MIDLINE PROLAPSE OF A LUMBAR INTERVERTEBRAL DISC WITH COMPRESSION OF THE CAUDA EQUINA

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Midline prolapse of a disc causing compression of the cauda equina is rare but needs urgent diagnosis and surgical treatment. The onset of bladder and rectal paralysis with saddle anaesthesia should be viewed with a high index of suspicion in a patient with backache and sciatica. Eight cases were seen over a period of five years, and they fell into three clinical groups. Group I patients presented with a sudden onset without any previous symptoms related to the back. Group II patients had a history of recurrent episodes of backache and sciatica, the latest episode resulting in involvement of the cauda equina. The Group III patient was indistinguishable from one with a tumour as he presented with backache and sciatica slowly progressing to paralysis of the cauda equina. The prolapse was at the disc between L5 and S1 vertebrae in 50 per cent of the patients, most of whom did not have any limitation of straight leg raising. Urgent myelography and equally urgent removal of the disc within two weeks of the onset of the symptoms resulted in almost complete motor and bladder recovery within five months after the operation in most cases. However, recovery of sensation and sexual function was incomplete even four years after the operation.

Involvement of the cauda equina with bladder and rectal paralysis due to a prolapsed lumbar intervertebral disc is of rare occurrence but requires urgent surgical treatment. If decompression is delayed, prognosis for the recovery of bladder and rectal functions is poor.

This paper is a review of eight cases of compression of the cauda equina due to a prolapsed lumbar intervertebral disc, and its aim is to highlight the presenting features of this condition and stress the need for urgent treatment.

CLINICAL MATERIAL

Of a total of 121 patients operated upon at the University Department of Orthopaedic Surgery at Singapore General Hospital between 1972 and 1976 for prolapsed lumbar intervertebral discs, only eight had associated compression of the cauda equina (Table 1). The clinical presentation of these eight cases fell into three groups as classified by Tandon and Sankaran (1967): Group I—those with a sudden onset of compression of the cauda equina without any previous symptoms related to the lower part of the back (Cases 1, 2, 3); Group II—those with a history of recurrent low backache and sciatica, the latest episode resulting in cauda equina paralysis (Cases 4, 5, 6, 7); and Group III—those presenting initially with backache and bilateral sciatica and later progressing to involvement of the cauda equina simulating a tumour (Case 8).

Age and sex. There were five men and three women aged twenty-five to sixty-six years.

Symptoms. Significant correlation to trauma was noted in two patients in Group I. Backache was the common complaint of all the patients, associated with bilateral sciatica in six and unilateral sciatica in two. The one patient in Group III initially had a right-sided sciatica, which became left-sided and finally bilateral.

All except one patient (Case 8) had urinary retention at the time of presentation. Impairment of sexual function was seen in three of the five male patients, one from each group.

Physical findings. Details of the straight leg raising test, sensations, anal tone and motor weakness are shown in Table 1.

