Interlaminar discectomy and selective foraminotomy in lumbar disc herniation

Manish Garg
Department of Orthopaedics, BP Koirala Institute of Health Sciences, Dharan, Nepal

Sudhir Kumar
Department of Orthopaedics, University College of Medical Sciences and Guru Teg Bahadur Hospital, Delhi, India

ABSTRACT

Our objective was to assess the clinical outcome of interlaminar discectomy in patients suffering with degenerated lumbar disc lesions. We made a prospective study of 50 consecutive patients who underwent limited lumbar discectomy. The clinico-radiological parameters, type of surgery performed and the post-operative follow up were assessed.

We found that interlaminar discectomy without laminotomy was adequate in 33 cases (66%). Most patients requiring laminotomy (17 cases –34%) for discectomy had associated lumbar canal stenosis, herniation at proximal levels (L3–4) and/or sacralization of L5 vertebra. Selective foraminotomy in addition to discectomy was performed in 28 cases (56%). The post-operative results were good in 43 (86%) fair in 6 (12%) and poor subjective in 1 case (2%). No patient was classified as poor objective.

In conclusion, interlaminar discectomy without laminotomy is a safe, effective and reliable surgical technique for treating properly selected patients with herniated lumbar disc at L4–5 and L5–S1 levels.

Key words: interlaminar, limited disc excision, lumbar spine, foraminotomy

INTRODUCTION

The success rate after lumbar disc surgery varies considerably from 46% to 96%. In the past, various authors have attributed this variability to the surgical technique. It is apparent, however, that a more common reason is faulty patient selection criteria.

The technique of lumbar disc surgery has undergone significant modifications. Originally, a wide laminectomy was performed in an attempt to remove as much disc material as possible. This more radical surgical approach is no longer common. In 1982, Spengler described limited disc excision. Only the ligamentum flavum and, if necessary, a small unilateral foraminotomy is performed to expose the affected disc space. Only the fragments of disc material on the affected side are removed through a small annular incision. Nachemson advocated removal of only sequestrated and extruded loose disc fragments, with minimal removal of tissue fragments from the intervertebral disc space. Disc material remained even after an apparently ‘complete’ lumbar discectomy was performed in his laboratory. The advantage of a limited lumbar disc excision is a decrease in the manipulation of the neural elements and subsequent diminished perineural fibrosis. In addition, a limited disc excision lessens the likelihood of anterior penetration of the annulus with potential injury to
vessels and/or viscera. The comparable results of limited disc excision and microdiscectomy in various series might be due to close similarity of the two techniques.4,2,8

This study was performed to assess the results of limited disc excision through an interlaminar approach in patients in whom specific objective criteria were used to justify surgical intervention.

MATERIALS AND METHODS

The study group comprised of 50 patients who underwent lumbar discectomy over a two-year period, from January 1998 to December 1999. Twenty-eight patients were men and 22 were women. The average age at surgery was 36 years (range, 18–60 years). Objective neurologic deficit was observed in 19 patients (38%). The clinical diagnosis was confirmed by computed tomography in all patients. The indications for lumbar discectomy in our series were bladder and bowel involvement (cauda equina syndrome), progressive motor deficit, failure of conservative treatment, recurrent sciatica and a significant motor deficit with significant positive straight leg raising test. The patients who responded to adequate trial of conservative treatment for a period of at least six weeks to three months were not subjected to surgery. Pre-operative marker films (Plain roentgenogram of lumbosacral spine – AP view) were obtained in all cases. Surgery was performed with the patient in a knee-chest position. A standard vertical midline incision, centered over the appropriate interspace, was used. The interlaminar space was identified on the affected side. Only the ligamentum flavum and, if necessary, a small unilateral laminotomy was performed to expose the affected disc space. The dural sac and the nerve root were retracted medially and limited disc excision was performed. After disc removal, the neural foramen was assessed and if necessary, a selective foraminotomy was performed. The residual interlaminar/laminotomy defect was covered by an autogenous free fat graft.

RESULTS

28 patients (56%) had disc herniation at L4–5 level and 16 patients (32%) had disc herniation at L5–S1 level (Table 1). Of the remaining 6 patients, 3 had concomitant disc herniation at L3–4 and L4–5 level and an equal number had concomitant disc herniation at L4–5 and L5–S1 level. Out of 28 cases of disc herniation at L4–5 level, 16 patients (57%) were managed by interlaminar discectomy (no laminotomy required) with or without foraminotomy and the remaining 12 patients (43%) required ipsilateral unilateral laminotomy and discectomy with or without foraminotomy. Out of 16 cases of disc herniation at L5–S1 level, 15 patients (94%) were managed by interlaminar discectomy with or without foraminotomy and only one patient (6%) required laminotomy and discectomy with foraminotomy.

