which I would greatly like to see accomplished. I have been working at the matter for nearly two years, but hitherto, I am sorry to say, without any great success. One would expect that lupus might be readily amenable to some form of electrolytic treatment, but the tubercle bacillus contains from 40 to 50 per cent. of fat, and is probably rendered a non-conductor of electricity thereby; possibly the want of success in my attempts on lupus may be due to this fact. Still, by using such compounds as aniline and its derivatives, it may be hoped that better

results may be achieved, and I have already succeeded in arresting the disease in a few slight instances by introducing aniline ions from a solution of the hydrochlorate, though I have failed in many others. Nevertheless, I still consider that the electrolytic method of treating lupus is one which deserves careful study from any one who is willing to devote much time and patience to the task.

REFERENCES.

- ¹ *Archives d'Electricité Médicale*, 1903, p. 734. ² *Medical Electricity and Radiology*, August, 1906. ³ *Ibid.*

A Clinical Lecture

ON

A CASE OF SECONDARY SUTURE OF THE GREAT SCIATIC NERVE.

DELIVERED AT THE LONDON HOSPITAL.

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EXAMPLES of complete division of the great sciatic nerve verified by operation are rare. Excluding the case I am bringing before you this afternoon, I have had the opportunity of examining 11 patients in whom the nerve was injured, but in only one of these was the nerve lesion demonstrated by operation. This patient suffered division of his great sciatic nerve in a stab wound of the middle third of the thigh, but he did not come under my observation early enough to be of use in determining with the necessary exactitude the loss of sensibility which results from this lesion. When I first saw him sensibility to prick had obviously begun to be restored, but the loss of sensibility to light touch was as extensive and as well defined as in the patient I am showing you.

Many cases of injury to the great sciatic nerve have been recorded from time to time, but only one with any degree of accuracy—that worked out by Professor C. S. Sherrington.¹ The present case is therefore of considerable interest; it is the first in which it has been possible to map out the area supplied by the great sciatic nerve exclusively with the three forms of sensibility described

by Dr. Head and myself.² The small sciatic was also severed; this is the only instance of division of this nerve, verified by operation, that I have been able to find. The history is as follows:

On October 4th, 1901, while on water picket at Witklip, the patient was ambushed, and shot from 20 yards. The bullet passed through the back of the saddle, and entered just above the fold of the nates. He experienced great pain down the back of the leg into the foot, but rode for 20 yards, when his horse stumbled and he fell off, his right foot being useless. He lay where he fell for half an hour, then the wound was dressed, and he was taken to Leidenberg Hospital.

I saw him first with Dr. Head at the Royal Victoria Hospital, Netley, on August 2nd, 1902. The wound of entry was situated 1 in. to the right of the spine of the third piece of the sacrum, it was depressed, adherent

to bone, and healed with the exception of a small sinus at its centre. One and a half inches in front of the great trochanter was a healed surgical wound, through which the bullet had been extracted. Midway between these two wounds was an incision discharging pus, made for the purpose of evacuating an abscess. Into the physical signs that were present at that time I do not propose to enter, but will only say that so far as the loss of sensibility and the motor paralysis was concerned

[Figs. 1, 2, 3, 4, and 5 show the loss of sensibility produced by division of the great sciatic nerve. Within the area bounded by the thick line all forms of sensibility were absent. Within the area between the thick line and the crosses deep touch was appreciated and localized, but there was loss of protopathic and epicritic sensibility. Within the area bounded by the crosses and the thin line, epicritic sensibility only was absent.]

Fig. 1.

Fig. 2.

they corresponded to those present when he came under my care in April, 1906, three years and nine months later.

