

Interlaminar Discectomy in Lumbar Disc Herniation: Surgical Experience and Results

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Author's contribution

The sole author designed, analyzed and interpreted and prepared the manuscript.

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ABSTRACT

Aim of the Study: Is to evaluate interlaminar discectomy in terms of: accessibility, safety and clinical outcome.

Background: Interlaminar approach for lumbar Discectomy is a less invasive technique that allows accessibility to a herniated disc via resection of ligamentum flavum either partially or totally with preservation of other structures leading to better spinal stability.

Study Design: Prospective study.

Patients and Methods: This is a prospective study including 64 cases of lumbar disc herniation operated between august 2012 and February 2015. All cases were subjected to lumbar discectomy via interlaminar approach. Surgical technique based on resection of ligamentum flavum either unilateral or bilateral with foraminotomy before disc extraction. Visual Analog Scale was used for preoperative and postoperative pain assessment, while Spengler's modification of Macnab's criteria was used for long term follow up. Patients were follow up for a period ranged from 3 to 18 months.

Results: Adequate exposure of herniated discs and involved roots obtained in 61 cases where partial laminectomy was need in 3 cases. In these 3 cases, the herniated disc showed cephalic migration. Bilateral resection of ligamentum flavum was done in 11 cases. All cases presented with

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sciatica showed excellent post-operative improvement, cases with foot drop showed no improvement. Early ambulation was done in all cases.

Conclusion: Interlaminar approach in lumbar discectomy is a safe and effective technique providing excellent accessibility in the majority of cases -even with higher levels like L3-4- with less post-operative back pain and early ambulation. Cases with cephalic migration of the herniated discs needs partial laminectomy.

Keywords: Interlaminar approach; lumbar discectomy; lumbar disc herniation.

1. INTRODUCTION

Different surgical techniques for lumbar discectomy were described, ranging from the conventional wide laminectomy to the most recent minimally invasive endoscopic procedures. In 1982, Spengler described limited disc excision [1]. Only the ligamentum flavum and, if necessary, a small unilateral foraminotomy is performed to expose the affected disc space. This approach is less invasive than the conventional laminectomy and does not affect stability. It results in early post operative mobilization, early return to work and less fibrosis around nerve root. This technique is less costly than the recent techniques like percutaneous lumbar disc decompression (PLDD), percutaneous endoscopic lumbar discectomy (PELD) and Young endoscopic spine system (YESS) which need lots of expertise, experience and expensive equipments [2,3]. This study is focused on: presentation of our surgical experience and technique, and evaluation of our results in terms of: accessibility, safety and clinical outcome.

2. MATERIALS AND METHODS

Sixty four patients with lumbar disc herniation (LDH) subjected to lumbar discectomy during the period from August 2012 to February 2015 were included in this study. Patients -suffering from sciatica- tried analgesics and bed rest for 2 weeks with no adequate response. All patients were admitted to neurosurgical department in Saudi German hospital –KSA. A written informed consent was obtained from each patient. Inclusion criteria were: single level LDH, no history of previous lumbar surgery, and failed conservative treatment. The exclusion criteria were: multiple level LDH, revision surgeries, lumbar canal stenosis, and cauda equina syndrome.

All patients were subjected to full neurological examination. Plain X-rays with stress view were

done to exclude instability. MRI lumbosacral spine was done to diagnose the cause of sciatica and to identify the responsible disc. The direction of the herniated disc whether unilateral or central and cranial or caudal migrating was identified.

Cases were done in prone position. After exposure of the interlaminar space at the desired level, the ligamentum flavum was identified. Anatomically both right and left ligamentum flavum joins in the midline forming an acute angle with a ventral opening. A McDonald dissector was introduced through this opening to dissect the ligamentum flavum from the underlying dural sac before its resection. Unilateral resection of the ligamentum flavum was done in most cases keeping the opposite one intact (Fig. 1).

Visual Analog Scale was used for preoperative and postoperative assessment of sciatica, while Spengler's modification of Macnab's criteria was used for long term follow up. Assessments of the patients were done 2 and 4 weeks and 2,6,12 and 18 months after surgery.

