THE SURGICAL RELIEF OF SPASTICITY IN PARAPLEGIC PATIENTS

I. ANTERIOR RHIZOTOMY

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The usual course for patients who have suffered trauma to the spinal cord follows from flaccidity immediately after injury, to spasticity in a matter of weeks, to paraplegia in flexion, and then to death in general and urinary sepsis within several years. Nursing care becomes increasingly difficult when the limbs cannot be properly positioned because of spasm, and bed sores develop over the trochanters and sacrum, advancing in some cases to complete destruction of the hip joints and sacrum. One is left with the impression that something drastic must be done in an effort to alter this course of events. The remarkable results usually obtained with anterior rhizotomy make it appear that a report of some experience with the surgical treatment of advanced spasticity is warranted.

Of approximately 700 paraplegic patients who have come under observation, some 230 had spasticity of varying degrees. Of these, about 70 have had spasm of sufficient severity to warrant surgical considerations. Fifteen of these patients were subjected to anterior rhizotomy by the authors and an additional 13 have been operated upon by other surgeons. All cases were done for spasticity of the legs and abdomen. In several of the cases one or more posterior roots were sectioned in addition to the anterior roots without noticeable difference in the effects. The indications for operation in almost every case were as follows: (a) marked, disabling spasm of the flexion-adduction type, with or without contractures; (b) wasting debility which responded poorly to supportive therapy; (c) severe decubitus ulcers, enlarging in spite of intensive treatment; and (d) a markedly hypertonic bladder with small capacity, and often intolerant of a suprapubic catheter. Most patients had proven transection of the cord or had failure of return of function after one year. However, lack of proof of transection did not serve as a deterrent factor when debility was advanced. In a few cases the presence of large decubitus ulcers extending to the projected operative area caused a delay in the initiation of the procedure.

SURGICAL TECHNIQUE

The surgical technique used by the authors in 15 cases was as follows: Preoperative roent-

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genograms of the lumbodorsal area were obtained. In early cases of the series, a marker was placed over what was believed to be the 12th dorsal process, and the roentgenograms were then taken. The location of the 12th dorsal process was marked with silver nitrate on the skin and with subcutaneous methylene blue. Laminectomy of the 1st lumbar and 12th dorsal vertebrae was carried out, usually under local anesthesia or no anesthesia other than that provided by the original injury. The dura mater was opened and the field was inspected for the location of the conus medullaris. If it was not completely in the field, the laminectomy was extended as far as necessary. In some cases, the 11th dorsal vertebra was included in the laminectomy in order to visualize the 10th root. The arachnoid was then opened. The last dentate ligament was grasped medial to the overlying posterior root with a small hemostat and was severed. The cord could then be rotated and the anterior roots exposed. The point of exit of the 12th root was used for orientation. After separating the larger blood vessels from the roots, section was carried out between two silver clips, starting with the 11th or 12th thoracic and continuing downward through the 1st sacral. The roots were sectioned bilaterally. Each root was stimulated mechanically before section to avoid mistaking a posterior root from the opposite side. A careful count of the number of roots sectioned was kept. An additional point of orientation was felt to be had in that the 5th lumbar root was often larger than its neighbors. It was rarely necessary to section a posterior root for adequate exposure. After section of all anterior roots from the 11th or 12th thoracic to and including the 1st sacral was thought to be completed, rough testing of the limbs was done. In 4 cases, the presence of residual spasticity required careful re-examination of the sectioned roots. In each of these cases, the missed filaments were found and sectioned. Closure was carried out in layers with black silk sutures.

This technique closely approximates that described by Munro. The 11th thoracic posterior roots were sacrificed in several of these cases when complete exposure of that root would have required further delamination. All patients were supported by transfusions and were placed on penicillin therapy.

RESULTS

The severe, deforming spasms were relieved in all cases. All patients are still alive, 3 to 19 months postoperatively. The contractures, differentiated from flexion spasms by preoperative spinal anesthesia, were corrected by the second postoperative month without further surgery in all but one case. This patient was subjected to tenotomy of the hamstring and Achilles' tendons prior to anterior rhizotomy (see Case 1). Non-disabling residual spasticity was noted in 5 cases.

The remarkable gain in weight that occurred in all cases was in itself extremely gratifying. Only one patient of this group failed to gain at least 30 pounds within 3 months after operation, and one patient had to be put on a reducing diet 6 months after operation, having gained close to 100 pounds in weight. Decubitus ulcers began to show signs of healing and have been successfully closed by dermoplastic procedures once the spasticity was abolished. Morale picked up tremendously. Nursing care was simplified, and following a vigorous course of rehabilitation, self-care of such a high order was usually obtained that nursing care was no longer necessary. The technique of physical rehabilitation of paraplegic patients will be the subject of a separate communication. Many of these patients have subsequently gone home and are in good health at the present time.

In no case of this series was a permanently flaccid bladder produced. All showed hypertonic bladders with postoperative capacities ranging from