He left Netley in November, 1902, and went to work in September of the next year as plate cleaner in an hotel. He managed to perform his duties satisfactorily until six months before I saw him, when "sores" broke out on the heel and great toe. For these he put himself under my care. All wounds had healed before he left Netley. The muscles of the right leg, thigh, and buttock were wasted,

and the foot dropped. On the heel was a sinus surrounded by thickened epithelium, passing down to bare bone. This had evidently started as suppuration beneath a corn, and resulted in the formation of a so-called perforating ulcer. On the inner side of the dorsum of the great toe was a shallow, unhealthy ulcer about an inch in diameter. He was able to flex his leg on the thigh, and a band of muscle was seen to stand out prominently on the inner side. This led some of those who saw him to conclude that the nerve was not completely divided, as he could extend his thigh and flex his leg by a muscle in the position of the inner group of hamstrings. But a little reflection, and tracing the muscle to its origin and insertion, showed that it was the gracilis, hypertrophied from the extra work that it had been performing. All movements of the foot were lost. The muscles supplied by the great

sciatic nerve did not react to the interrupted current, but reacted in a sluggish manner to the constant current, A.C.C. being greater than K.C.C. (reaction of degeneration).

Sensibility was lost over the area shown in Figs. 1, 2, 3, 4, 5, 6. The thick line bounds the area insensitive to all stimuli—deep touch, light touch, prick, all degrees of temperature; the area between the thick line and the crosses was sensitive to deep touch only, that between the crosses and the thin line, sensitive to prick, to temperatures above 45° and below 20° C., but insensitive to light touch and to the intermediate degrees of temperature. You will see from this how easy it may be to overlook the fact of division of the nerve if the patient is sharp and the testing hurriedly carried out, as the patient can feel "touches" over the whole of the area supplied by the nerve except a portion of the foot. I want you to notice the way in which the internal saphenous supplies the inner side of the leg and the inner part of the sole of the foot. The sensitive area left is the full supply of the internal saphenous (vide Figs. 4 and 5).

To sum up, over both the great and small sciatic areas, the area insensitive to prick was almost as extensive as the loss of sensibility to light touch, but over the small sciatic area there was no loss of sensibility to deep touch; over the great the loss of sensibility to deep touch, though present, was relatively small in extent.

When you remember the large area to which filaments of the small sciatic nerve may be traced in the dissecting room, it may come as a surprise to you to find that the area of loss of sensibility is so small in extent. But you must bear in mind that section of a nerve only reveals the "exclusive" supply of that nerve, the area to which it

alone sends fibres; to obtain an area corresponding in extent to that found in dissection the surrounding nerves must be divided, leaving the small sciatic intact.

It was evident in this case that both great and small sciatic nerves were completely divided at the lower part of the sciatic plexus, and that other branches of the plexus, namely, those supplying the glutei, had also been interfered with, either in the original wound, or later, as the result of the operations necessary for the removal of the bullet and sequestra.

The question of treatment had next to be considered. Four years had elapsed since the injury, and although

it is probable that up to three years from the time of injury the period after division plays little part in prognosis, after this date no perfectly satisfactory example of recovery after suture has been recorded. Again, af-

fecting the prognosis to a marked degree was the fact that suppuration had been long and severe in the original wound; this was against complete recovery. But the patient was not exacting; he said he would be content if he could be put in a condition in which he would have no

more pressure ulcers. I felt that I was justified in giving a good prognosis from this standpoint, for Dr. Head and I have shown that the tendency to the formation of these ulcers ceases with the restoration of sensibility to prick; also that the nerve fibres subserving this form of sensibility regenerate under conditions unfavourable to the restoration of sensibility to light touch and motor power. I therefore undertook the operation, and events seem to have justified my decision.