3. RESULTS

Out of 64 patients 43 patients were males (67%) and 21 patients were females (33%). The average age of patients was 38.9 years with the youngest 21 years and the oldest 58 years. Follow up period ranged from 3 to 18 months with an average follow up period 13.2 months. The most commonly affected level was L4-5 in 31 patients (48.4%) followed by L5-S1 in 29 patients (45.3%) and lastly L3-4 in 4 patients (6.3%) (Table 1).

On MRI, Seven patients showed central disc herniation. Fifty seven patients showed unilateral disc herniation. Among those 57, 34 patients were on right side and 23 on left side. Sixteen patients showed sequestered disc. Three cases showed cranial migration, and 5 patients showed caudal migration (Fig. 2).

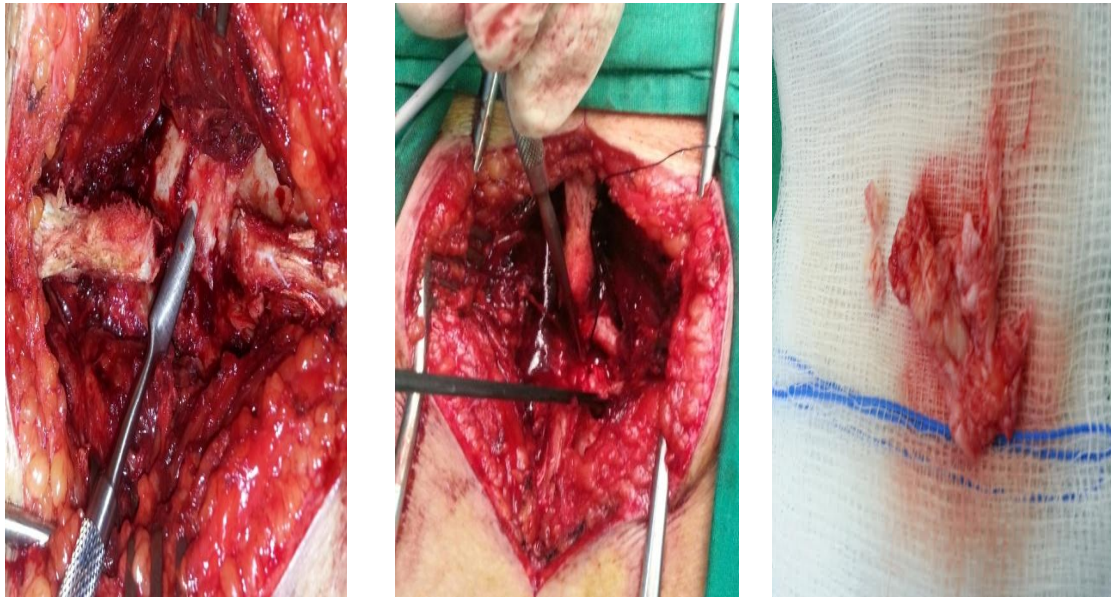


Fig. 1. Intraoperative pictures demonstrating a. resection of lig. flavum, b. nerve root exposure and c. extracted disc material

Table 1. Incidence of the level lumbar disc herniation in our study

Level of lumbar disc herniation	Number	Percentage
L4-5	31	48.4%
L5-S1	29	45.3%
L3-4	4	6.3%

Chronic low back pain was present in 92% of patients (59 patients), unilateral sciatica in 86% (55 patients), weakness of extensor hallucis longus in 26.5% (17 patients) Parasethia and numbness in 22% (14 patients), bilateral sciatica in 11% (7 patients) and unilateral foot drop in 3% of patients (2 patients).

Bilateral resection of ligamentum flavum done in 11 patients and unilateral resection was done in 53 patients. Partial laminectomy was needed in 3 cases, No intraoperative complications was faced. Average operative time was 63 minutes with a range between 40 and 85 minutes. The average blood loss was 145 cm³. No blood transfusion was required. Postoperative complications included 2 cases with superficial wound infection. All patients were allowed for

