A NOTE ON THE SURGICAL TREATMENT OF SPASTIC INFANTILE PARALYSIS.*

By ROBERT JONES, F.R.C.S.,
Honorary Surgeon, Royal Southern Hospital and Liverpool Hospital for Chronic Diseases of Children.

For many years I have taken a considerable interest in the treatment of spastic paralysis, and have now operated upon over a hundred cases. Some of my results have already been shown to the members of the Society for the Study of Disease in Children. I think it will be agreed that from medicine we have nothing to expect likely to influence the course of the affection. Indeed, we have but to scan the text-books on neurology to realize the note of pessimism which is sounded.

Sir William Gowers, in his "Diseases of the Nervous System," says: "The tendo Achillis is sometimes divided for contraction of the calf muscles in infantile spastic paralysis, but the operation is useless and ought never to be performed." The same opinion has been pronounced by other distinguished men. I would argue that a large proportion of children suffering from severe spastic paralysis may be transformed into useful members of the community, improved both in body and mind by surgical methods, enabled to walk with comparatively little deformity, many requiring only the aid to be derived from one or two sticks.

The class of case which we can place outside remedial art is the idiot, the microcephalic and the violent irritable type of diplegic, so often seen, subject to fits and active athetotic movements, who has generally lost all control over his secretions. The treatment of any condition short of this may be undertaken with varying success, subject to conditions which obtain in any surgical case requiring prolonged attention. Another class which gives the greatest anxiety and trouble is that in which the affection of the hands is of such a kind as to promise but slight hopes of their assistance to the limbs during walking.

I would divide the treatment of all cases of spastic paralysis into operative and post-operative, for although mechanism is

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involved in nearly every case there is hardly a case which we are called upon to treat without invoking operative aid.

Infantile hemiplegia usually affects the arm much more than it does the leg. This is almost invariably the case, and in this particular it differs from diplegia, where when the four limbs are attacked, the hands are frequently less severely affected than the limbs. Indeed, in hemiplegia the paralysis of the hands is sometimes absolute, and in addition we have a complication in the share of rigidity. The behavior of the lower limb differs also from that of spastic paraplegia in that the adductor spasm is proportionately not so marked.

The treatment of the hand and arm in infantile hemiplegia is distinctly less promising than in the diplegic cases, but there are clinical signs to which I would draw your attention which help us to prognose success or failure. If the paralysis is complete, or in other words, if the little patient is never known to relax his spasm, treatment is futile. If he only moves the fingers of his affected hand in conjunction with the fingers of the opposite side, the results will in all probability be discouraging. Similarly, where any degree of voluntary relaxation of spasm exists apart from an associated movement on the opposite side, treatment is indicated.

Noting that the dominant deformity in both hand and elbow is pronation and carpal flexion, treatment should consist in fixing the elbow supine and in hyperextending the wrist. The hyperextension of the wrist should be combined with that of the fingers, and a special arrangement adapted to keep the thumb at right angles to the palm. The spasm in these cases is so pronounced that the extension of the wrist and fingers must be brought about very gradually. If the elbow is accompanied by contracture of the biceps and brachialis anticus, supination may be combined with extension. If this be not the case the flexed position of the elbow will suffice. If instead of being firmly pronated the elbow lies semiproned, it is not necessary to treat it, and all one's energies should be directed to the hand.

It is difficult to give a reason as to how improvement comes about, but it may be taken as an axiom that prolonged fixation of spastic muscles in a position opposed to the spasm lessens the severity of the spasm. The operative treatment will consist of tenotomy or tendon transplantation: myotomy need only be mentioned to be avoided. An incision is made
over the tendon of the flexor carpi ulnaris just above the annular ligament; another is made over the flexor carpi radialis, and both tendons are divided low down and taken: (a) The flexor ulnaris to be inserted into the extensor ulnaris, and (b) the radial flexor into the radial extensor. I performed this operation for the first time some years ago upon two spastic children, whom I showed before the Society for the Study of Disease in Children, and in both instances voluntary movements were steadily performed; and one, a girl of 9, was able to write quite a respectable hand. In order to overcome severe spasm in the forearm, my friend, Mr. Tubby, has changed the point of insertion from the front to the back of the radius of the pronator radii teres, thus transforming the muscle into a supinator. The operation has been several times successfully performed.

Tenotomy alone has proved distinctly disappointing, although one has had an occasional successful case. The operation should be confined to the division of the flexor carpi radialis and ulnaris. It is, in my opinion, better to elongate the other flexors of the hand by a long median incision, such as one would employ in lengthening the tendo Achillis. Tendon transplantation, however, is a better operation, less complicated and more reliable. The surgeon's art, however, does not end with the operation, and hyperextension of the wrist leaving the fingers free, should be practised for a further few weeks. In order to prevent adhesions after the operation the wrist should be freely, but withal very gently, moved in about a fortnight's time.

The nature of the movements to be practised must be left to the ingenuity of the surgeon. The principles which should govern him may, however, be indicated here: (a) The movement should be practised slowly and without excitement; (b) they should be made interesting to the child; (c) those opposed to the direction of deformity should predominate; (d) those presenting the greatest difficulty should be chiefly practised.

Just a word before we deal with paraplegia regarding tenotomy of the spastic muscle. Empiricism has taught us that for some reason or another tenotomy lessens both in frequency and intensity the spasmodic element in paraplegia. I do not merely mean to say that division of the tendo Achillis controls spasm in the calf muscles, although of course it does, but rather that spasm in which those muscles are not directly
concerned is also influenced. This is beyond all question and
must have been noted by everybody who has had the oppor-
tunity of observing, and the fact has now reached the robust
stage when physiological explanations are vouchsafed.