Myelography. Emergency myelography was done in six cases. They all revealed a total or near total block to the flow of the contrast medium at the level of the prolapse. In all instances in the anteroposterior projection the column of the dye at the level of the block showed an irregular sawtooth or paint-brush appearance (Fig. 1). In the lateral projection the anterior portion of the dural sac was compressed and elevated. In all cases the disc had herniated through the midline posteriorly and was compressing the cauda equina on at least one side. In none of the cases was there any evidence of arachnoiditis or intrathecal herniation of a sequestrated portion of the disc.
<table>
<thead>
<tr>
<th>Case</th>
<th>Age</th>
<th>Sex</th>
<th>Duration of backache</th>
<th>Duration of syndrome</th>
<th>History of trauma</th>
<th>Scatica</th>
<th>SLR test</th>
<th>Sensory signs</th>
<th>Motor signs</th>
<th>Tendon reflexes</th>
<th>Anal tone</th>
<th>Level of protrusion</th>
<th>Sensory recovery</th>
<th>Motor recovery</th>
<th>Bladder recovery</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>33</td>
<td>M</td>
<td>3 days</td>
<td>3 days</td>
<td>Lifting strain</td>
<td>Bilateral Positive</td>
<td>Bilateral</td>
<td>L5, S1 dermatome (R) Perianal anaesthesia (R)</td>
<td>Bilateral weakness of EHL</td>
<td>+  +  -  -</td>
<td>Lax</td>
<td>L4–L5</td>
<td>No recovery after 4 years</td>
<td>4 months</td>
<td>9 days</td>
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<tr>
<td>2</td>
<td>42</td>
<td>M</td>
<td>7 days</td>
<td>4 days</td>
<td>Nil</td>
<td>Left-sided</td>
<td>Bilateral Positive</td>
<td>S1 dermatome (L)</td>
<td>Bilateral weakness of EHL</td>
<td>+  +  -  -</td>
<td>Lax</td>
<td>L3–L4</td>
<td>3 months</td>
<td>No recovery after 1 year</td>
<td>5 days</td>
</tr>
<tr>
<td>3*</td>
<td>66</td>
<td>F</td>
<td>14 days</td>
<td>14 days</td>
<td>Myelographic procedure</td>
<td>Right-sided</td>
<td>Normal</td>
<td>Saddle anaesthesia</td>
<td>Nil</td>
<td>+  +  +  +</td>
<td>Intact</td>
<td>L5–S1</td>
<td>15 months</td>
<td>Intact</td>
<td>5 days</td>
</tr>
<tr>
<td>4</td>
<td>30</td>
<td>M</td>
<td>21 days</td>
<td>10 days</td>
<td>Nil</td>
<td>Bilateral Positive</td>
<td>Bilateral</td>
<td>Saddle anaesthesia</td>
<td>Nil</td>
<td>+  +  -  -</td>
<td>Not recorded</td>
<td>L5–S1</td>
<td>No recovery after 1 year</td>
<td>Intact</td>
<td>5 days</td>
</tr>
<tr>
<td>5</td>
<td>40</td>
<td>M</td>
<td>2 years</td>
<td>5 days</td>
<td>Nil</td>
<td>Bilateral Positive</td>
<td>Normal</td>
<td>Saddle anaesthesia</td>
<td>Nil</td>
<td>+  +  +  +</td>
<td>Lax</td>
<td>L5–S1</td>
<td>No recovery after 3 years</td>
<td>Intact</td>
<td>14 days</td>
</tr>
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<td>6</td>
<td>25</td>
<td>F</td>
<td>21 days</td>
<td>1 day</td>
<td>Nil</td>
<td>Bilateral Positive</td>
<td>Bilateral</td>
<td>L4, L5 dermatome (R) Saddle anaesthesia</td>
<td>Weakness of EHL (R)</td>
<td>-  +  -  +</td>
<td>Lax</td>
<td>L4–L5</td>
<td>1 year</td>
<td>5 months</td>
<td>10 days</td>
</tr>
<tr>
<td>7</td>
<td>60</td>
<td>F</td>
<td>1 year</td>
<td>2 days</td>
<td>Nil</td>
<td>Bilateral Positive</td>
<td>Normal</td>
<td>L3, L4, L5 (bilateral) Saddle anaesthesia</td>
<td>Weakness of both lower limbs from L3 level downwards</td>
<td>-  -  -  -</td>
<td>Lax</td>
<td>L2–L3</td>
<td>5 months</td>
<td>5 months</td>
<td>14 days</td>
</tr>
<tr>
<td>8**</td>
<td>33</td>
<td>M</td>
<td>3 months</td>
<td>3 months</td>
<td>Nil</td>
<td>Bilateral Positive</td>
<td>Normal</td>
<td>Saddle anaesthesia</td>
<td>Nil</td>
<td>+  +  -  -</td>
<td>Not recorded</td>
<td>L5–S1</td>
<td>5 months</td>
<td>Intact (No recovery of tendon reflexes after 18 months)</td>
<td>—</td>
</tr>
</tbody>
</table>

SLR=straight leg raising  
EHL=extensor hallucis longus  
* The syndrome with urinary retention was precipitated by myelography.  
** He had difficulty in passing urine on and off at the time of presentation but no retention of urine.  
His urinary symptoms improved twelve months after operation.  
All except Case 8 had retention of urine.
Postoperative course and follow-up
The longest follow-up was four years and the shortest was thirteen months. All the patients obtained relief from pain immediately after the operation. One patient (Case 7) died thirteen months after the operation of a staphylococcal sepsicaemia which at necropsy was confirmed to be unrelated to the operation on her lumbar spine.

Control of the bladder was classified as partial if the patient had recovered the bladder sensation and was able to pass urine on his own without a catheter. It was considered to have recovered fully when the patient was able to appreciate bladder sensation, had a good stream, no incontinence or frequency of urine and no persistent urinary infection. All the patients in Groups I and II who had bladder paralysis regained partial bladder control within five to fourteen days after the operation (Table I), and full control within five months (with one exception). The patient in Group III did not have complete bladder paralysis but he volunteered that his bladder control was normal only twelve months after the operation. There was generally poor sensory recovery in all patients.

Motor recovery was good in most patients who presented with gross weakness. Disturbances in sexual function did not improve; it was not possible to assess whether this was of organic origin or due to psychological factors.

ILLUSTRATIVE CASE REPORTS
Case 1 (Group I). A thirty-three-year-old labourer experienced severe backache radiating to both legs while lifting a heavy weight three days before his admission, and immediately felt weakness of his legs; he was unable to walk, had difficulty in passing urine and was sexually impotent. On examination, there was paralysis of the long toe extensors, absence of ankle reflexes on both sides and hypoaesthesia in the L5, S1, S2, S3 and S4 dermatomes on the right side. He had retention of urine with a distended bladder. Myelography revealed a complete block at the level of the fourth lumbar vertebra. An urgent, wide bilateral laminectomy of L4 was performed and a midline massive disc prolapse at the L4–L5 level, compressing the cauda equina, was removed. The bladder control returned by the ninth day after operation and although he was able to pass urine on his own it took two months to recover normal bladder function. The motor weakness recovered almost fully after four months. However, his sensation, sexual function and tendon reflexes had not returned to normal even four years after the operation.

