Selective Sacral Neurectomy for Contracted Neurogenic Bladder*

V. E. HESSE, V. I. DODD, I. P. MAAS, *Division of Urology,* AND L. F. NEL, *Division of Neurosurgery, University of Pretoria*

SUMMARY

Selective sacral neurectomy has been described for conversion of a spastic bladder to a flaccid bladder in patients with a thoracic cord injury. It is a relatively minor procedure and in our experience it is preferable to the ileal loop procedure.

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Urological care of the patient suffering from spinal injury is of paramount importance, because the lifespan of this patient is directly proportional to the renal involvement.

At the spinal injury unit of H. F. Verwoerd Hospital in Pretoria, there is a multidisciplinary team handling patients with cord injuries. We have no standard method of treating the patient with upper or lower motor neuron lesions, as each one is thoroughly assessed and treated according to the medical, social and rehabilitative status.

Our knowledge of micturition can be summarized by saying that normal micturition depends on a balance between the forces of expulsion and retention, synchronized by an intact nerve supply. Anything that upsets any one of these facets, upsets micturition. If this disrupting factor itself is irreparable, a substitute for the normal mechanism of micturition must be found. In spinal injuries any one, or more than one, of the above factors may be disturbed; due to either the primary injury, or due to secondary changes.

Selective sacral neurectomy is done on patients in our unit when all other conservative measures of bladder training have failed. This procedure is performed six months after the injury to the dorsal segments excluding the bladder reflex centre. The patient with an intact spinal reflex centre is liable to involuntary contractions of the bladder leading to social inconvenience and an increased risk of pressure sores. Apart from this, the autonomic hyperreflexia syndrome of paroxysmal hypertension, bradycardia, nasal obstruction, profuse perspiration and headache, may accompany the bladder contractions. Long-term free catheter drainage or spastic bladder contractions may lead to a diminished bladder capacity.

These complications of the spastic, small-capacity bladder may be adequately cared for by a penile incontinence appliance with a leg urine bag.

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Reprint requests to Dr V. E. Hesse, Division of Urology, University of Pretoria, P.O. Box 667, Pretoria.

In the male who refuses this treatment, and especially in the female without the ability of having an incontinence device, the alternative is permanent catheter drainage, a urinary diversion, or the conversion of an upper motor neuron lesion to a lower motor neuron lesion.

In the past such a conversion has been brought about by chordotomy or rhizotomy.

Management of a lower motor neuron lesion may be more manageable by voluntary emptying of the bladder.

In our series of 5 patients it has been a prerequisite that the spinal injury be a thoracic segment lesion, enabling the patient to empty the flaccid bladder by increasing the intra-abdominal pressure, and manually compressing the bladder.

PROCEDURE—6 MONTHS AFTER INJURY

In a patient with a thoracic spinal injury and a spastic, low-volume bladder we opt for selective sacral neurectomy. A pre-operative test of great importance is to establish whether bladder-wall fibrosis secondary to infection is present. We do not believe that fibrosis occurs in the absence of infections.

If there is an increase in bladder volume after spinal anaesthesia, the patient is acceptable for definitive selective sacral neurectomy. In co-operation with the Division of neurosurgery the operation is performed under general anaesthesia, as involuntary contractions of the abdominal muscles may give a false graph of spasticity on the cystometrogram.

The patient is positioned in a true lateral position with an indwelling bladder catheter. The cystometer is at the same level as the bladder.

A midline incision over the fifth lumbar and first two sacral vertebrae permits exposure of the sacrum and allows for a lumbosacral laminectomy.

The dura mater is opened from the fifth lumbar vertebra to the first sacral vertebra; exposing the terminal neural philum. The bundles of nerve fibres are dissected free of one another by microdissection with a probe. Each individual nerve is picked up with a blunt hook, and the nerve is stimulated by 0·5 volts for 50 microseconds at 10 cycles per second with a Grass stimulator.

By this method the specific nerves to the bladder are identified on the cystometrograph by the increased bladder pressure recorded at the time of stimulation.

