ferring those sensations to their exact position on the surface of the body be lost, it is obvious that an incorrect conclusion will be drawn as to the size of the object handled. In the patients before you these two forms of sensation are defective, in the male the spacing sense is lost in the left hand; in the female it is lost in the left foot. (3) The next important sense is the muscular sense and the sense of posture of the extremities in space. A patient may have absolutely no tactile anaesthesia, and yet be quite unable to accurately describe the position of the fingers or toes, the hands or the feet in relation to one another or to space. If this sense be lost it is clear that the patient will be unable to state whether an object handled is 2 or 3 in. thick or only the thickness of paper. He will be unable to tell whether the object is round or square. This sense is lost in both of these patients. Involved in the true recognition of posture of the extremities is the sense of muscle tension or tone, and hence with the loss of sense of muscle tension there is loss of recognition of the different weights of objects handled. (4) Pressure sense. Apart, however, from the differentiation of the weights of objects placed in the hand, there may be a loss of sense of pressure upon the extremities. This implies an anaesthesia of the deeper structures such as occurs in hysterical anaesthesia, where the anaesthesia appears to extend to all the structures of the limb. If this be so, astereognosis must be present. Note that this sense of pressure is much more important for the stereognostic sense than the retention of tactile sensation. The latter may be quite absent, but if the pressure sense be retained there will not necessarily be any astereognosis. This sense is also necessary to enable one to recognize the consistence of an object. (5) Temperature sense. The retention of the power of differentiating between heat and cold is necessary to enable one to recognize a metal object, such as a coin as distinct from a piece of wood or cardboard. And (6) the pain sense will be necessary to enable one to differentiate between a sharp edge or a blunt one, between a prickly object and a smooth one.

The loss of one or more of these different "senses" may determine an error of judgement or an entire loss of this faculty. To arrive at an accurate judgement, or in other words for the complete normality of the stereognostic sense, it is clear that the cerebral cortical centre or centres, the conducting paths, and the peripheral receptive sensory mechanisms must be intact. Disturbance of either of these parts of the nervous system may lead to the manifestation of "astereognosis." By clinical investigation it has been proved pretty conclusively that astereognosis may be present in a complete form in disease of the superior parietal lobe of the brain, so that we may reasonably assume that this part of the cerebral cortex is concerned in the co-ordination or elaboration of the special sensations received from the periphery. Cases recorded by Williamson, Dercum and Teller, C. K. Mills, and others support this localization. Further, reasoning *a priori*, we should expect that if the paths of conduction of sensory impressions in the spinal cord be impaired by compression, or disease within the cord itself, some dissociation of sensations would result, and probably astereognosis be manifested. This we know now to be a fact as this symptom has been observed in some cases of compression of the spinal cord by a tumour. Further, it is obvious that if the peripheral receptive mechanisms or the peripheral nerves be diseased, astereognosis may be developed.

How are we to explain the loss of the stereognostic sense in these cases of tabes. It is obvious that there is a dissociation of these special "senses," and since I have shown that there is not the smallest evidence of any cerebral cortical disease in either of these patients such as would lead to the defective co-ordination of sensory impressions received from the periphery, we must conclude that the dissociation takes place either in the spinal cord from defective conduction, or in the peripheral sensory receptive mnchanism. In tabes we know that the poison exerts its influence *par excellence* on the afferent sensory neuron, and specially on the muscle sensory nerves, since we sometimes find in early cases of this disease loss of sense of posture and pressure, and loss of muscle sense, when no tactile anaesthesia or analgesia can be detected. Later on we find evidence of involvement of the cutaneous nerves, the distribution of the anaesthesia corresponding to the sensory root areas as mapped out by Head. Starr, Thorburn, and others. Hence we conclude that when astereognosis occurs in tabes, it is a manifestation of dissociation of these special sensory perceptions, which in a normal person are all co-ordinated in the higher sensory centres in the brain. The fact that it does not occur in every case of tabes is but another proof of the, comparatively speaking, random action of the toxin, which, while it affects the afferent sensory neuron as a whole, in different cases appears to affect more particularly different peripheral sensory structures or afferent nerve fibres.

