Extreme-lateral lumbar disc herniations

Clinical syndrome and special problems of diagnosis

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The authors believe that posterior lumbar disc herniations that occur far laterally (beneath, or beyond the facet) present a clinical picture and special problems of diagnosis different from those encountered with the usual herniations within the spinal canal. In a series of 204 consecutive disc operations, there were 24 "extreme-lateral" disc herniations at the second, third, or fourth lumbar interspace, none at the lumbosacral joint. When compared with the incidence of posterior herniations above the fourth interspace, it appeared that "extreme-lateral" herniations were responsible for the majority of second, third and fourth lumbar root compressions. The clinical syndrome is characterized by anterior thigh and leg pain, absent knee jerk, and sensory loss in the appropriate dermatome but also by the absence of back pain, typical back signs, or positive Lasegue's sign. Reproduction of pain and paresthesia by lateral bending to the side of the lesion is a reliable diagnostic sign. The authors report that myelography fails to disclose these lesions, while discography often proves helpful.

KEY WORDS • ruptured intervertebral disc • extreme-lateral herniation • disc syndromes • myelography • discography • Lasegue's sign

Most herniated discs in the lumbar region occur posteriorly in the mid-lateral position and compress the nerve root that exits one level lower. If a herniation occurs far enough laterally (beneath, or beyond the facet), it compresses the corresponding nerve root at its exit from the intervertebral foramen (Fig. 1). In this location the disc herniation is outside the anatomical boundaries of the spinal canal and cannot be demonstrated by myelography or by limited exploration. Not surprisingly, these lesions have proved elusive and their true incidence has not been recognized.

In reviewing our experience with these herniations, we hoped to determine their true incidence and to identify preoperative features that would distinguish them from the usual herniations within the spinal canal. We also wished to evaluate the helpful role we have found for discography in diagnosing these lesions, in contrast with our nonproductive experience with myelography.

Material and Methods

Cases studied were identified from 204 unselected cases seen in the last 2 years through regular referral channels. The 24 cases comprising this series were routinely investigated by myelography, which when negative was followed directly by discography. Myelography was always performed first because extravasation of the medium renders the study useless if performed after the discogram. Based on our experience, we now believe it is
justifiable to start with discography, provided lumbar puncture and manometric studies precede the discogram to rule out tumors and extruded fragments within the spinal canal.

Discography was routinely carried out at the second through the fourth interspaces since the clinical picture suggested involvement of L-2 through L-4 nerve roots. Except for one extremely obese patient for whom a needle of sufficient length was not available, all discograms were technically satisfactory. Surgical exposure was accomplished by partial laminectomy and undermining the facet with a drill. In a few cases early in the series facetectomy was performed, but this is now avoided when possible. One herniation that projected strictly from the lateral surface required combined extraspinal and intraspinal exposure resulting in visualization of the nerve root in continuity with the proximal portion of the spinal nerve; in this case it was the spinal nerve distal to the ganglion that was compressed rather than the nerve root. Details of the techniques of discography and operation are beyond the scope of this paper.

Analysis of Cases

Incidence

The 24 cases of "extreme-lateral" herniation represent an incidence of 11.7%. Although admittedly a small series, the credibility of the incidence figure was reinforced if the series was divided into 6-month intervals; the incidence was found to be essentially the same in all periods. Not only is this incidence surprisingly high, it assumes further significance when compared with the incidence of herniated discs above the L4-5 level where similar neurological findings might be expected. Although in one series an incidence of 5.2% was reported, Table 1 shows that the incidence in several series ranged between 1.6% and 3.6%, with an average of 2.7%. These figures indicate that whenever the neurological findings suggest upper lumbar nerve root compression, the chances are 4 to 1 that the responsible lesion is an extreme-lateral disc herniation.