On April 12th I explored the condition through a long incision, and found that the great sciatic nerve had been divided at its point of origin from the plexus, and that the third sacral nerve had been destroyed in the wound of the sacrum. The distal ends of both great and small sciatic nerves were bulbous, and adherent to the pyriformis muscle. Passing upwards

was a dense mass of fibrous tissue into which, after a tiresome dissection, I was able to trace the lumbo-sacral cord and second sacral nerves. I cut with a sharp scalpel above the mass of fibrous tissue and below the bulbs, the amount removed measuring an inch and a half. I sutured the distal end of the great sciatic to the central end of the lumbo-sacral cord and second sacral nerve, enclosing the junction in a decalcified bone tube. The peripheral end of the small sciatic I sutured into a small transverse cut in the great sciatic below the point of union to the lumbo-sacral cord and second sacral

Fig. 3.

Fig. 4.

nerves. The wound was closed except for a small drainage opening, and healed by first intention.

I tested sensibility daily for the first week; no change took place, it remained exactly in the condition it had been before operation. In none of the 16 cases of secondary suture that I have watched was the early return of sensibility mentioned by some authorities observed.

On May 22nd, six weeks after operation, a prick was appreciated over nearly the whole of the small sciatic area, and a week later was restored over the whole of this area. On this date the loss of sensibility to prick had begun to diminish in extent on the leg; this is the usual time for the commencement of restoration of sensibility to prick, about six weeks from suture. It is interesting to note that recovery began practically at the same time in both the great and small sciatic areas, although the length of nerve from suture to distribution is much greater in the latter; it is also the same time as is necessary for the commencement of sensory recovery after suture of the median nerve at the wrist, and for the first sign of restoration of sensibility to prick after grafting the whole thickness of the skin. We see, therefore, that the commencement of recovery to prick occurs at about the same time whatever distance from the periphery the nerve is divided.

Whilst he was kept at rest the "perforating ulcers" healed in the usual way, and I have no doubt that protopathic recovery will eventually become complete, and prevent further troubles of this kind, but I doubt if recovery will advance beyond this, the first stage.

There are several points raised by this case to which I wish to direct your attention. First with regard to sensation. It is a striking fact that the loss of sensibility remained absolutely unchanged for nearly four years. It is a good example of what has been pointed out by Dr. Head and myself, that restoration of sensibility does not take place apart from regeneration and union with the central

nervous system; there is no gradual encroachment on the anaesthetic area by the surrounding sound nerves; in other words, the doctrine of "substitution" is fallacious. You could have no better instance than this; look at the small sciatic area, surrounded by skin well supplied with normal sensibility yet remaining absolutely unchanged.

The rule is plain: whenever improvement in sensibility takes place after division of a whole nerve, it is due to regeneration and re-establishment of communication with the central nervous system. But you must bear in mind that this applies only to division of a whole nerve, and not to one of its branches; for example, the palmar branch of the ulnar, here the loss of sensibility to prick may vary from day to day.

I would again remind you of the nature of the loss of sensibility which takes place after division of a peripheral nerve. It is tested and described under three headings: deep sensibility, protopathic sensibility, and epicritic sensibility.

Deep sensibility is tested by pressing with a blunt object, it can only be investigated over areas insensitive to prick.

Protopathic, that is, sensibility to prick, to ice and water above about 50° C.

Epicritic, that is, sensibility to light touches with cotton-wool and temperatures between about 20° C. and 40° C.

With regard to the method of testing, the patient must not be able to see the part under observation, and should not be asked, "Can you feel this or that?" but told to speak when he feels anything, and say what he thinks it is.

After division of many nerves sensibility to deep touch is unaffected; for instance, after section of the median nerve at the wrist, the patient may be able to appreciate and localize with accuracy touches with the point of a pencil or the finger,

so that if testing is carried out hurriedly the fact of the nerve section is often overlooked. Next, as to loss of protopathic sensibility. For clinical work, testing the appreciation of a pin point is sufficient in most cases, but

care must be taken that the patient understands that he has only to speak when he feels a prick, not when he feels a touch. If, from the high power of appreciating stimuli which appeal to deep sensibility, doubt exists, the temperature test is useful; for example, if the patient apparently appreciates the point of a pin over a large area, and yet cannot discriminate between ice and water at 50° C., deep touch is being tested. With regard to epicritic sensibility, for ordinary work a piece of cotton-wool is sufficient as a test, but when doubt exists, owing to roughness of the skin or other causes, the minor degrees of temperature are useful as a control test. If the patient is able to

Fig. 5.

