Syndromes associated with protrusion of upper lumbar intervertebral discs

Results of surgery

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This report reviews a series of 69 patients operated on for herniations of upper lumbar intervertebral discs and identifies four syndromes related to the principal complaint. These are, in order of frequency, anterior thigh pain, low-back pain only, sciatica, and acute paraplegia. Overall, 78% had satisfactory relief of pain and 93% were improved following laminectomy. Satisfactory results were more common with protrusions at L3-4 than at L2-3. Patients in whom the onset was sciatica had a higher percentage of satisfactory results (94%) than those with anterior thigh pain (70%) or low-back pain alone (80%). Neither of the patients with a paraplegic onset had a good recovery even after removal of the extruded disc.

KEY WORDS • upper lumbar intervertebral disc • anterior thigh pain • sciatica • paraplegia • laminectomy

Of 1000 consecutive patients operated on for herniation of a lumbar intervertebral disc at Episcopal Hospital in Philadelphia, only 69 (6.9%) had herniations or ruptures of the upper lumbar discs (L-1 to L-3 interspaces). These cases form the basis of this review. Gurdjian and his associates found an even lower incidence of upper lumbar disc herniations. Semmes similarly found only 32 upper lumbar disc herniations in 1500 cases. Other large series of lumbar disc herniations have reported incidences from 3.0% to 9.25%. Only one review of these lesions is available in the English literature and is confined to the consideration of the anterior thigh pain syndrome most commonly observed with upper lumbar disc herniations. Reviews of small series have been found in foreign journals.

Method

The records of the 69 patients with upper lumbar disc herniation were reviewed as to their presenting clinical syndrome, findings on x-ray examination, changes in the cerebrospinal fluid (CSF), and results of treatment. Patients with only degenerative lumbar arthritis and chronic back pain, or even radicular symptoms, have not been included in this series. All 69 patients of this series were re-examined by a member of the neurosurgical staff in a postoperative period ranging from 1 month to 11 years and averaging 20 months. The patients ranged in age from 30 to 80 years, averaging 53 years;
there were 51 men and 18 women. Table 1 summarizes the locations of the lesions.

The patient's own estimate of improvement at the time of the most recent follow-up examination was considered an important factor in the assessment of the results of surgery. When the patient was asymptomatic the result was classified as "excellent"; when he reported marked improvement but with mild residual back pain the result was classified as "good"; when the patient felt the severity of the pain was distinctly less but that he still was disabled by his original complaint the result was classified as "fair." The results were considered "poor" if the initial symptoms were unchanged or worse. Patients whose results were classified as either "excellent" or "good" were considered to be "satisfactory" results.

For purposes of this review we have defined a herniated disc as a protrusion of the disc out of the interspace while the annulus fibrosis and posterior longitudinal ligament remain intact; a ruptured disc refers to a disc that enters the epidural space through defects in these structures.

Results

Patients with upper lumbar disc lesions presented four distinct clinical pictures (Table 1).

Anterior Thigh Pain

Forty of 69 patients (58%) had anterior thigh pain as their principal complaint. Twenty-two patients had herniated discs and one a ruptured disc at L3-4; 10 had herniated discs and four ruptured discs at L2-3; two had herniated discs and one a ruptured disc at L1-2. Midline disc protrusions occurred in five patients, all at the L3-4 level. The knee reflex was depressed in 18 patients (12 at L3-4 and six at L2-3). Atrophy and weakness of the quadriceps muscle was present in eight patients, associated with a depressed patellar reflex in all individuals with this finding. There was moderate to marked paravertebral spasm with restriction of back-bending in 19 patients. Pain and restriction of straight-leg raising was noted in five patients (four with disc herniations at L3-4 and one at L1-2).

X-ray films of the lumbosacral spine revealed narrowing of the appropriate interspace in only four patients. Pantopaque myelography was abnormal at the proper level in 38 of 40 patients; 29 had unilateral defects, three bilateral defects, and six complete blocks. Two patients with normal myelograms were thought to have root compression at operation. The CSF protein was normal (up to 50 mg%) in 13 patients and elevated in 24 (six of these had a complete block).