The distribution of the 24 cases at various disc levels is summarized in Table 2; the majority occurred at the L4-5 interspace, and no cases of extreme-lateral disc herniation were encountered at L5-S1. The reason may be related to the mechanism of injury. In analyzing the clinical histories it seemed clear that in some cases the movement that precipitated pain was strictly lateral bending, while in the remaining cases it was more complex but did in part involve lateral bending. Injuries occurred most commonly in workers on assembly lines or in packing factories where a relatively heavy object is picked up from the front and lifted to one side or vice versa. When back movements were observed by fluoroscopy and cineradiography, it appeared that lateral bending involved primarily the second through the fourth interspace. Although this concept is speculative, the

<table>
<thead>
<tr>
<th>Author, Year</th>
<th>Total Cases</th>
<th>Herniations</th>
<th>Herniations Above L4-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>O'Connell (1951)</td>
<td>500</td>
<td>8</td>
<td>1.6</td>
</tr>
<tr>
<td>Raaf (1959)</td>
<td>638</td>
<td>19</td>
<td>3</td>
</tr>
<tr>
<td>Gurdjian, et al. (1961)</td>
<td>1176</td>
<td>20</td>
<td>2</td>
</tr>
<tr>
<td>Brown &amp; Pont (1963)</td>
<td>487</td>
<td>18</td>
<td>3.6</td>
</tr>
<tr>
<td>Semmes (1964)</td>
<td>6000</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Abdullah, et al. (1974)</td>
<td>1076</td>
<td>33</td>
<td>3.1</td>
</tr>
</tbody>
</table>

FIG. 1. Diagram showing relation of "extreme-lateral" disc herniation to the spinal canal and nerve roots.
Extreme-lateral lumbar disc herniations

### TABLE 2

<table>
<thead>
<tr>
<th>Disc Level</th>
<th>Extreme-Lateral Herniation</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>L2-3</td>
<td>5</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>L3-4</td>
<td>1</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>L4-5</td>
<td>18</td>
<td>75</td>
<td></td>
</tr>
<tr>
<td>total</td>
<td>24</td>
<td>100</td>
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</table>

The possibility that the mechanism of injury could influence the direction of disc herniation deserves more thorough investigation.

**Characteristic Clinical Findings**

A history of back injury was elicited in most cases. Initially patients complained of transient sharp back pain on one side or the other, vague discomfort in the hip, and severe pain down the anterior thigh. Later the pain was chiefly in the anterior thigh with occasional discomfort in the hip. The duration of symptoms before patients came to surgery varied from 1 to 17 months, with an average of 5 months. Of the 24 patients in this series, 19 were men and five were women, ranging in age from 42 to 63 years with a median age of 50.

Table 3 shows the characteristic features associated with these herniations: 1) The usual back signs, such as, paravertebral muscle spasm, tenderness, limitation of flexion and extension, list, or flattening of the lumbar curvature were absent. 2) Pain on straight-leg raising was absent in over 90% compared with positive Lasegue's signs in 97.6% and 99% of the patients with disc herniations. 3) Characteristic pain and paresthesias were reproduced by lateral bending to the side of the lesion; this sign was present in 83% of the cases. 4) The neurological signs were those expected from involvement of the L-2, L-3, and L-4 nerve roots. The knee jerk was absent or diminished in 88%. It is interesting to speculate regarding the significance of this finding relative to some disc series reports in which changes in this reflex were considered of little or no localizing value. Figure 3 shows the distribution of pain and sensory changes according to the level of the lesion.

As a rule the distribution of the pain and sensory loss with L-2 involved the groin and medial thigh; with L-4, the anterolateral aspect of the thigh and medial aspect of the leg below the knee. We had only one case in which L-3 was involved with pain and sensory loss in the anterior thigh. In general, the dermatomal distribution of sensory loss in the case of "extreme-lateral" discs is reliable since one can expect only one nerve root to be compressed by the herniated disc.