Fig. 6.—Showing loss of sensibility produced by section of the small sciatic nerve. Over the whole of this area deep touch was appreciated and localized. The crosses mark the area within which protopathic and epicritic sensibility was absent; the line, the area of loss of epicritic sensibility.

not discriminate between ice and water at 50° C., deep touch is being tested. With regard to epicritic sensibility, for ordinary work a piece of cotton-wool is sufficient as a test, but when doubt exists, owing to roughness of the skin or other causes, the minor degrees of temperature are useful as a control test. If the patient is able to

discriminate between water at 25° and 35° C., epicritic sensibility is certainly present.

The last form of sensibility to be restored is that of exact localization, tested by the ability of the patient to appreciate as two the points of a pair of compasses when separated to the normal distance for that part of the body. This power may be regained after primary, but is rarely, if ever, restored after secondary suture.

To sum up, after division of a peripheral nerve there is a large area of loss of light touch, a smaller loss of sensibility to prick, and a still smaller loss of sensibility to deep touch.

Turning now to the motor side, there is one lesson to be learned, and unless it is applied many cases of nerve injury will be missed, and mistakes made in interpreting results. In examining into the functions of the muscles you must remember to investigate the action of individual muscles, not certain movements you believe these muscles produce. For example, in this case the patient has learned to flex his knee by his gracilis alone.

I would draw your attention briefly to other examples of this supplementary motility. After division of the median nerve at the wrist, the abductor and opponens pollicis muscles, together with the outer two lumbricales, are paralysed, but this paralysis is frequently overlooked. The abductor pollicis draws the thumb away from the index finger in a plane at right angles to that of the palm; this is the movement that is lost. The patient can perform what is usually considered to be abduction by means of the extensor ossis metacarpi pollicis. Opposition may be so well performed that it is impossible by inspection only to tell if the opponens pollicis is contracting, palpation over its insertion into the first metacarpal bone is necessary.

When we consider the number and importance of the intrinsic muscles of the hand supplied by the ulnar nerve, it would seem impossible to overlook their paralysis, yet this occurs not infrequently. Adduction of the thumb is often misunderstood; it is the opposite of abduction, and is movement of the thumb toward the index finger in a plane at right angles to that of the palm; this is the movement which cannot be performed if the adductors of the thumb are paralysed. But the long flexor or long extensor muscle is able to produce a good imitation, in the former case flexion of the terminal phalanx and inward rotation of the thumb always occurs, in the latter extension and outward rotation. Abduction of the little and index fingers can be produced to a certain extent by the extensor muscles, and this is commonly mistaken for interosseous action. But care in observation at once shows the nature of the movement.

After section of the anterior primary division of the fifth cervical nerve, Erb-Duchenne paralysis results, that is, the deltoid, the biceps, brachialis anticus and supinators, usually the spinati, sometimes the radial extensors of the wrist, and rarely the pronator radii teres. Mistakes occur, for the patient soon learns to flex the forearm, usually by means of the muscles arising from the external condyle of the humerus, and I have known patients say that they were recovering because of this.

Again, after division of the musculo-cutaneous or outer cord of the plexus, I have known mistakes to arise from failing to remember the action of the supinator longus, which is an efficient flexor of the elbow in these cases. Again, paralysis of the deltoid may be concealed by the vicarious action of the upper fibres of the pectoralis major, the supraspinatus, serratus magnus and trapezius. These movements have to be taken into consideration not only in diagnosis but in considering treatment.

I have brought this case before you this afternoon really to illustrate these points. I want you to remember the care that is necessary in testing sensibility, and the three groups into which the different forms are placed, and what is more important, the widespread overlap of the fibres subserving deep sensibility. Lastly, that the action of individual muscles must be investigated; for example, we must not conclude that because opposition of the thumb is present, the opponens pollicis muscle cannot be paralysed.

