Journal of Orthopaedic Surgery 2012;20(1):7-10

Discectomy for primary and recurrent prolapse of lumbar intervertebral discs

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ABSTRACT

Purpose. To reviewed 416 patients who underwent discectomy for primary or recurrent prolapse of lumbar intervertebral discs (PLID).
Methods. Records of 296 men and 102 women aged 19 to 60 (mean, 39) years who underwent discectomy for a primary PLID, and 14 men and 4 women aged 28 to 50 (mean, 40) years who underwent revision discectomy for a recurrent ipsilateral (n=14) or contralateral (n=4) PLID at L4-5 (n=14), L5-S1 (n=3), or L3-4 (n=1) were reviewed. The pain-free interval, side and degree of herniation, operating time, length of hospital stay, and pre- and post-operative visual analogue score (VAS) for pain were recorded. Clinical outcomes were evaluated using the modified Macnab criteria and the Oswestry Disability Index.
Results. Patients were followed up for one to 4 years. The mean operating time was significantly longer in revision discectomy (65 vs. 141 minutes, $p<0.001$, unpaired *t*-test). There was no significant difference between revision and primary discectomy in terms of length of hospital stay or clinical improvement rates. Age, gender, smoking, profession, level and extent of herniation, and pain-free interval did not affect clinical outcomes. In the 18 revision cases, the mean pain-free interval until recurrence was 31 (range, 1–42) months. At the one-year follow-up, results were excellent in 8, good in 6, fair in 3, and poor in one. Three of the patients had persistent pain despite taking analgesics. 14 of the patients had returned to their normal daily activities. Complications included foot drop (n=1), dural tear (n=3), and superficial wound infection (n=1).
Conclusion. Discectomy achieved satisfactory results for both primary and recurrent PLIDs.

Key words: *intervertebral disc displacement; recurrence; reoperation*

INTRODUCTION

Low back pain secondary to prolapse of lumbar intervertebral discs (PLID) is a major cause of morbidity. Its lifetime prevalence is 60 to 80%, with

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a true sciatica rate of 5% in men and 4% in women.[1] Symptomatic PLID is usually treated with nerve root decompression with preservation of bony and ligamentous stabilisers of the spine.[2–5] The overall unsatisfactory rate after discectomy is 3 to 20%.[3,6–8] Its recurrence (at the same level regardless of ipsilateral or contralateral herniation) following disc excision is reported to be 5 to 11%.[3,6,7,9,10] 50 to 90% of revision surgeries achieve satisfactory outcomes.[6,7,11] We reviewed 416 patients who underwent lumbar discectomy for primary or recurrent PLIDs.

MATERIALS AND METHODS

Between October 2003 and January 2010, 296 men and 102 women aged 19 to 60 (mean, 39; standard deviation [SD], 7) years underwent discectomy for a primary PLID, whereas 14 men and 4 women aged 28 to 50 (mean, 40; SD, 5) years underwent revision discectomy for a recurrent ipsilateral (n=14) or contralateral (n=4) PLID at L4-5 (n=14), L5-S1 (n=3), or L3-4 (n=1). Their records were reviewed. Patients were included if they had (1) dominant leg pain rather than back pain, (2) severe motor and sensory deficits, (3) progressive neurological deficits with sciatica, (4) persistent pain hampering daily activities, and (5) restricted straight leg-raising test and positive radiographic or magnetic resonance imaging findings (Fig.). Patients with spinal instability, other spinal pathology, cauda equina syndrome, or recurrent PLID at >2 levels were excluded.

The extent of PLID on magnetic resonance imaging was classified as (1) protrusion (focal extension of the posterior margin of the disc beyond the adjacent vertebral bodies), (2) extrusion (presence of disc fragment migrated through a defect of the posterior longitudinal ligament, but still connected to the disc), and (3) sequestration (herniated tissue was no longer connected to the disc).[8]

The pain-free interval, side and extent of herniation, operating time, length of hospital stay, and pre- and post-operative visual analogue score (VAS) for pain were recorded. The clinical outcome was evaluated using the modified Macnab criteria[12] (Table 1) and the Oswestry Disability Index, in which the sex life section was not evaluated owing to social taboo.

For primary discectomy, a 3.5-cm longitudinal midline incision was made on the affected side, and the paraspinal muscles were elevated to approach the inter-laminar space. A Casper retractor or micro lumbar retractor was used to expose the interlaminar space. The nerve root was exposed using unilateral flavectomy and retracted medially or laterally depending on the position of the disc. Through a transverse annulotomy, all the loose disc material was removed (in most cases aggressive discectomy and disc fragment curettage was performed). The midline ligaments, facets, and lamina were left undisturbed. The operating microscope was not used.