SUTURE OF THE BRACHIAL PLEXUS IN BIRTH PARALYSIS OF THE UPPER EXTREMITY.

By ROBERT KENNEDY, M.A., M.D., D.Sc.,
Senior Assistant to the Regius Professor of Surgery in the University of Glasgow; Assistant Surgeon to the Western Infirmary, Glasgow; Examiner in Surgery in the University of St. Andrews.

In the third edition of his work, entitled *De l'Electrisation Localisée*, published in 1872, Duchenne described under the heading, "Paralysies obstétricales infantiles du membre supérieur, sans complications," four cases of infants who at birth presented paralysis of certain muscles of the arm and shoulder. The muscles affected in these cases were identical, consisting of the deltoid, the infraspinatus, the biceps, and the brachialis anticus. He states that in all but one of the cases the electrical reactions in these muscles were abolished, and that cutaneous sensation was normal. In consequence of this paralysis, the arm showed the same defects in function in each of the infants. Thus the arm hung powerless by the side and could not be abducted, the forearm was extended and could not be flexed, and the hand was pronated, in consequence, Duchenne states, of the inward rotation of the humerus. The muscles affected did not therefore belong to the distribution of any single nerve trunk of the arm, and also the entire distribution of no single nerve trunk of the arm was involved. Duchenne concluded that the lesion was rupture or compression of nerve fibres in the brachial plexus, before they entered the nerve trunks of the arm. The exact nature of the lesion he left to others to investigate, but concluded that, whatever it was, it was brought about in an identical way by force applied during the birth of the child.

In 1874 Erb described a form of paralysis in adults which presented almost exactly the same characters as that described by Duchenne. His investigations enabled him to indicate the exact spot at which the nerve lesion would most probably be found, as he discovered a point on the skin of the supraclavicular region, about two fingerbreadths above the clavicle and about one fingerbreadth outside the sternomastoid, on stimulating which by the electrode contractions were evoked of all the muscles which were found to be affected in the form of paralysis under consideration. This point corresponded to the position of the anterior primary divisions of the fifth and sixth cervical nerves, where they unite to contribute to the brachial plexus. In Erb's cases the muscles affected were the deltoid, biceps, brachialis anticus, supinator longus, and sometimes the brevis.

Much has since been written on the subject of birth paralysis and of the identical form of paralysis originating in adult life, so that it is now a well-recognized form. Research has also shown that the motor nerve fibres which run in the anterior divisions of the fifth and sixth cervical nerves at their point of junction are those which supply just the muscles which are found to be affected.

In some way, therefore, during the birth of the child, tension or compression of the upper part of the brachial plexus has been caused, with the result that the nerve fibres of the fifth and sixth nerves have had their conductivity destroyed. Some maintain that the lesion is caused by a compression of the nerves between the clavicle and the transverse processes of the vertebrae, while others think that the damage is caused by the nerves being crushed between the clavicle and the first rib. As a rule, there is the history of considerable force having been applied during the birth of the child. In some of the cases the presentation has been cranial, and after the birth of the head the finger of the accoucheur has been hooked into the axilla, and considerable traction exerted. In other cases the presentation has been of the breech, or transverse in which version has been performed, and the arm has slipped up over the head and required considerable force to dislodge it, or the body has been at the same time pulled on, in order to hasten delivery in such a way that the head has been extremely rotated and bent to the side. The nerves are in this way over-stretched, causing rupture of the nerve fibres, or even complete rupture of the nerve trunks themselves. Whatever may be the presentation of the child at birth, the chief factor in producing the lesion is, I believe, forcible de-

pression of the shoulder, while the head is bent to the opposite side and rotated.