Semmes referred to these lesions through the statement that in the majority of cases where there is compression of the fourth lumbar nerve root, the herniated disc is at the

### TABLE 3

**Summary of clinical findings**

<table>
<thead>
<tr>
<th>Clinical Findings</th>
<th>Level of Herniation</th>
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<tbody>
<tr>
<td></td>
<td>L4-5</td>
</tr>
<tr>
<td>total no. of cases</td>
<td>18</td>
</tr>
<tr>
<td>back pain absent leg pain</td>
<td>18</td>
</tr>
<tr>
<td>anterolateral aspect of thigh and anteromedial aspect of leg</td>
<td>17</td>
</tr>
<tr>
<td>negative Lasegue sign</td>
<td>15</td>
</tr>
<tr>
<td>pain with lateral bending toward lesion</td>
<td>16</td>
</tr>
<tr>
<td>knee jerk reduced or absent paresthesia and sensory loss quadriceps weakness</td>
<td>14</td>
</tr>
<tr>
<td>quadriceps weakness</td>
<td>12</td>
</tr>
</tbody>
</table>
Fig. 2. Discograms showing "extreme-lateral" herniations. *Upper Left and Right:* Herniation at L4-5. *Lower Left and Right:* Herniation at L2-3. Here the disc retains its normal bilocular configuration indicating absence of degeneration; the herniated fragments were excised without radical discectomy.
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Fig. 3. Diagrams showing distribution of pain, paresthesia and sensory loss in cases of "extreme-lateral" disc herniations. Left: Herniation at L2-3. Center: Herniation at L3-4. Right: Herniation at L2-3. Dots in each composite figure (from cases in this series) represent the location of all points of pain and sensory loss.

Fourth interspace. Others have, undoubtedly, encountered these lesions, but the reference is uncertain. Disc lesions described as high discs, far lateral, and superiorly placed may have included this type of lesion. On the other hand, the term "far lateral" has often been used to describe disc herniations lateral or dorsolateral to the nerve root, or to refer to extruded fragments that migrate for a distance along the nerve root which exits one level lower. The proposed term "extreme-lateral" may focus attention on the precise and outermost location of the herniations discussed in this paper.

Role of Diagnostic Discography

Neurosurgeons are familiar with the controversy surrounding discography. So far many have been reluctant to use it, either because it is regarded as being more complicated than myelography, or because it has never been demonstrated that discography can provide practical information that myelography cannot. However, extreme lateral disc herniations seem to present a specific indication for discography, which provides a positive diagnosis not available in myelography. In the period since the initial observations were reported, Gardner and Dohn verified the discographic findings; and Patrick in a recent report on discography reiterated its role in the diagnosis of these lesions.

Despite the predictable clinical syndrome, occasions arise when there is a need to confirm the diagnosis preoperatively. Limitations of myelography in the diagnosis of lumbar disc herniations have been pointed out by several authors. In the case of "extreme-lateral" disc, myelography consistently failed to demonstrate the lesion while discography, which also has its limitations, proved to be valuable in demonstrating the precise location of the herniation (Fig. 2).

Discography was helpful in all of our cases. In most cases all the criteria of a positive discogram were present. In a few instances the anteroposterior projection of the discogram was considered positive on the basis of lateralization of the contrast medium to the side of the lesion without extravasation or reproduction of the pain, provided the clinical findings were typical. This occurred when there was an extruded and separated fragment or when the disc was markedly degenerated so that the medium dispersed within the disc. We think it is important to remember that a normal discogram is rare and that, therefore, meaningful interpretation of an abnormality depends on its correlation with the clinical picture.

Apart from its value in localizing the lesion we believe discography provides valuable information regarding the degree of disc degeneration and in many instances the exact relation of the protrusion to the facet; thus it contributes guidelines for the operative management, namely, the extent and direction of exploration and the extent of discectomy. From an operative point of view, in "extreme-lateral" discs without discographic evidence of degeneration, we favor simple removal of the herniated or extruded fragments rather than radical discectomy.

References

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This paper was presented before the Southern Neurosurgical Society, Atlanta, Georgia, February 22, 1973.

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