These nerves are transsected with neurosurgical scissors. Distal and proximal ends are stimulated after transsection to exclude a central axonal connection.

RESULTS

In 5 female patients with dorsal vertebra lesions from D3 - D10, there was an immediate increase in bladder capacity. The age of the lesions ranged from 6 months to 17 months. There was no incidence of increased morbidity and no fatalities occurred. The cystometric readings in Fig. 1, are a good example of the intra-operative response to stimulation and neurectomy. The follow-up period has been from 1 - 3 years, one patient being readmitted with a small capacity bladder. She had cystitis, and was catheterized for 1 month in a rural hospital before transfer to our unit. Intermittent catheter occlusion helped the patient to regain a capacity of 400 ml, and the catheter eventually became redundant.

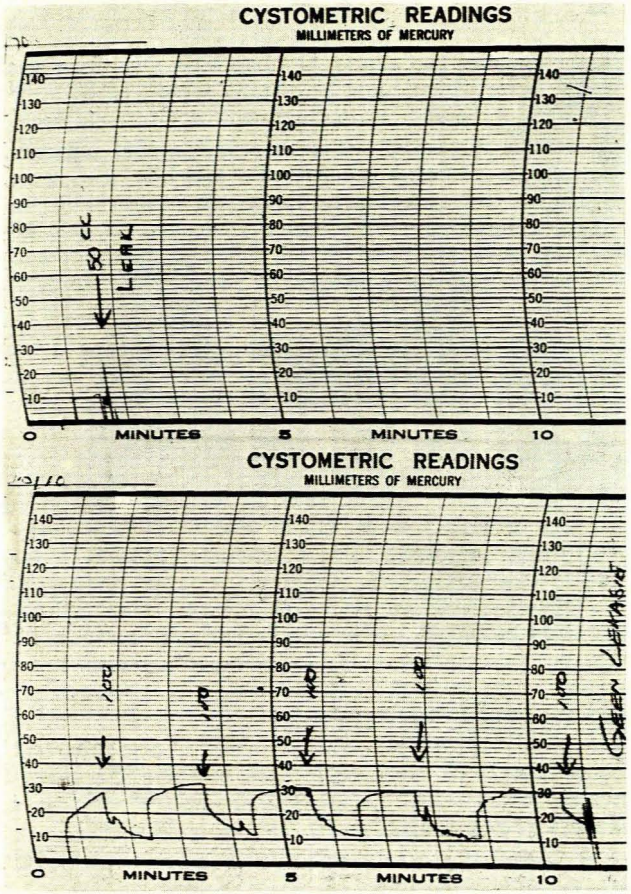

Fig. 1. Upper graph: **Pre-operative cystometrograph. Leakage of urine past 20 F catheter at 50 ml volume.** Lower graph: **Postoperative cystometrograph. No leakage at 500 ml volume.**

DISCUSSION

Selective sacral neurectomy excludes the disadvantages of a non-selective rhizotomy or chordotomy, in which instance the bladder atonicity would be accompanied by: (*i*) extensive atrophy of muscles in the lower extremities; (*ii*) vasomotor changes leading to troublesome cutaneous lesions; and (*iii*) impotence.

We believe that a small capacity bladder will always enlarge on neural section if no post-inflammatory fibrosis has taken place. One patient had a capacity of 30 ml, and no way could be found to enlarge the capacity. Within 12 hours of the selective sacral neurectomy she had a bladder capacity of 350 ml.

We agree that because of the frequency of relapse after initial success, frequent and extensive follow-up examinations must be carried out during the rest of the patient's life. In our unit cases are seen initially every 3 months for 1 year, and thereafter at least every 6 months.

Apart from the 5 patients with thoracic neural segment lesions, this procedure has also been performed in our unit for intractable bladder pain as well as in neurectomy for intractable lower limb pain with retention of the bladder function in these cases. In the latter cases, it has been possible to prevent a neurogenic bladder as complication of the neurectomy.

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