When the child is born the effects of the injury are at once evident, as the arm does not take part in the usual active movements of the child, but remains hanging by the side. On examination it is found that the attitude of the arm is very characteristic. It cannot be abducted at the shoulder on account of the paralysis of the deltoid and supraspinatus; the forearm cannot be flexed on account of the paralysis of the biceps, brachialis anticus, and supinator longus. The forearm is usually in extreme pronation on account of the usually present paralysis of the supinator brevis, and the entire arm is rotated inwards, so that the palm of the hand may be directed outwards, this being caused by the paralysis of the external rotators of the humerus (infraspinatus and teres minor), the unopposed action of the internal rotators thus bringing about the characteristic position. In rarer cases other muscles are affected, but in the great majority of cases the paralysis is limited to the muscles which have been mentioned. In young infants it is very difficult to test the condition of the cutaneous sensibility, and I have not been able to determine the absence of sensation in any of the cases which I have seen, although I believe that there must be disturbances of sensation in certain areas, judging from the analogy with cases of Erb's paralysis originating in adults. This, then, is the clinical picture which cases of birth paralysis present, the atrophy which ensues in the affected muscles being added after the lapse of some time.

The usual treatment adopted in such cases is the routine one of massage, application of electrical currents, and employment of passive movements, and in certain cases the muscles recover. There is doubt, however, whether the recovery of the muscles is due to the treatment, but there is no doubt that the treatment often fails, as partial restoration may be all that is obtained, or there may be no improvement at all. There is also no doubt that certain cases recover without treatment. The results, therefore, in cases of birth paralysis are just what might be expected from the analogy with cases of nerve injuries in general, and from a study of many of these cases I have formed the opinion that the employment of electrical treatment is of little use in achieving recovery of the muscles. When the recovery of the muscles takes place under electrical treatment in my opinion that recovery, although perhaps somewhat hastened by the treatment, would ultimately have occurred without the use of electricity. I therefore employ electrical currents merely for diagnostic purposes and to ascertain the progress of a case.

The prognosis in cases of birth paralysis is as follows: Some cases recover rapidly, others make partial recoveries after the lapse of a year or more, while many cases practically never show improvement. This is what might be expected in consideration of the nature of the lesion. Supposing that the nerves are merely overstretched, possibly with rupture of the nerve fibres within the sheath, the recovery is almost certain. If the nerve trunks are completely torn across, complete recovery is possible, but the recovery may also fail completely or take place only partially. Recovery may even then be complete if there is nothing to hinder the reunion of the nerves, but if there is cicatrization in the neighbourhood as the result of the injury this will cause a partial or complete failure of the reunion. That there may be injury of neighbouring structures also is to be expected, seeing that force sufficient to rupture the nerves has been exerted. That this damage to surroundings is often very great one of my cases showed, as there was at the same time torticollis present due to the rupture of the sterno-mastoid.

From these considerations I hold that the only rational way to treat cases of birth paralysis is to deal with them just as injuries to the peripheral nerves in general are treated. The lesion to the nerve in birth paralysis is, of course, unaccompanied by a cutaneous wound, and in consequence the condition of the nerves cannot be examined before operation. As there is therefore the possibility that the lesion is a slight one which may be spontaneously recovered from, it is right to delay operation until the lapse of a certain time to see if the developing electrical reactions will indicate an approaching recovery of the muscles. When this period of time has elapsed without sign of improvement there must be no further delay and the seat of injury must then be exposed and the nerve lesion dealt with on general principles. During the first few weeks of the child's life, the electrical reactions are, of course, unsatisfactory, but by two months, before which age I do not think the operation should be undertaken, it is possible to obtain good contractions of the muscles by the faradic current. If these are obtained, then the case ought to be left for a further period, and if after the lapse of another month good contractions are obtained with the faradic current in all the affected muscles, then the case may be expected to recover naturally. In one of the cases which came under my observation that is what happened. If, however, after two months no responses can be got in the muscles with the faradic current, although, of course, the galvanic current evokes good contractions, it is safer to proceed with the operation than to put off further time in the hope that recovery will eventually be the result.

Few secondary operations on the brachial plexus have been published. Thorburn[1] described the case of a girl, aged 16, who presented brachial plexus paralysis due to an accident. The nerve trunks of the plexus were torn, and the ends were involved in a cicatrix, which, seven and a-half months after the accident, he excised, and then united the nerves by suture. The result was, when reported four years subsequent to the operation, that sensation and certain movements in the shoulder and arm had recovered in an imperfect degree. Lexer, according to a notice by Oppenheim,[2] sutured the nerves in a case of Erb's paralysis, but no details are given, and I can find no further reference to the case in the literature. I also[3] published a case in which the brachial plexus was involved in cicatricial tissue, causing total paralysis of the arm. The nerves of the plexus in that case were liberated from adhesions, and a practically complete recovery was recorded when the case was published fourteen months after the operation.