Low-Back Pain Without Radicular Pain

Ten patients with upper lumbar discs (15%) had histories limited to chronic or recurrent low-back pain. Seven patients had herniated discs, and one had a ruptured disc at L3-4. One patient had a herniated disc at L1-2 and another at L2-3. The disc protrusions were reported to be distinctly midline in six of these ten individuals.

Straight-leg raising tests were positive in two patients. There was moderate-to-marked paravertebral muscle spasm with restriction of back-bending in six patients. The knee reflex was depressed in two patients (both at L3-4 level), and there was a foot drop without radicular pain in two patients (one at L2-3 and one at L3-4).

X-ray films of the lumbosacral spine revealed narrowing at the proper interspace in one patient, narrowing of lower inter-
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spaces in three, and mild scoliosis in one. Myelography was positive in all patients, revealing midline lesions in six, three of whom had a complete block. The CSF protein was normal in three patients, and elevated in seven (three of these had a complete block).

Sciatica

Seventeen patients (25%) presented with typical sciatica and all lesions were at the L3-4 level. Fourteen were herniated discs and three, ruptured discs; two of the disc protrusions were reported to be midline.

Examination revealed pain and restriction of straight-leg raising in 11 patients. Moderate-to-marked paravertebral muscle spasm with restriction of back-bending was reported in eight individuals. The ankle reflex was depressed in six patients and the knee reflex depressed in three. There was weakness of dorsiflexion of a foot in seven patients.

X-ray films of the lumbosacral spine disclosed narrowing at L3-4 in only one instance, narrowing of L4-5 twice, spondylolisthesis at L4-5 in one patient, and at L5-S1 in another. Myelography revealed a unilateral defect at L3-4 in nine patients, a bilateral defect in three, and a complete block in five. The CSF protein was normal in eight of this group and elevated in nine (five with complete blocks on myelography).

Paraplegia

Two men presented with sudden onset of paraplegia. Both had complete myelographic blocks at L2-3, and massively ruptured discs were found at this level. Unfortunately, these patients were not seen until 48 and 72 hours respectively after the abrupt onset of complete paraplegia and even though operated on without further delay, both have shown only incomplete recovery and continue to be disabled.

Follow-Up

Twenty-five patients had excellent results, 27 good, 10 fair, and five poor. The two patients with paraplegia have shown some improvement but are still disabled. Satisfactory results were obtained in 78% of the patients with pain syndromes only. Results were satisfactory in 28 of 40 patients with anterior thigh pain (70%), eight of 10 patients with chronic low-back pain (80%) and 16 of 17 patients with sciatica (94%) (Table 2). Satisfactory results were found in 40 of 48 patients with lesions at the L3-4 interspace (83%), nine of 17 cases at the L2-3 level (53%), and three of four cases at the L1-2 level (Table 3). Thirty-one of 44 patients (70%) with unilateral disc herniation had satisfactory results. Nine of 10 patients with ruptured discs and 12 of 13 patients with midline disc protrusions also had satisfactory results (Table 4).

Discussion

The most common clinical syndrome in the overall series was low-back pain radiating into the anterior or anterolateral thigh. This syndrome was the most common one with disc protrusions at the L2-3 level (82%) and less frequent with lesions at the L3-4 level (48%). There was an accompanying depression of the patellar reflex in 45% of these individuals with quadriceps muscle wasting in at least 20%. Despite the more frequent occurrence of lesions at the L2-3 interspace in patients with anterior thigh pain, the patellar reflex was more frequently reported to be impaired in

<table>
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<th>Clinical Syndrome</th>
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<th>Fair</th>
<th>Poor</th>
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<td>12</td>
<td>5</td>
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patients with lesions at the L3-4 interspace (17 to 6). This indicates that the L-4 root usually contributes more significantly than the L-3 root to the patellar reflex.

