

As far as urinary function is concerned, myogenic bladders and those that were not tested because of severe complications did not change their previous state. In one patient a persisting hypertonic bladder compelled us to block the sacral nerves, which resulted in an autonomous bladder. Out of a group of eight reflex bladders, seven of them continued to be automatic, though one of them was hypotonic and one became autonomic. One hypotonic reflex bladder remained unchanged.

The final result of phenol block after periods from 1 year 4 months to 2 years 5 months was loss of spasticity selectively to lumbar roots where phenol had been injected. No signs of ascending arachnoiditis developed so far.

This procedure was used mainly in complete cord lesions. A second block was necessary in a few cases.

MOTOR POINT INJECTIONS WITH DILUTED ALCOHOL AND INTRATHECAL INJECTIONS THROUGH THE VERTEBRAL FORAMINA WITH ABSOLUTE ALCOHOL

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IN our experience with paraplegics, in about 20 per cent. of the patients spasticity is a complication in rehabilitation, a hindrance to independence and considerably increases the hazard of bed sores and fractures.

Early accurate nursing decreases the incidence of incapacitating spasticity. If therapy becomes necessary, the choice may be difficult. We must take great care not to aggravate the patient's misery.

In this respect, we think that two technical aspects are valuable in the minor therapies:

- (a) intramuscular injections of diluted alcohol;
- (b) sub-arachnoid injections of absolute alcohol through the vertebral foramina.

Intramuscular Injections of Diluted Alcohol. We have been experimenting this technique, following Professor Tardieu, who obtained interesting results, first with decerebrated cats, secondly with children suffering from cerebral palsy. We firstly inject 2 ml. of 1 per cent. xylocaine at the motor points. If we have a response within 6 min. (decreasing hypertonia or clonus) we inject through the same needle 2 ml. of alcohol. If there is no result with the xylocaine we move the needle for another trial. We exceptionally had no response after two trials. We use mostly 45 per cent. alcohol. If we get an inadequate result or if there is a return of spasticity, we make another attempt with 60 per cent. alcohol. We often had to do up to four injections in the same muscle, but always with intervals of more than 15 days, sometimes after one year (for example when required by a check-up patient).

Animal experiments showed that xylocaine and alcohol suppress the stretch reflex by an elective paralysis of the motor fibres, easier to accomplish because they are thinner.

We do not assert that the hypertony in paraplegia is an alpha rather than a gamma type, but in about 50 injections carried out in these patients we have obtained fairly good results, especially with the triceps surae: easier mobilisation, decreased or suppressed foot clonus. Although, as a rule, the effects are never permanent and the hypertony recurs within two weeks to three months, they often give the opportunity to take further measures in rehabilitation by initiating or accelerating the patient's upright position, giving better independence and persistence of functional results. Even a transitory result will allow us to decide whether operations such as Achilles tendon lengthening or triceps surae neurotomy are indicated. The other muscles which we treated frequently with alcohol are the adductors and the biceps femoris.

We had two accidents with our patients: a painless muscle oedema, the first in a complete paraplegia, the second in an incomplete tetraplegia.

Sub-arachnoid Absolute Alcohol Injections through Vertebral Foramina. We use this technique for spasms of the hip flexor muscles. As is known, this spasticity is frequent. However, a successful treatment is difficult. It is quite a delicate technique, the aim of which is to inject the absolute alcohol through one of the vertebral foramina: L1-L2-L3, the best being L2. The patient is placed in the usual lateral position for a lumbar puncture, with the side to be treated raised, the head being in lower position. Cushions under the loin help us to put the spinal column in such a position as to obtain an angle at the point where the injection will be done. Thus, the alcohol will flow to the roots of the correspondent vertebral foramen and will denervate the muscles. We always obtained a decrease of the hip flexor spasms. We have to be very careful during the whole procedure: radiological control is necessary to know with certainty in which space the lumbar puncture needle has been introduced, constant neurological control has to be made to ensure that the injection does not reach the conus terminalis.

Amongst eight patients, we had on two occasions a slight and transient injury of the sphincter musculature. The risk of an intrathecal alcoholisation is something we must know, and the patient has to be informed of this hazard.

In conclusion, these two techniques—intramuscular and subarachnoid alcoholisations through the foramina—seem to be interesting in the treatment of spasticity in paraplegia. If there is a definite indication for such treatment these procedures have proved to be an effective and sufficient therapy with our patients and we had no serious complication with these treatments.

PHENOLISATION OF SPINAL ROOTS AND PERIPHERAL NERVES IN SPASTIC PARALYSIS

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THE authors discuss the results of the subarachnoid phenol injection and selective peripheral nerve block with dilute phenol solution in the treatment of spasticity.

The theoretical basis of such a procedure is the differentiation of fibres which build up the spinal root and peripheral nerve in respect of their anatomical struc-