In cases of birth paralysis of the upper extremity the operation is performed as follows:

The patient lies on his back with a pad placed underneath the shoulders, so that the head is well thrown back. The head is then inclined to the opposite side, and the face also directed to the opposite side. In this position the supraclavicular space is well exposed. An incision is then made, extending from the outer border of the sterno-mastoid, commencing at the junction of its middle and lower thirds, passing outwards and downwards to the junction of the outer and middle thirds of the clavicle. On dividing the superficial fascia, platysma, and the deep fascia between the sterno-mastoid and the trapezius, the omo-hyoid muscle is exposed just under the lower edge of the wound. Above the omo-hyoid a little dissection exposes the nerve trunks emerging from under the cover of the scalenus anticus. The junction of the fifth and sixth nerves is easily found by tracing the two upper trunks outwards. Having found the junction, the various branches are to be recognized and freed from adhesions. In the cases on which I have operated there was no difficulty in exposing these nerves, and the nerves were found thickened, as is usual in nerves which have been damaged. When the junction is reached, it is found adherent, and these adhesions must be carefully separated, and the further course of the nerves traced beyond the junction. The separation is first made along the upper border, and this is carried on until the suprascapular nerve is reached, and it is then ascertained by following this nerve that it is free from adhesions. The division destined to contribute to the outer cord of the plexus is then traced out in a similar manner, and its freedom from adhesions ascertained. Similarly the third offset from the junction is traced downwards towards the posterior cord of the plexus. Care must be exercised not to damage any of the small twigs which are given off from the fifth nerve previous to its junction. The nerve to the subclavius coming off so near the junction, and therefore from the damaged part, has not been recognizable except in one of my cases. Having cleared the affected part of the plexus it remains to deal with the damaged part of the nerve. This in all my cases has been so; evidently cicatricial that it appeared hopeless to deal with it other than by excision. I therefore divided the fifth and sixth nerves well above the cicatricial tissue. When this is done, there ought to be the appearance presented of fasciculi of nerve fibres projecting from the perineurium, and if this appearance is not obtained, but instead a cicatricial appearance, an additional slice must be removed from the central end, and a second slice, if necessary, removed until normal fasciculi are seen. To omit this precaution would be to risk failure. The cicatricial mass is then seized and pulled inwards, so as to put the three peripheral divisions on the stretch, and these three divisions—namely, suprascapular nerve, branch to the outer cord, and branch to the posterior cord, divided at a point which appears to be distal to the cicatricial area, and in healthy nerve. Each of these three sections must also expose nerve fasciculi, and, if not, additional slices must be removed until this appearance is seen. The three peripheral ends are then sutured to the two central ends by means of a single thread of fine chromicized catgut, which is passed through the entire thickness of the nerves. When the single suture is in place, but before it is tied, the shoulder is pushed upwards, and the head inclined to the side which is being operated upon. This enables the nerves to be sutured without tension. The suture is then tied, bringing the three peripheral ends into contact with the two central ends. From the time that the suture is tied the nerves must be kept relaxed by keeping the head and shoulder approximated as much as possible. While this position of relaxation is being maintained, the wound is sutured and dressings are applied. On account of the head being approximated to the shoulder the neck is thrown into folds, and care must therefore be taken that these folds are

separated by gauze, as otherwise cutaneous irritation would result and endanger the aseptic course of the wound. The child is then bandaged to a posterior splint of poroplastic felt which fixes the head and body, thus rendering movements of the neck impossible. The arm is fixed across the chest, and the bandages are so arranged that the head and shoulders are kept as much approximated as possible. The dressings remain undisturbed until the fourteenth day, when the cutaneous stitches are removed, and the splint is not then reapplied. After this no further treatment is adopted, the muscles being left to recover under the influence of the nervous impulses, which owing to the restoration of the nerves are now able to reach them.