early ambulation within the first 24 hours. Patients with sciatica showed marked improvement. The preoperative mean VAS±SD was 8.9±.79 on a scale of 10. The postoperative mean VAS± SD at early post operative period, (first two weeks following surgery) became 2.93±1.01 (P < 0.005).Among 17 patients with extensor hallucis longus weakness, 12 patients improved within the first week, the remaining 5 cases improved within 2 weeks to 6 months. Among 14 cases with numbness and parasethia, 9 cases improved within the first 3 weeks (6 cases improved within 2 weeks,3 cases during their follow up after 4 weeks documented improvement occurred few days following previous assessment), the remaining cases improved after a period between 3 weeks and 9 months. The 2 cases with foot drop showed no improvement regarding motor power after a follow period of 6 and 12 months. On long term follow up the results were evaluated using Spengler’s modification of Macnab’s criteria, the results were classified as excellent in 39 patients (60.9%), good in 22 patients (34.4%), fair in one patient (1.6%), and poor in 2 patients (3.1%) (Fig. 3). Sixty one patients (95.3%) returned to work after a period ranged from 3-8 weeks with a mean period of 6 weeks.

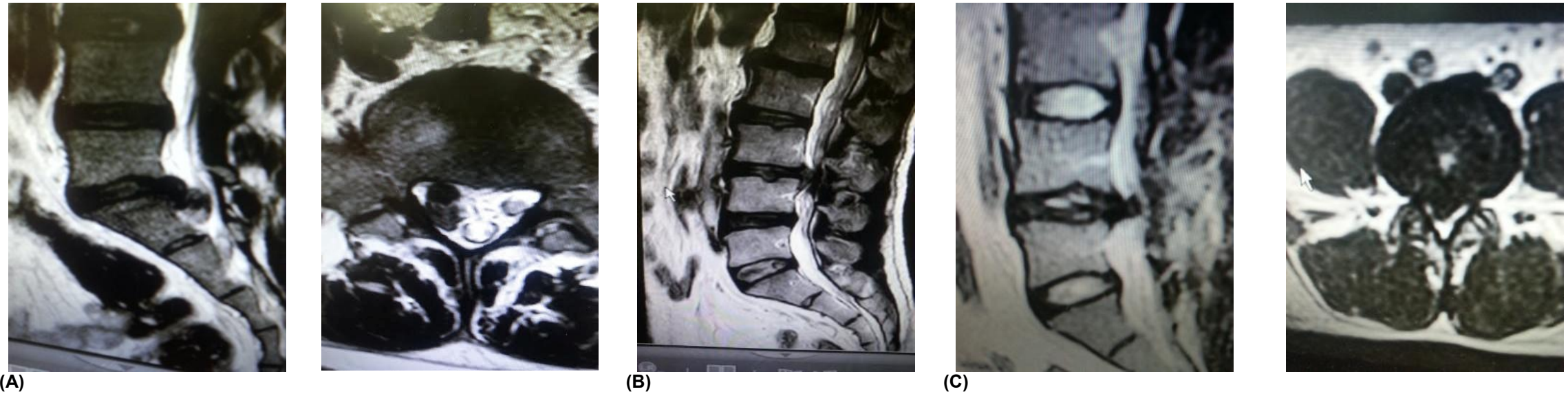


Fig. 2. A. Sagittal and axial T2-weighted MRI images showed L5-S1 right posterolateral disc herniation with caudal migration, and sequestered disc. B. Sagittal T2-weighted MRI image showed L3-4 disc herniation. C. Sagittal and axial T2-weighted MRI images showed L4-5 right posterolateral disc herniation