If the surgeon has decided that a case of spastic paraplegia
is suitable for treatment a splint should be prepared, so designed
as to keep the limbs in marked abduction. The area over the
hamstrings, the adductors at the groin, and the tendo Achillis
should be prepared for operation. The adductors should be
first attacked. An incision 1½ in. long should be made to the
inside of the adductor longus. This muscle should be seized
by a Spencer Wells or a small Doyen forceps, and about ¾ in.
of it removed. The limb is then abducted and portions of the
adductor brevis and gracilis are exsected in similar fashion.
The horizontal portion of the adductor magnus, and, if neces-
sary, the pectineus, is divided, and also any tissue, muscular
or fibrous, obstructive to an absolutely free abduction of the
femur. Experience has shown me that although the chief
offenders are the adductors longus and brevis, nevertheless the
deeper muscles often require division. To anyone who has
practised this operation the futility of attempts to effectively
divide the muscles subcutaneously will be apparent. Division
is followed with but little hemorrhage and the wounds are
closed without drainage. Having exsected the pieces of the
adductors, each tendo Achillis is divided subcutaneously and
rectangular splints are applied to the foot. The limbs are
then well abducted, and the surgeon notes whether there is
any obstacle to easy extension of the knees. If there should
be—it is not often the case—an open incision must be made on
each side of the popliteal space, and the tense hamstrings are
in turn divided. If these incisions are long enough the fascial
contraction can be attacked on either side, for it is here that
opposition is often found. I would discourage the use of a
transverse incision, as when adopted it often seriously hampers
the surgeon’s efforts to fully extend the knee by reason of the
strain cast upon the sutures.

We have now presumably got our patient comfortably
stretched upon an abduction frame, and we must keep him
there for at least three months.

At the end of three months the splint is taken off during
the day and movements are sedulously practised. For some
weeks stiffness exists, and often the movements are at first
painful, but after a time, always shortened by vigorous exercise, the pain disappears and the effort must be made to walk.

It will be noted that one of the difficulties of an untreated spastic when he tries to walk is the narrowing of the pedestal upon which the trunk rests by reason of the adducted limbs. Operation has now overcome this, and with abducted limbs the body is poised upon a widened pedestal. During early training the nurse must see that while walking the limbs are not approximate, and that, from the first, swinging the limbs must be prohibited. Crutches should not be allowed until the patient has been taught to stand unsupported. I need not enter into any more detail regarding this most important stage of treatment, but would add that it affords an inexhaustible field for ingenuity, and that upon the intelligence and industry of the nurse very much depends.

Diplegic hands are treated on the same principles as I have enunciated in regard to infantile hemiplegia, and they must be trained to hold sticks and crutches with a firm unyielding grip. I cannot now deal with individual cases, but I may say I have operated on cases from 12 months to 20 years of age. A large number of these were so bad that they had never attempted to place one foot before the other. Some were structurally flexed (contracted) at the ankle, knee and hip. A most helpless youth of 20, every limb across the other, was able in six months to stand erect and walk with two sticks, and twelve months later could move his limbs north, south, east and west, with hardly an appreciable jerk. Success in an ancient case, where so much has to be unlearned, and where the mechanical stage offers such difficulty, proves the accuracy and efficacy of the principles I have endeavored to expound. It is logical to infer that if old neglected cases are amenable to surgical education, that our prognosis should not be dismal in the young.

With regard to the degree of benefit to be derived from treatment, the parents should be given to understand that, under favorable conditions of nursing and tuition, the child, aided by the hand or sticks, will be able to walk varying distances in from twelve months to two years, and that with perfectly straight limbs and heels on terra firma. A large proportion of cases will later on manage aided by one stick. Even in the least successful cases, parents, mostly having despaired are full of gratitude. The mental condition of the children obviously improves when their physical defects are remedied,
and they are enabled to mix with their little friends. Complete recovery in spastic paraplegia is of course impossible.

It will be gathered from my remarks that I wish to urge that the treatment of spastic paralysis should resolve itself into a system. Such a system involves operative, mechanical and educational stages. The treatment cannot be separated into parts. If the surgeon is not satisfied that the case is to be under his control for twelve months, he will consult his reputation best by leaving it alone. Operations not followed up by careful and prolonged after-care give rise to disappointment and discredit. Merely dividing tendons, to be followed by massage and electricity, is futile and dispiriting.

At the new Liverpool Country Hospital for chronic children at Heswall, which we intend to build for 200 patients, we hope to have a ward for these paralytic cases where we can keep them as long as needed. The nurses will be specially trained, and no opportunities will be lost from ignorance or neglect. The three months' time limit which general hospitals impose materially blights the prospects of paralytic subjects. They are neglected at home, and wander from one institution to another, often the victims of conflicting theory and diverse practice. The successful hospital management of infantile paralysis is not complete unless an organized system of education be inaugurated. This, in the case of spastics, must often be of the visual, as opposed to the abstract, type. Apart from its direct influence in improving the mind, we find it to have a sedative influence on the irritable. I have often thought that, if there were scholastic institutes for the care of the paralytic children of the well-to-do, an undesirable gap would be filled. With cheerful surroundings these little ones would enjoy in happy combination a development of both mind and body under the scientific auspices of specially trained instructors. Such advantages would render material aid to many helpless little cripples. As it is, treatment is often half-hearted, rarely continuous, entered into with misgivings on the part of the surgeon and despair on the part of the patient's friends.

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