In all the cases which I have operated upon the junction of the fifth and sixth nerves was, as already mentioned, apparently cicatricial. If, however, the junction was apparently nerve tissue, and cicatricial surroundings had been found and separated, no doubt it would be right to refrain from excising the junction; but if there should be any suspicion of a partial cicatricial condition of the nerve trunk it would, I think, be safer to excise the entire segment on which the damage is seated than to trust to restoration of conductivity occurring in the damaged area.

In my cases, after excision of the affected area, there was no difficulty in getting the central ends to meet the peripheral ends when the shoulder and head were approximated. In the event of the length of nerve requiring to be excised proving so extensive that the union by suture could not be effected, I should approximate the ends by means of suture as much as possible without undue tension, and still be confident of adequate reunion by means of the newly-formed nerve fibres bridging the gap in an aseptic wound. I should hesitate to implant the ends into one of the neighbouring nerves in this region, on account of the importance of the only nerves into which the implantation could be made with prospects of success; for, in the event of failure, the result might be that additional muscles would participate in the paralysis.

I have operated on three cases, but in only one has sufficient time elapsed for recovery to be well advanced, and the following is a synopsis of the reports of these cases.

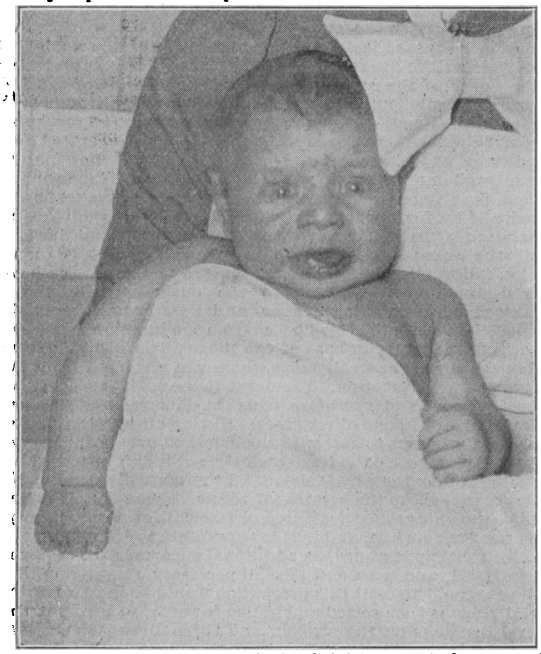

Fig. 1.—Case I. Duchenne's paralysis of right arm. Before operation.

CASE I.—J. W., male, born December 12th, 1901. First child; cranial presentation; forceps used and considerable force required. As soon as child born the defect in the right arm noticed. Sent to me on January 23rd, 1902. Typical birth paralysis in right shoulder and arm (Fig. 1). Inward rotation, pronation, inability to flex forearm, supinate, or abduct arm. Examination of case on February 12th, by faradic current, the child being anaesthetised; no responses. Good contractions in all the affected muscles by galvanic current. Operation on February 15th in Western Infirmary. Excision of cicatricial junction of anterior primary divisions of fifth and sixth cervical nerves, together with portions of the nerves before their junction, and portions of the three peripheral divisions. Suture of the three peripheral ends to the two central ends with chromicized catgut. Cutaneous stitches removed on fourteenth day, wound healed; child sent home. No improvement was exhibited till early in May (two and three-quarter months after operation), when it was noticed that the child was commencing to make movements with the arm which were not previously attempted. These movements gradually became more pronounced, and by August (six months after the operation) the child was using the arm in a fairly normal manner. When last seen (November 15th), nine months after the operation, the child was able to abduct the arm more than 90 degrees, was able to flex the forearm almost normally, and was using the arm constantly. The inward rotation had disappeared. The most defective movement remaining was supination, but this movement in an imperfect degree was also noticed. Fig. 2 shows the child as when last seen, making use of the arm.