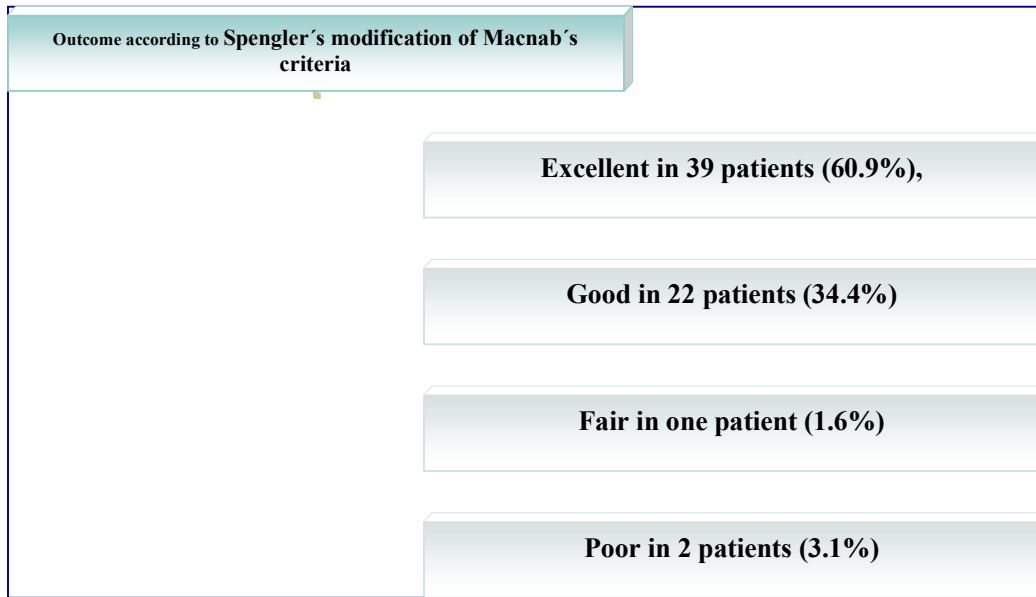


Fig. 3. Outcome according to spengler's modification of macnab's criteria

4. DISCUSSION

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 [1]. Although the majority of cases of lumbar disc herniation occurs without migration, 10% of cases showed migration either cranial or caudal [4]. In our study, 8 cases (12.5%) showed migration. Five cases showed caudal migration and 3 cases showed cranial migration. The term (*hidden zone*) was introduced by Macnab in 1971 to describe the unusual position of lumbar disc herniation migrated cranially [5]. In such cases, disc extraction cannot be performed via interlaminar approach without performing laminotomies [6]. In this study, adequate exposure of disc space was achieved in 61 patients (95.3%). Partial laminectomy where the lower edge of lamina was removed so as to get adequate exposure of the cranially migrated disc herniation was performed in 3 cases with cranial migration., the incidence of partial laminectomy in our study is considered quite lower than mentioned by Garg and Kumar where partial laminectomy was done in 34% (17 cases out of 50 studied patients), they explained that this

higher incidence was due to associated canal stenosis [7]. We attributed this difference to two reasons , first we did exclusion criteria included cases associated with spinal canal stenosis (which is a common pathology in middle east area), so most of our cases had a relatively wide canal with a thin ligamentum flavum, and secondly the morphology of the pathology as we faced 3 cases with cephalic migration. Celik H et al. Documented an incidence of 7.5% of laminotomy in their study (3 cases out of 40) they attributed it to the earlier learning curve during their study when these cases done [8].

The level of herniated disc in these 3 cases was L4-5 level, while the more higher level L3-4(4 cases) showed no caudal migration and interlaminar approach with sufficient for adequate disc extraction. In this series, no intraoperative complications occurred. Success rate for lumbar disc herniation varies from 46% to 96%, regarding pain relief and neurological status [9]. The outcome depends on patient selection, surgical technique, and surgeon experience [10,11]. A few authors have reported a higher level of success rate and a shorter hospital stay with microdiscectomy [12,13,14]. In this study, operative time, blood loss, and success rate were comparable to the results of microdiscectomy in various studies, which might be attributed to the similarity of both techniques [15, 16, 17].

According to Spengler's modification of Macnab's criteria used for long term follow up success rate was 95.3% (61 patients) in this study. Achorya et al reported a good result in 96.5% in patients with minimally invasive lumbar discectomy [18], Findlay et al. reviewed 88 patients and reported the outcome after 10 years. The initial success rate was 91% which declined to 83% after 10 years follow up [19]. The relatively short period of follow up in this series (3 to 18 months) might be one of the causes that could be responsible for that higher rate of success.

5. CONCLUSION

Interlaminar approach provides enough space to perform lumbar discectomy at L5-S1, L4-5, and L3-4. partial laminectomy only needed in cases where lumbar disc herniation located at the hidden zone (cranial migration). Interlaminar approach in lumbar discectomy is a safe and effective approach providing a high rate of success with less operative time, less blood loss, less operative stay, and early return to job. As no expensive equipments needed to perform it and its results are closure to that of microdiscectomy, it could be used by the majority of neurosurgeons even in small peripheral less equipped centers.

CONSENT

As per international standard or university standard, patient's written consent has been collected and preserved by the author.

ETHICAL APPROVAL

Author hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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