Case 5 (Group II). A forty-year-old hospital attendant was admitted to the General Surgical Unit for acute retention of urine. He had a history of chronic backache with right-sided sciatica for two years which had responded to conservative management. Five days before his admission, he had developed bilateral sciatica, followed by urinary retention and impotence. Clinical examination revealed saddle anaesthesia, a distended bladder and loss of anal tone. The straight leg raising test was normal on both sides, there was no motor weakness in the lower limbs and the knee and the ankle reflexes were present on both sides.

Myelography revealed a complete block at the fifth lumbar vertebra. A wide bilateral laminectomy of L5 was performed immediately and a large posterior midline disc prolapse at the L5–S1 level was removed. On the fourteenth day after operation he was able to pass urine but it took sixteen months for him to recover normal bladder function. Three years after operation he was still not able to have a sustained erection and there was only slight improvement in his perianal sensation.

Case 8 (Group III). A thirty-three-year-old man had a history of low backache with right-sided sciatica for three months before his admission. It settled but soon recurred with initially a left-sided and then bilateral sciatica. At this time he noted transient difficulty in passing urine, impotence and perianal hypoesthesia. Clinically, spinal flexion was limited, both the ankle reflexes were absent and there was perianal hypoesthesia but no motor weakness. A slow-growing tumour of the cauda equina was suspected.

A myelogram (Fig. 1) revealed a block at the level of the L5–S1 disc space, and at operation a large midline disc prolapse was removed. His pain was promptly relieved and the perianal hypoesthesia disappeared after five months. Bladder control returned to normal one year after operation. At the end of two years there was no recovery of his ankle reflexes and he still complained of delayed ejaculation and sometimes incomplete erection.

DISCUSSION
The incidence of reported cases of compression of the cauda equina due to a prolapsed intervertebral disc is small. Ver Brugghen (1945) reported eight cases, O’Connell (1951) noted a 2 per cent incidence and Robinson (1965) reported an incidence of 3.4 per cent. It must be stressed that every prolapsed lumbar
intervertebral disc is a potential danger. To detect compression early, a high index of suspicion is necessary.

Trauma as a precipitating cause was not a prominent feature in our patients nor in the twenty-five cases reviewed by Jennett (1956). However, Shephard (1959) reported that ten out of thirteen of his patients had a history of trauma. A history of a previous spinal operation to remove a degenerate disc is significant as remnants of the annulus have been known to give rise to compression of the cauda equina. Although severe backache with bilateral sciatica should raise the spectre of compression of the cauda equina, three out of four patients with a midline prolapse at the L5–S1 level and one patient with a midline prolapse at the L2–3 level did not have any limitation of straight leg raising. Saddle anaesthesia and bilateral absence of ankle reflexes in association with bladder symptoms were the consistent features in our patients.

A myelographic examination is a prerequisite to the operation and must be done as an emergency. It confirms the diagnosis, defines the level of the prolapse and excludes the presence of multiple prolapses. The differential diagnosis from transverse myelitis, diabetic myelopathy, extradural abscess and extradural tumour may sometimes be difficult. Acute transverse myelitis of the conus medullaris and a tumour of the cauda equina may present with clinical features which are indistinguishable from those of a midline prolapse of the disc with compression of the cauda equina. All patients in our review had posterior midline prolapse. This fact was also noted by Shephard (1959) in all his thirteen patients. However, Scott (1965) reported that of his ten patients only one had a midline prolapse while in the rest it was posterolateral. The reason why a posterior midline prolapse occurs is still not clear. Farfan, Huberdeau and Dubow (1972), in experimental stress studies of 182 cadaveric spines, noted that almost all discs with a rounded posterior surface developed posterior midline ruptures when subjected to stress. The commonest site of midline prolapse in our series was at the L5–S1 level.

The operative procedure for this syndrome, which should be done as soon as possible after the diagnosis has been made, is different from that for an uncomplicated case of a prolapsed lumbar disc. Since a liberal exposure is absolutely essential, a bilateral laminectomy should be done. This enables adequate visualisation of the lesion and avoids excessive retraction of the dura. Where it is difficult to remove a tense midline prolapse without excessive retraction of the dural sac, it is advisable to remove the offending disc via a transdural approach. In our series we did not have to resort to this approach in any of our cases.

It is an acknowledged fact that the extent of recovery is related to the time interval between the onset of symptoms and the operation, but Jennett (1956) in his review of twenty-five cases noted that there was no evidence for this. However, Tandon and Sankaran (1967) reported that for Groups I and II recovery was especially poor if the operation was performed more than two weeks after the onset of the syndrome. In our series, all patients except the one in Group III were operated upon well within fourteen days resulting in good motor but incomplete sensory recovery. In the majority of the patients the bladder function recovered gradually with full control within five months. The longest period of bladder recovery was sixteen months. Although we were unable to perform cystometric studies to assess the return of bladder function, none of the patients had any residual urological problems necessitating the use of any appliances, nor any recurrent urinary infection nor permanent renal dysfunction.

Poor recovery of sexual function in the affected male patients was a significant feature but it was not possible to assess whether there were any associated psychological factors.

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REFERENCES