NOTE.—Since the lecture was given, steady improvement has taken place. At the present time—nearly six months after the operation—deep touch is appreciated and well localized over the whole of the affected area, sensibility to prick has been restored to the leg, but the foot still

remains insensitive to this stimulus. The area of loss of sensibility to light touch remains as extensive and well defined as before the operation.

REFERENCES.

¹ *Philosophical Trans. Royal Soc.*, B. cxc. p. 202. ² *Bratn.* 1905, Part ex; Erasmus Wilson Lectures, *Lancet*, March 17th, 24th, and 31st, 1906.

A CASE OF IDIOPATHIC DILATATION OF THE RECTUM AND OF THE COLON AS FAR AS THE HEPATIC FLEXURE.*

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At a meeting of the Clinical Society of London held on April 23rd, 1905, we exhibited the patient, who presented the above lesions, as a "clinical case." The boy, who was under our care at the East London Hospital for Children, has since died, and we now give a fuller account of the case, which showed some anatomical features not usually met with in this condition.

P. V., aged 12 years, was admitted on November 15th, 1904.

History.

The mother stated that the boy had always had a "large belly" and been rather constipated, but not markedly so until within the last fortnight; otherwise he had been a healthy lad though not robust. A fortnight before admission she noticed a great increase in the size of the belly, constipation became more marked, and the boy complained of some pain on defaecation; there was no vomiting, nor was there any passage of blood per rectum. This condition with some wasting persisted until admission.

Condition on Admission.

He appeared to be a nervous lad, very sallow, and with a very distended belly. The heart and lungs, pulse and temperature were normal; the abdomen was tense, with a regular rounded outline and no widening of the costal angle; the surface veins were rather full; the percussion note was resonant all over, and in the knee-elbow position a thrill was obtained over a small area round the navel. On palpation irregular masses were felt in the region of the transverse colon. After examination peristalsis was very obvious. On rectal examination, the tone of the sphincter was normal but the rectum was very dilated. The belly measured in circumference at the navel 29 in., from navel to pubes was 5½ in., and from navel to ensiform 7½ in. His weight was 3 st. 4 lb. 14 oz.

On November 25th it was noted that there was a slight increase in girth, and the bowels were obstinately constipated; there was no response to aperient medicines, and only poor results from enemata. The weight had increased 1 lb. At no period was there tetany.

Operation.

On November 29th Mr. Robinson made a mid-line incision below the umbilicus, and on opening the peritoneal cavity about 2 oz. of clear fluid escaped. A large, tense, bluish-coloured tumour presented, with very large distended veins coursing over it, and with a lace-like pattern on its surface, due to the hypertrophied and separated muscular bundles. The bladder was attached to the lower part in front. The swelling was proved to be free at the sides and in front, and to extend upwards in the mid line to the ensiform cartilage. To explore this further the incision had to be extended considerably upwards, and the tumour was brought out of the belly. The following was found to be the condition of things: The mid-line swelling started from the pelvic floor and expanded immediately like the body of a flask; above the navel it began to narrow into the neck of the flask, but yet its circumference was as large as a man's arm. Just below the ensiform cartilage there was a somewhat acute bend to the left, and the gut, with almost the same calibre, went straight down into the left iliac fossa, formed a loop, and became continuous with the descending colon. Further exploration showed that the dilatation continued along the descending and transverse colon, with very little diminution in size until the hepatic flexure was reached. The ascending colon was only slightly enlarged, and filled with some hard faecal lumps, and the caecum and appendix were normal. The colon beyond the hepatic flexure contained many pounds of soft, dark, faecal material, which was squeezed out per anum by gradual pressure on the gut from within, with

* A paper read before the Clinical Society of London, February 8th, 1907.