Two level laminotomy and discectomy was performed in all 3 patients of concomitant disc herniation at L3–4 and L4–5 level. Of the 3 patients of concomitant disc herniation at L4–5 and L5–S1 level, 2 cases were managed by interlaminar discectomy with or without foraminotomy and one patient required laminotomy and discectomy with foraminotomy. A limited medial ipsilateral foraminotomy was done in 28 cases (56%) in which it was thought that the involved nerve root remained tight following disc excision.

<table>
<thead>
<tr>
<th>Level of herniation</th>
<th>No. of patients</th>
<th>Type of Surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Interlaminar discectomy</td>
</tr>
<tr>
<td>L4-5</td>
<td>28</td>
<td>10</td>
</tr>
<tr>
<td>L5-S1</td>
<td>16</td>
<td>6</td>
</tr>
<tr>
<td>L3-4, L4-5</td>
<td>3</td>
<td>–</td>
</tr>
<tr>
<td>L4-5, L5-S1</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>17</td>
</tr>
</tbody>
</table>
The average operating time for lumbar discectomy was 75 minutes, with a range of 60–120 minutes. The average blood loss was 180 ml. No patient required a blood transfusion. The average hospital stay after surgery was 2 days (range 1–5 days). Amongst the complications, 2 patients had minor dural punctures, which were covered by gelfoam and did not require dural repair. One patient had a superficial wound infection, which subsided with appropriate antibiotics for three weeks.

All patients were assessed after one year or longer following lumbar discectomy. The average follow up was 18 months, with a range of 12–24 months. The results were evaluated using Spengler’s modification of MacNab’s criteria. The results were classified as good in 43 patients (86%), fair in 6 (12%) and poor subjective in one (2%). No patient was classified as poor objective. The functional recovery of the objective neurologic deficit (19 cases) occurred within 3–12 months after surgical decompression.

**DISCUSSION**

A review of the literature reveals success rates for lumbar discectomy ranging from 46–96% [1,11,1]. The outcome of lumbar discectomy depends more on patient selection than on surgical technique. Good results were obtained in 86% of the cases in our series. The fair and poor results were related to subjective factors rather than to any objective impairment of function of the musculo-skeletal system.

The technique of limited disc excision was described by Spengler in 1982. The advantages of this technique are diminished perineural fibrosis and less likelihood of damage to vessels and/or viscera anterior to the annulus. In the present study, interlaminar discectomy was adequate in 33 cases (66%). No laminotomy was required in these cases. Only 17 cases (34%) required unilateral laminotomy for discectomy. Most of the patients requiring laminotomy had either associated lumbar canal stenosis or herniation at proximal levels (L3–4, L4–5). Laminotomy was done mostly during the early phases of our experience, but gradually we matured on the interlaminar discectomy. At L5–S1 level, laminotomy was required in only one case, because the interlaminar space was not adequate enough for discectomy due to sacralization of L5 vertebra. Thus interlaminar approach without laminotomy gives adequate space for disc excision at L4–5 and L5–S1 levels in the majority of the cases.

The role of autogenous free fat graft or gelfoam to prevent perineural fibrosis is still debated. We routinely used autogenous free fat graft to cover the residual interlaminar/laminotomy defect in our cases. No case of perineural fibrosis was reported in our series till the last follow up.

A few authors have reported a higher level of success, a shorter hospital stay and a quicker return to work with microdiscectomy [4,9,12,16] but that has not been established in well-controlled studies [15,5]. In our series, the operating time, in patient stay and success rates were comparable to the results of microdiscectomy reported in various series. This might be due to close similarity of the two techniques [4,2,8]. However, microdiscectomy offers better visual comfort and facilitates surgery especially in cases of extraforaminal disc herniation [7,10].

**CONCLUSION**

The results of this study show that enough space is available in the interlaminar area to perform limited disc excision in cases of disc herniation at L4–5 and L5–S1 levels. Most of these cases do not require laminotomy for decompression. The results are comparable to microdiscectomy, and this may be due to close similarity of the two procedures.

**REFERENCES**