Seventeen patients with disc herniations at the L3-4 level had a true sciatica. Taptas reported sciatica in seven of 20 cases with upper lumbar discs and much more commonly at the L3-4 level. Dragonetti and Bianchi also reported two cases with sciatica in their series of 17 cases, both with herniations at the L3-4 level. It should be emphasized that true sciatica was not found with herniations at the L1-2 or L2-3 levels but only at the more caudal L3-4 level. The clinical picture in these patients may be attributed to a more medial and downward herniation of the disc at this level compressing the more medial L-5 root rather than the L-4 root which lies more laterally. Other possibilities could be the presence of a lumbosacral plexus with a significant L-4 contribution to the sciatic nerve, or a relatively high takeoff of the L-5 root. The combination of sciatica with a depressed patellar reflex can be explained by a massive protrusion of the L-4 disc impinging on the L-5 root medially and the L-4 root laterally. This explanation is supported by the occurrence of a complete myelographic block and an almost complete obstruction in two of the three patients with this association of findings.

The 10 surgical patients in this series whose only complaint was back pain were selected by myelography after repeated severe exacerbations of low-back pain or when in a particularly intractable episode. Myelography was positive at the proper level in 67 of 69 patients (97%); Aronson and Dunsmore reported 80%. There were no false positive results in our series.

In general we have not operated on patients with negative myelographic findings; unfortunately the records of nonsurgical patients with negative myelograms and clinical syndromes compatible with upper lumbar disc lesions could not be sufficiently retrieved for a worthwhile retrospective analysis. No comments on the incidence, if any, of false negative myelograms could be found in the literature. It is our impression that myelography is more reliable in this regard at the upper lumbar levels than below. It is well known that the incidence of false negative myelograms is far less at the L4-5 interspace than at the L5-S1 level.

The incidence of complete block, midline or bilateral defects on myelography was 36% in this series and was much more common in the group of patients with chronic back pain. In this group we feel that even if the symptoms are unilateral, bilateral exploration and decompression are required.

Myelography was also valuable in the evaluation of the group with sciatica by identifying the proper interspace (L3-4) and avoiding a negative exploration at the lower interspaces.

Seventy-eight percent of our patients had eminently satisfactory results, and 93% were improved following laminectomy for upper lumbar disc protrusions. Aronson and Dunsmore and Taptas reported 80% favorable results and Paillas, et al., 73%. The surgical results on upper lumbar discs fall short of the more favorable reports on selected by myelography after repeated severe exacerbations of low-back pain or when in a particularly intractable episode. Myelography was positive at the proper level in 67 of 69 patients (97%); Aronson and Dunsmore reported 80%. There were no false positive results in our series.

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**TABLE 3**

*Results of surgical treatment related to disc level*

<table>
<thead>
<tr>
<th>Disc Level</th>
<th>Excellent</th>
<th>Good</th>
<th>Fair</th>
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<tr>
<td>L1-2</td>
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<td>1</td>
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<tr>
<td>L2-3</td>
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<td>4</td>
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</table>

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**TABLE 4**

*Results of surgical treatment related to findings at surgery*

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<thead>
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<td>9</td>
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</tr>
<tr>
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<td>1</td>
</tr>
<tr>
<td>ruptured disc</td>
<td>4</td>
<td>5</td>
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</tr>
<tr>
<td>total</td>
<td>25</td>
<td>27</td>
<td>12</td>
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</table>

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lower lumbar disc lesions.\textsuperscript{8,9,11} However, other series\textsuperscript{8,7} of lower lumbar discs reported no better results than those noted in upper lumbar lesions. Comparison of the results of these various series may not be completely valid because of the different methods used in classifying results. For instance, if in evaluating our series the “fair” results had been considered “satisfactory,” the total of “good” results would be raised from 78% to 93%.

An effort to explain the 17 unsatisfactory results in this series yields only limited information. The poor results in the two patients with paraplegia might be attributed to a delay in surgery. The two patients with normal myelograms had only small disc herniations and have had only fair results. Twelve of the patients with an unsatisfactory outcome had anterior thigh pain, two had low-back pain, and only one had sciatica. Thus, 30% of the patients with anterior thigh pain had unsatisfactory results as opposed to only 11% of the patients with the other pain syndromes. The reason for this difference is not clear.

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