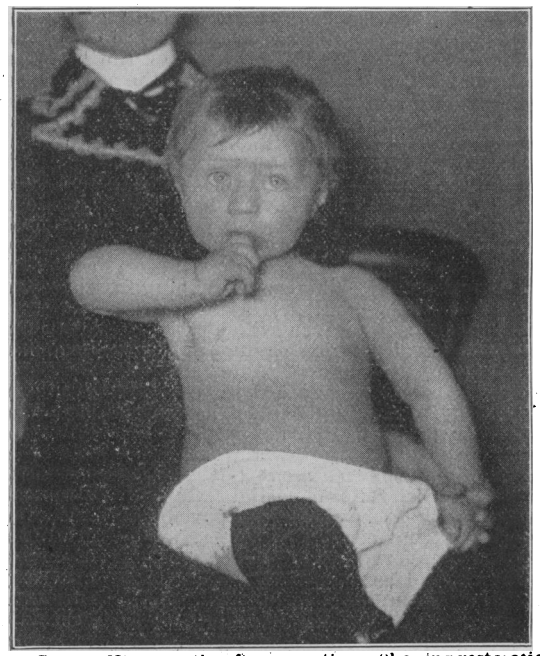

Fig. 2.—Case I. Nine months after operation. Showing restoration of power to abduct arm and to flex at elbow-joint.

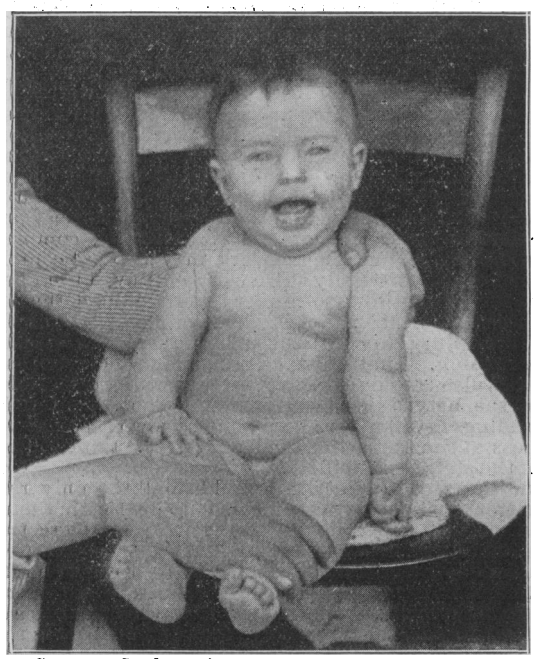

Fig. 3.—Case III. Duchenne's paralysis of left arm. Before operation.

CASE II.—T. B., male, aged 14 years, first child. Breech presentation. Torticollis due to cicatricial contraction of the right sterno-mastoid. Right arm presented typical Duchenne's paralysis. Wasting of infra spinatus, deltoid, biceps, and supinator longus evident. No abduction of arm, slight flexion of forearm, supination impossible, inward rotation only slightly marked. Right arm somewhat shorter than left, right hand smaller. Electrical examination showed galvanic irritability in deltoid and biceps. Faradic current induced slight contractions in a few of the muscular fibres of the deltoid. Sensation normal. Operation in Western

Infirmary June 26th, 1902. Torticollis dealt with, and at same time brachial plexus exposed. Cicatricial mass at junction of fifth and sixth cervical nerves. Mass excised and suture of fifth and sixth nerves to the three distal ends. On November 13th (five months after operation) distinctly improved contractions in deltoid by faradic stimulation. Faradic irritability also present distinctly in biceps. No improvement in movements.

CASE III.—M. T., female, born February, 1902, fifth child. Transverse presentation, version. Arms slipped above head, and in bringing them down, left arm fractured at middle of humerus. Arm placed in splints on account of fracture. After splints removed arm hung useless by side. Defect attributed to the fracture involving nerves in the arm. Sent to me in June. Typical Duchenne's paralysis; extreme inward rotation, no abduction, no flexion of forearm, no supination, no loss of cutaneous sensation. Involvement of nerves at seat of fracture therefore excluded. Operation delayed till child six months old, by which me there was still no sign of faradic irritability in the affected muscles. Operation in Western Infirmary on August 14th. Junction of fifth and sixth cervical nerves found cicatricial and excised together with affected portions of the nerves centrally and peripherally to the junction. Wound healed in fourteen days. Examined November 10th (twelve and a-half weeks after operation). Arm no longer rotated inwards, but no apparent improvement in the voluntary movements. Electrical reactions showed distinct faradic irritability in deltoid and biceps. Fig. 3 (p. 300) shows the child previous to operation.