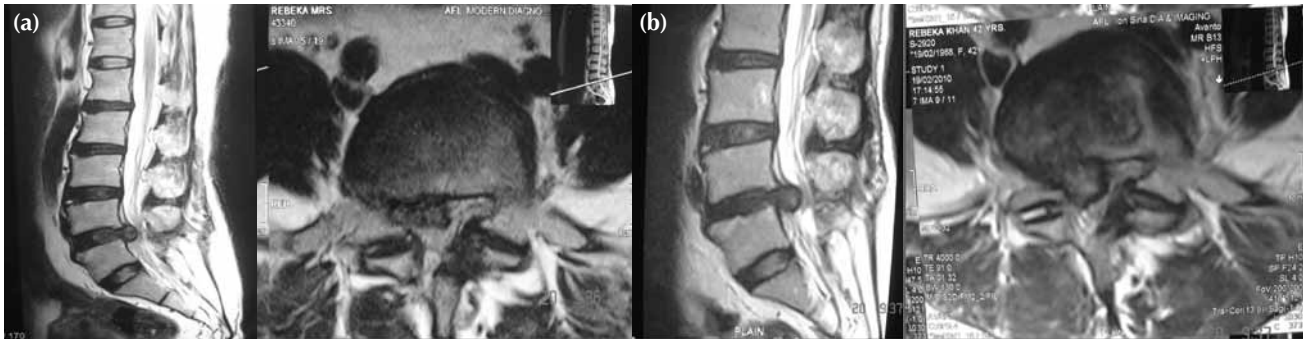

Figure **(a)** Primary and **(b)** recurrent (1.5 years later) prolapse lumbar intervertebral disc at L4-5.

Table 1
Modified Macnab criteria[10]

Results	Criteria
Excellent	No pain; no restriction of mobility; return to work and original level of activity
Good	Occasional non-radicular pain; return to modified work
Fair	Some improved functional capacity; still handicapped and unemployed
Poor	Continued objective symptoms of root involvement; additional operative intervention needed at the index level

For revision discectomy, the spinal canal was exposed from the medial border of the inferior facet rather than the midline ligament. The lateral part of the annulus was exposed using partial (<25%) facetectomy. The annulus was then incised laterally, without retracting the fibrous scar on its medial aspect, which contained the nerve root. The knee-chest position enabled opening up the interlaminar space. The lumbodorsal fascial incision was linear and immediately adjacent to the midline. Despite the small incision, an operating microscope was not used. A micro lumbar retractor was used to expose the interlaminar space.

Postoperatively, all 416 patients were allowed to mobilise out of bed on the same evening and discharged on about day 5 (range, 3–8). Patients were followed up on day 14 for suture removal and spinal stabilising exercises and then at weeks 6 and 12, month 6, and year one. Statistical analyses were made using the unpaired *t*-test and the Pearson Chi squared test.

RESULTS

Patients were followed up for one to 4 years. The mean operating time was significantly longer in revision discectomy (65±8 vs. 141±9 minutes, p<0.001, unpaired *t*-test). There was no significant difference between revision and primary discectomy in terms of length of hospital stay or clinical (pain and disability) improvement rates (p>0.05, unpaired *t*-test). Age, gender, smoking, profession, level and extent of herniation, and pain-free interval did not affect clinical outcomes (p>0.05, Chi squared test).

In the 18 revision cases, the mean pain-free interval until recurrence was 31 (range, 1–42) months. The extent of herniation before primary and revision discectomy was protrusion in 13 and 10 patients, subligamentous extrusion in 4 and 3 patients, and sequestration in one and 5 patients, respectively. There was no instability or translation. At the one-year follow-up, results were excellent in 8, good in 6, fair in 3, and poor in one (Table 2). Three of the patients had persistent pain despite taking analgesics. 14 of the patients had returned to their normal daily activities. Complications included foot drop (n=1), dural tear (n=3), and superficial wound infection (n=1). The latter 2 complications resolved after treatment.

Table 2
Characteristics and outcomes in patients with primary or recurrent prolapse of lumbar intervertebral discs (PLID)*

Characteristics	Patients with primary PLID (n=398)	Patients with recurrent PLID (n=18)
Age (years)		
16–40	300 (75)	13 (72)
41–65	98 (25)	5 (28)
Mean	39±7	40±5
Sex		
Male	296 (73)	14 (78)
Female	102 (27)	4 (22)
Involved level		
L2-3	4 (1)	0 (0)
L3-4	15 (4)	1 (6)
L4-5	248 (62)	14 (78)
L5-S1	131 (33)	3 (17)
Involved side		
Right	124 (31)	7 (39)
Left	235 (59)	11 (61)
Bilateral (central)	39 (10)	0 (0)
Recurrence (months)		
1–2	-	3 (17)
3–24	-	12 (67)
25–42	-	3 (17)
Radicular pain (visual analogue score)		
Preop	7.7±1.1	8.5±0.9
Immediate postop	2.3±0.6	2.2±0.7
Postop one year	1.3±0.7	1.4±0.6
Disability status (Oswestry Disability Index)		
Preop	63±7%	77±8%
Immediate postop	17±8%	25±5%
Postop one year	9±3%	17±5%
Outcome		
Excellent	220 (55%)	8 (44)
Good	120 (30%)	6 (33)
Fair	39 (10%)	3 (17)
Poor	19 (5%)	1 (6)

* Data are presented as no. (%) of patients or mean±SD

DISCUSSION

PLID can recur at the same disc and side as the primary PLID[10,13] or at the same disc and contralateral side or at a new disc at different level.[9,13] Annular incision performed at primary discectomy may be a predisposing factor for recurrence, and the presence of scar tissue may affect the results of revision surgery.[14]

Recurrent PLID should be distinguished from postoperative fibrosis, as the former necessitates re-operation.[15] Its risk factors include weakness of annular tissue,[16] repetitive lifting, vibrations, and smoking.[16,17] 42% of patients with recurrent PLID have radicular pain secondary to a traumatic incident.[6,7] Men with markedly degenerated discs are more prone to recurrence, particularly after an injury or a precipitating event.[6] 78% of our patients with recurrence were men. Fusion should be reserved for recurrent PLID with instability, degenerative scoliosis, or kyphosis of >20°.[18–19]

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