THE ROLE OF SURGERY IN CEREBRAL PALSY

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Rapid advances in the treatment of cerebral palsy have been and are being made, and it may justly be claimed that surgical measures are being applied with an increasing measure of success in an increasing number of cases — while at the same time admitting that the problem is *per primam* a neurologic one, and that the answers are preponderantly in the hands of the physician.

Berta Bobath[1] shed the light of true perspective upon the lesion and its management when she said: 'For an understanding of the movement disorders of patients with

lesions of the central nervous system, it is essential to realize that damage to the CNS results in abnormal co-ordination of muscle action *and not in paralysis of muscles*'. By the same token, all types of therapy are directed at increasing the control, range and strength of the muscles in fulfilment of their function as prime movers, and of equal importance, at assisting the muscles to acquire the ability to relax when called upon to act as antagonists.

George Pollock,[2] although a professed and acknowledged champion of the cause of surgery in cerebral palsy, emphasized the importance of observation of the patient over a prolonged period (many years) as a prelude to surgery, and of the application of conservative measures, including the use of splints and walking aids, during this time.

It would seem pertinent to stress these points, particularly because they require of the orthopaedic surgeon a radical re-orientation of his more accustomed approach to an orthopaedic rather than to a neurologic problem. A simple yet specific instance is the operation for lengthening the tendo achillis. As an orthopaedic problem, the matter is straightforward and the end result is in all respects predictable — a mechanical answer to a mechanical question.

How different is the case in cerebral palsy, where the shortening of the tendon is not necessarily due to *structural* alteration or contracture, and where the surgical correction of this deformity has the effect not only of allowing the heel to make contact with the ground, but also of setting in motion the 'switch over' from the positive to the negative supporting reaction — a sequence which is vital to ambulation.

How different also are the conditions which are to be fulfilled before surgical measures in cerebral palsy may even be contemplated, thus:

1. The establishment, beyond reasonable doubt, of the diagnosis. The typical childhood case presents no diagnostic problem, but what of the individual who has reached the age of adolescence or even adulthood in complete normality, and then develops the picture of cerebral palsy?

2. The determination of a favourable mental and psychological 'climate' in which to undertake the procedure.

3. The demonstration of the fact that a deformity is of a structural rather than a functional nature.

4. The demonstration, to the satisfaction of patient and parent or relative alike, that maximal possible benefit has been derived from non-surgical measures, and that such benefit cannot be equated with minimal functional requirements.

5. The demonstration of the fact that the time factor is on the side of those who favour operation.

The period of observation, during which these conditions either become fulfilled or fall away, requires the aid of the orthopaedic surgeon who will advise in respect of and direct the application of plaster casts, splints[3] and functional aids, and who will assess the degree of improvement in range, control, strength and deformity of the affected limbs.

CAN SURGERY BE HARMFUL IN CEREBRAL PALSY?

In cerebral palsy, the muscles are not paralysed — they are spastic, and they may also be weak. This is a basic and cardinal fact, and it is at the relief of muscle spasticity and an increase in the strength of muscle action that treatment is directed. A muscle of which the nerve supply has been severed or even partly divided, is complicated and prejudiced from the point of view of rehabilitation. A muscle of which the tendon has been shortened or lengthened, is a 'disturbed muscle' and one in which effective treatment and effective function are rendered very difficult. Furthermore, the results of surgery are not always strictly predictable, and 'curious' results have been known to be an indication for further surgical treatment with (not infrequently) further and more curious results.

It is for these reasons that neurectomy, either partial or total, should be undertaken with great reluctance in a limb where the aim is the ultimate and near-normal restoration of function. A destructive and multiple neurectomy or radiculectomy, aimed at eliminating intractable spasticity and producing permanent flaccidity, is of course a legitimate procedure, but with an ultimate objective quite at variance with any procedure which aims at the restoration of function.

ABSOLUTE INDICATIONS FOR OPERATION

The snags, pitfalls and objections to surgical approaches have been cited — what then (if any) are the absolute indications for operation?

There are a number of conditions and circumstances which, in my opinion, constitute absolute indications for surgery. They are as follows:

1. The mild case of cerebral palsy with localized involvement and minimal reflex activity, e.g. the equinus foot, in which the results of operation are good and comparatively rapidly obtained.

2. The presence of severe structural contractures in a case of any degree of severity, where it is anticipated that ambulation may be restored.

Pollock[2] advised the use of local block-anaesthesia in these patients, in order to establish the structural nature of the contracture. It is generally agreed that if the contracture involves the hip, knee and ankle in the same lower extremity, it is advisable to correct the hip deformity before the knee, and the knee deformity before the ankle.

3. Inequality of the leg length in excess of 1 - 1½ inches. The operation for restoration of equal leg length can and does have results which are dramatic for obvious reasons, not the least of which is the restoration of dorsiflexion at the ankle.[4]

4. Severe adductor (and internal rotation) contracture of the hip, of either a structural or a functional nature. The choice of operation will be determined by the merits of the case, but I favour one of two procedures, namely:

(*a*) adductor tenotomy, which permits re-attachment and restoration of function of the adductor longus, and

(*b*) abduction (and external rotation) high femoral osteotomy, either uni- or bilateral. Neurectomy of the obturator nerve is a procedure which in my opinion should be condemned — the presence and retention of functioning adductors is essential to satisfactory ambulation.

5. Gross spasm or contracture of the wrist joint, in a position of maximal palmar flexion. Arthrodesis of the wrist in a suitable position is a procedure of great cosmetic value, and one which may produce gratifying (if unexpected) functional recovery.

6. Gross spasm or contracture of the fingers in a position of severe flexion, with the finger nails producing ulceration of the palm of the hand. Suitably chosen arthrodeses of the finger joints produce great relief.[4]

7. Severe talipes calcaneus, in which shortening of the tendo achillis is an invaluable procedure.

8. The knee joint which has been straightened out after a severe flexion contracture, is one in which control of extension is limited because of relative lengthening of the quadriceps muscle. Distal advancement of the insertion of the patellar tendon is necessary in order to restore function.

9. The fixed equino-varus contracture of the foot, in which triple arthrodesis is performed for the restitution of a stable, plantigrade foot.

10. The flail calcaneo-cavus foot, in which the Grice procedure, with or without simultaneous shortening of the tendo achillis, may be undertaken.

CONCLUSIONS

Cerebral palsy is seen to be a condition in which every possible modality of treatment may and should be utilized, in which conservative measures play the dominant role, and in which surgical measures of a limited and selective nature are able to complement those conservative measures which are productive of the best possible end results.

REFERENCES

1. Bobath, B. (1954): Physiotherapy, **40**, September - December.
2. Pollock, G. A. (1962): J. Bone Jt Surg., **44B**, 68.
3. Wilson, D. R. and Allen, D. (1962): Physiotherapy, **48**, 41.
4. Allen, D. (1962): Personal communication.