The degree of recovery which has taken place in the first case is so nearly perfect in the nine months which have elapsed since the operation was performed that complete restoration may be anticipated. The commencing restoration of movements was first noticed about twelve weeks after the operation. In the third case the recovery cannot be expected to commence so soon as in the first case, on account of the longer interval which was allowed to elapse between the birth of the child and the performance of the operation. Yet already—at twelve and a-half weeks from the date of the operation—signs of improvement are exhibited in the development of the faradic responses in the affected muscles, and in the disappearance of the very marked inward rotation of the arm, although so far no improvement is exhibited in the voluntary movements. This case, therefore, will probably also be successful.

The second case belongs to a different category, as the operation there was performed so long after the injury—namely, fourteen years. The operation was undertaken in this case on the ground that there was evidence from the electrical examination that the affected muscles were not totally destroyed, as good contractions were obtained by stimulation with the galvanic current, and therefore it was decided to restore the affected nerves by operation. Improvement in the electrical reactions is now, at five months from the date of operation, undoubted, but whether any appreciable voluntary control will be required is, I admit, doubtful. At best this case can only be expected to make slow progress, on account of the profound alteration in the muscles caused by the long interference with their nutrition. Judging, however, from the recovery which has taken place in the first case, and the improvement exhibited in the electrical reactions in the third case in so short a period, operative intervention has certainly been fully justified; and in consideration of the hitherto unsatisfactory prognosis of these cases and of the safety of modern surgical procedure, I think that operation is the right course to follow in all cases which do not very early show spontaneous improvement.

REFERENCES.
[1] BRITISH MEDICAL JOURNAL, May 5th, 1900. [2] *Lehrbuch der Nervenkrankheiten*, 3rd Edition, 1902. [3] *Glasgow Medical Journal*, October, 1900.

SPINAL HYDATID CYSTS CAUSING SEVERE "COMPRESSION MYELITIS."

OPERATION, WITH SUCCESSFUL RESULTS.

BY

P. TYTLER, M.D.Aberd., Senior Surgeon, and R. T. WILLIAMSON, M.D.Lond., F.R.C.P., Senior Physician, Ancoats Hospital, Manchester.

"COMPRESSION MYELITIS" due to spinal hydatid cysts is an extremely rare affection; but, if recognized early, it is a disease particularly suitable for surgical treatment. A case of this disease has been under our care at the Ancoats Hospital, Manchester, and, as two and a-half years have elapsed since the operation was performed, we are now in a position to judge fairly of the permanent results. The following is the report of the case:

"Compression Myelitis" in the Dorsal Region: Complete Paralysis of Both Legs: Anaesthesia of the Legs and Lower Half of the Trunk: Complete Paralysis of Bladder and Rectum.—Removal of Fifteen Spinal Hydatid Cysts (Extradural): Gradual Improvement: Complete Recovery of Sensation and o Control of Bladder and Rectum, marked Recovery of Motor Power in Legs: Two and a-Half Years after the Operation Legs Spastic, but Patient able to Walk Alone with the Aid of One Stick.

Sarah A. M., aged 27, was admitted as a medical in-patient at the Ancoats Hospital, June 29th, 1900, on account of paralysis of both legs.

Previous History.—About three or four years previous to admission a swelling had developed on the back, just to the inner side of the lower angle of the left scapula. This was removed by Dr. Tytler, and found to be a hydatid cyst. She remained quite well until May, 1900. She then began to suffer from severe pain in the back (mid-dorsal region), and in the region of the base of the right lung. The pain continued more or less for two or three weeks; it then diminished, and there has only been occasional pain since. There had been no girdle sensation. Two weeks before admission she first noticed weakness of the legs when coming home from her work. The weakness gradually increased, and at the end of two days she was unable to continue her work on account of difficulty in walking. By the end of one week she was quite unable to walk, and the legs remained paralysed. There had been no pain in the legs. There had been loss of control over the rectum for four days, and difficulty in micturition for two days; the latter symptom had gradually increased.

