmth and sensibility; and, by degrees, all the morbid symptoms disappear.

The time necessary for a cure, is very different in different cases. Some of Mr POTT's

patients

patients were well in two or three months. In others, no appearance of amendment could be perceived for sixteen or seventeen months; but then they began to improve, and, in seven or eight months more, were completely cured. The time will depend greatly on the progress the disease has made. In some cases, the issues have been allowed to heal, when the symptoms had disappeared, and no bad effect followed; but, in others, when this was done, the disease soon returned, and required a re-establishment of the drain. It will, therefore, be proper to keep them open, for a considerable time after the symptoms have been removed, and, at last, to heal them very gradually.

Dissections of the bodies of those, who have died from other causes, soon after having been cured of this disease, have taught us in what manner the issues act in curing it. They seem to check the progress of the caries, and to remove the other morbid affections of the bone.

The

The reproductive process then commences; and, in a short time, the decayed portions of the vertebræ are supplied. The intervertebral cartilages, however, are not reproduced; so that the vertebræ, which have been affected, are found anchylosed.

When the disease is extensive, a degree of deformity generally remains after the cure. When it is confined to one vertebra, the curvature is often completely removed; and, even in more extensive cases, it may, by proper care, be greatly alleviated.

The remedy which we have been considering, is that which has hitherto been found most effectual in curing this complaint; but there is another, which deserves to be mentioned. It is a combination of hyoscyamus and sub-muriat of mercury, in doses of gr. ij. of the former, and gr. i. of the latter daily. The hyoscyamus in each dose should afterwards be increased to three or four grains. This remedy

stands

stands recommended on the very respectable authority of Dr RUTHERFORD. Farther experience must determine its efficacy.

II. The second intention is to support the spine, while the reproductive process is going forward. The object of this is, by keeping the parts as nearly as possible in their natural situation, to prevent subsequent deformity. Without such a precaution, the reproduction would but confirm the curvature.

For this purpose, some have recommended an horizontal posture. This, however, is liable to numerous objections. The end in view is more conveniently answered by a sort of stays, which were first invented in France, but are now made by Mr JONES in London. These are so made, that, resting upon the ilia, they support the trunk. Upwards, along the spine, goes a bar, to the upper part of which is fixed a collar, that supports the head. When properly fitted, they are worn without

inconvenience;

inconvenience ; and often, by a judicious application of them, very extensive curvatures have been completely removed.

After the removal of the paralysis, there commonly remains in the limbs a great degree of weakness. This, however, may often be removed by friction and tonics.

CHAP.

CHAP. III.

OF THE PARALYSIS WITHOUT EVIDENT DISEASE OF THE SPINE.

THIS form of the disease is often very obscure. Its general characters resemble those of the former; but its symptoms are not so marked, nor are they commonly so severe.

The disease comes on very gradually, with a degree of weakness, and want of command over the muscles of the lower extremities. The patient walks, like a person somewhat intoxicated. He complains of occasional coldness of his legs, stiffness of his knees and ankles; and is frequently troubled with pains of his feet, and with a sense of tension in the tendons

tendons of his toes. These pains come on in irregular fits, most commonly in the night; and, in some cases, the patient observes, that they are more severe when he lies on the one side, and easier when he turns to the other. They are often brought on by fatigue, cold and wet. While these pains are present, the feet are tender to the touch; but, what is singular, a slight impression produces pain, while a stronger one is borne without inconvenience. Sometimes the legs and thighs are affected with spasmodic twitches. In many cases, the bladder and rectum are not in the least affected.

The unsteadiness in walking is most remarkable, after the patient first gets up to walk. After walking some time, he seems to improve considerably, and the stiffness diminishes in the same proportion.

The disease is often attended with some degree of stricture about the stomach; but,

besides this, the general health is little affected.

The patient commonly makes no complaint of his back; and, on examination, no appearance of disease can be detected there. Sometimes, indeed, when the spine is pressed with one finger moved along it, pain is felt at a particular spot; but, in many cases, not the smallest symptom of this kind can be discovered.

In the state, which I have now described, the disease often continues for several years, without amendment or aggravation; unless that the general health suffers a little from the confinement, which is produced by the difficulty of walking. It is frequently mistaken for chorea, sometimes for rheumatism, and sometimes for a modification of gout; but the remedies, which are proper for these disorders, are applied without the smallest benefit. By

stimulants,

stimulants, as electricity, all the symptoms are aggravated.

The disease seems to be most common in adults. Its exciting causes are unknown ; and its nature is involved in considerable obscurity. From its similarity to the disease which was the subject of this Essay, I have described it as a modification of it ; but, whether it be so or not, may to many appear doubtful. If it proceed from an affection of the parts, which are connected with the spinal marrow, it is evidently an affection in its nature different, from that which produced the former; but, what may be its nature, is not so easy to determine. Some have supposed a thickening of the ligaments ; but this supposition can be considered as nothing better than conjecture.

Various remedies have been recommended, such as a course of mercury, tepid sea-bathing, friction, &c. ; but all, I believe, with little benefit. Issues may be tried, since they

produce

produce good effects in the disease, to which it seems most nearly allied. It may, indeed, be somewhat difficult to determine, where they should be made. When there is no symptom which can direct us, our only resource is to make them successively in different places, and to persevere in keeping them open in that place, where, by trial, we have found them to be most efficacious.

FINIS.