Late Surgery for Incomplete Traumatic Lesions of the Conus Medullaris and Cauda Equina

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The role of laminectomy in spinal injury is a subject of great controversy. The various criteria that have been suggested in making the decision for or against surgery include the presence or absence of manometric block, the degree of neurological deficit or preservation of function, and the time between injury and surgery. Opinions regarding the time factor range from pessimism ("laminectomy after one year... had no practical value except when it was done exclusively for psychic reasons") to enthusiasm ("laminectomy should be carried out in every case of traumatic paraplegia, early or late"). Many shades of opinion lie between these extremes.5-3,7,9,10-14

This paper describes our own experience and is intended to lend support to the argument for surgery, even late, in the treatment of lesions in the region of the conus medullaris and cauda equina.

Analysis of Clinical Material

This study is based on seven consecutive cases of late laminectomy for traumatic lesions involving the conus medullaris or cauda equina, operated upon at the New York University-Bellevue Medical Center during a 5-month period in 1965.

Initial Paraplegia. Six of the seven patients had initially been rendered totally paraplegic, the seventh partially. However, all had experienced partial subsequent improvement.

Interval. The interval between injury and surgery ranged from 1 month to 17 years. Four of the seven patients were operated on 2½ years or longer after injury, while three were operated on 1, 2, and 9 months after injury.

Level. In all cases the injury involved the conus medullaris or the cauda equina. The distribution by levels was as follows:

<table>
<thead>
<tr>
<th>Spinal Level</th>
<th>No. of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>T12-L1</td>
<td>1</td>
</tr>
<tr>
<td>L-1</td>
<td>3</td>
</tr>
<tr>
<td>L-2</td>
<td>1</td>
</tr>
<tr>
<td>L2-3</td>
<td>1</td>
</tr>
<tr>
<td>L2-4</td>
<td>1</td>
</tr>
</tbody>
</table>

Block. In six cases, myelography was carried out, and four of these demonstrated a complete block, two intradural and two extradural. Two other patients showed only partial block secondary to arachnoiditis. The remaining patient, in whom a myelogram was not done, had a complete manometric block.

Operative Findings. In all of the cases, we found significant scarring that bound the conus or roots to dura, arachnoid, or adjacent neural tissue. Four patients had bony fragments within the spinal canal, which in one instance penetrated the dura. In six patients, neurolysis was carried out; in the other, only decompressive laminectomy was performed because of the extreme density and strength of the scar tissue.

Results

Neurological Improvement. In each of the seven patients, improvement occurred in at least one category of neurological function. In one patient, although there was measurable improvement in both motor and sensory function, there was no increase in general performance. However, in the other six patients there was significant improvement in either motor, sensory, or bladder function. In two patients, there was improvement in all of these categories.

Of the three patients unable to walk even with braces and canes, all recovered the ability to do so, in two instances unaided.

Of two patients incontinent preoperatively, one achieved normal bladder function, the other almost normal function. Of four patients with bladder function rated as fair to poor preoperatively, two showed improve-
ment after surgery. One of these, rated as poor, regained normal control.

A correlation was suggested between improvement and the interval since injury, in that the two patients who showed functionally significant gains in all categories were operated upon sooner after injury (1 month and 2 months) than the others in the series. However, as will be noted in the case histories, functionally significant improvement also occurred in at least one category among those patients in whom the interval was longest.

In four patients, one or more categories of neurological function were initially worse postoperatively. In two instances this was transient and the patients ultimately surpassed their preoperative levels of function. In the other two cases, the increased deficits were still present several months postoperatively; however, the functional activity of each actually improved despite these slight deficits, probably because of significant gains in muscle strength.

Onset of Improvement. In the two patients operated on at 1 and 2 months after injury, improvement continued at the same rate as it had preoperatively, but in one was accelerated after 2 weeks. In another patient (Case 3), in whom injury had occurred 17 months earlier, improvement was noted 8 hours postoperatively. In the other patients, the onset of improvement ranged from 8 days to 6 months.

Representative Case Reports

Case 1. A 25-year-old printer was admitted with a history of having fallen from an embankment 6 years earlier, sustaining a compression fracture of L-1. He was left with weakness and sensory loss in both lower extremities, but was able to walk. He was incontinent of both urine and feces, but sexual function was only mildly impaired. There had been no improvement in these disabilities for the last 3 or 4 years.

Examination. The patient had severe distal weakness in both legs, with complete paralysis of all toe movement. The anus was patulous, and normal superficial anal reflexes could not be elicited. Sensation was markedly decreased from S-1 through the coccygeal segments bilaterally. X-rays of the spine showed a compression fracture of L-1, and myelography demonstrated a complete block, intradural in type, with a split of the column of contrast medium at L-1 that suggested a bony spicule.

Operation. Laminectomy from T-12 to L-2 was carried out. The bony spicule was found and removed, disclosing a 5 mm dural defect in which elements of the cauda could be seen. The dura was opened, and the conus was found firmly attached to dura with scar tissue. No lysis was carried out for fear of reducing his fairly good sexual function.

Postoperative course. Within 3 weeks, there was definite knee flexion and extension, and improvement in ankle dorsiflexion. There was also improvement in sensation. By 11 months, significant further improvement had taken place in these categories, and bladder function had become normal, allowing the patient to discontinue use of an indwelling catheter. Sexual function had also improved. It should be stressed that this patient's spontaneous improvement had plateaued many years before this operation.

Case 2. A 35-year-old man was rendered paraplegic 2½ years earlier when he fell down an elevator shaft. X-rays taken at the time of the accident had shown a fracture of L-2, with dislocation of L-1 over L-2. Laminectomy had been carried out within 24 hours, and enlarged a few weeks later because of persistence of myelographic block. Following these procedures, and a later fusion at the level of the laminectomy, the patient had slowly improved and stabilized at a level where he had regained partial bowel, bladder, and sexual function, and was able to walk with braces. Only questionable minimal progress had resulted during the last year, which had been spent in the regular activities of a rehabilitation program.

Examination. There was extreme weakness in both lower extremities, especially distally, where except for a trace of plantar flexion of the left toes all toe and ankle movement was absent. Quadriceps function was absent on the right, and present only as a trace on the left; deep tendon reflexes were absent in both lower extremities. There was severe sensory loss on the right below the knee, slight impairment in the left foot, and scattered loss in the sacral dermatomes. Myelogram showed a complete block, epidural in type, at L2-3 plus evidence of arachnoiditis.

Operation. A dorsal decompression from