State on Examination.—On July 1st, the day after admission to the hospital, the condition was as follows: The patient was fairly well nourished, and the general appearance was healthy. The temperature was normal. Both legs were completely paralysed. There was no wasting and no rigidity of the legs. The knee-jerks were present and slightly increased. There was no ankle clonus. The plantar reflexes were present, and of the "extensor" type. The abdominal and epigastric reflexes could not be obtained. The movements of the chest appeared normal. The bladder was distended. The urine could not be passed voluntarily, and had to be drawn away with a catheter. There was incontinence of faeces. The touch with the head of a pin was not felt on the legs and abdomen and lower part of the chest up to the level of the fifth rib. In the fourth intercostal space on each side the touch with a pin's head was felt distinctly; but in the fifth space on each side it was not recognized. Over this anaesthetic region of the legs and abdomen a light touch with the finger was not felt, but a firm touch was just recognized. Below the fifth rib (on legs and trunk) a pin prick was felt if deep, but the sensation was much less distinct than on the body above the level mentioned. Also on the anaesthetic part of the trunk and on the legs the patient was unable to distinguish between heat and cold. Above the fifth rib, on each side, sensations of heat, cold, and pain were recognized normally. The arms and cranial nerves were not affected. No signs of disease of the heart, lungs, liver, or abdominal organs could be detected. There was no spinal curvature, no localized spinal pain or tenderness on percussion. Just to the inner side of the lower angle of the left scapula was a small scar at the region where the hydatid cyst had been removed three or four years previously. In the dorsal region, just to the left of the third and fourth vertebral spines, was a small round swelling about the size of a half-penny. This could be moved slightly under the skin and felt like a sebaceous cyst. On July 7th the swelling just mentioned was punctured, and a small amount of clear colourless fluid withdrawn. On microscopical examination the fluid contained scolices and hydatid hooklets. The urine was alkaline; specific gravity, 1015; no sugar; no albumen; deposit of triple and amorphous phosphates. July 11th. Urine ammoniacal; it contained a few pus cells and a deposit of phosphates. July 12th. Anaesthesia more marked. Below the fifth rib, sensation lost to tactile and painful impressions, to temperature, and to the faradic current. Above the fifth rib, on each side all the forms of sensation just mentioned were preserved.

Diagnosis.—From the history of the development of the symptoms—the localized pain in the back, followed by loss of power in the legs which gradually increased until there was complete paraplegia, with anaesthesia, and bladder and rectal symptoms—it appeared probable that the case was one of "compression myelitis." From the presence of the small subcutaneous hydatid cyst, which was found to contain clear colourless fluid and scolices, and which was situated on the back just to the left of the third and fourth dorsal vertebral spines, it appeared probable that there was another hydatid cyst within the vertebral canal which was causing the compression myelitis. The upper limit of the anaesthesia also indicated a lesion at this part—at the fifth spinal segment and at the level of the third dorsal spinous process. Operative treatment was strongly recommended. After considerable hesitation the patient consented and the operation was performed by Dr. Tytler on July 14th, 1900.

Operation.—Chloroform was administered, and the patient was placed prone on the table. An incision was made from the seventh cervical spine along the spinous processes of the vertebrae, to about an inch below the upper level of the anaesthesia of the trunk. The skin was reflected to either side, and then the fasciae and muscles filling the grooves. The spinous processes were next nipped off with a pair of bone forceps. Then an attempt was made to divide the laminae with a Hey's saw, but the ligaments and soft tissues so clogged the teeth of the saw that it was laid aside. A ½-in. trephine was then applied to one of the laminae, and a piece removed. Then with a gouge forceps the vertebral canal was easily unroofed for about 2 in. Fifteen hydatid cysts were found outside the dura mater, and situated at the posterior aspect. These cysts were easily scraped out. The dura mater was not divided. The largest cyst was about the size of a gooseberry; two others were about half that size, and the rest were about the size of peas. The muscle flaps were then replaced