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Minimally Invasive Open Lumbar Discectomy: A Series of 150 Cases

Surgical options for lumbar disc herniation (LDH) ranges from open lumbar laminectomy and discectomy to percutaneous discectomy, however minimally invasive open lumbar discectomy is being widely practiced by neurosurgeons with best results for last two decades which was initially introduced by R.W. Williams in 1980s.

This is a retrospective study of 150 cases who underwent minimally invasive open lumbar discectomy for lumbar disc herniation at Bir hospital, Kathmandu, Nepal from B.S 2063 to 2067. This study is aimed at analyzing the outcome of lumbar disc herniation after minimally invasive open lumbar discectomy. Surgery was indicated for those patients who did not improve with conservative treatment (90%), and who had progressive neurological deficit (5%).

Out of 150 cases, there were 101 males and 49 females with majority (42%) of cases falling in the age group of 30-39 years and 20% falling in either 20-29 or 40-49 years age group. Of 150 cases, 98% presented with low backache and radicular pain and 20% had focal deficit. In all the cases, MRI was the preoperative diagnostic tool. Commonest level involved was Lumbar (L) 4/5 (48%) followed by L5/S1, (42%), and high LDH was found in 8 patients. Multiple level LDH was found in 5 patients.

In 80% of patients, radicular pain subsided postoperatively and they were mobilized 12 hours after the surgery and discharged the same day. Complications include dural tear (5), discitis (8), increase pain (2), and postoperative death in 1 patient. And more than 80% of the patients were able to re-join their previous job.

Follow up period after 6 month of surgery revealed more than 80% of the patients were pain free and less than 5% had persistent sciatica and other discomfort.

Keywords: Laminectomy, LDH, minimally invasive open lumbar discectomy

Low back pain is a very common nonspecific complain, affecting up to 95% of population at some point in their lifetime. The annual prevalence of low back pain is 15-45% of the population and sixty percent of those who suffer from acute low back pain recover in 6 weeks and up to 80-90% recover within 12 weeks with conservative management; however, the recovery of the remaining patients with low back pain is less certain. The annual incidence of lumbar disc herniation is 1% and among them 10% need disc surgery eventually.

First Lumbar discectomy was done by Oppenheim and Fedre Krause in 1906 though the first publication was done

by Mixter and Barr.¹¹ Since then laminectomy, hemilaminectomy and fenestration were introduced and are still being widely practiced world over. The lateral approach was evolved in 1964 with the introduction of intradiscal chymopapain injections. This was followed by the introduction of manual percutaneous discectomy by Hijikata followed by the introduction of percutaneous discectomy by Onik, laser nucleolysis and transdiscoscopy discectomy.^{6,7} In seventh decade, Yasargil, Casper and Williams¹⁶ started the use of microscopes for posterior discectomy which limited the skin incision and less muscle and epidural scarring. Ever since then, microdiscectomy

has become a gold standard procedure. The advantages of this procedure are small skin incision, less muscle and epidural scarring, less postoperative pain, early rehabilitation, early return to work, and low blood loss. Later the Microendo system allows the use of micro-instruments through a tube, making it possible, under endoscopic control, to perform a discectomy. The incision size is further reduced with no paraspinous muscle cutting or detachment from their insertion but the muscles are dilated using their elasticity. This has further reduced the invasion to the paraspinous muscle and muscle scarring. This procedure is known as microendoscopic discectomy (MED).¹

Materials and Methods

A total of 150 cases, aged 20-72 years operated by the minimally invasive open lumbar discectomy from 2062 to 2067 were retrospectively evaluated in National Neurosurgical referral centre, Bir Hospital. Any patient with bilateral symptoms, cauda equina syndrome and recurrent disc prolapse were excluded.

MRI was the preoperative diagnostic tool. All patients were operated only after proper conservative management for minimum 6 weeks which consisted of rest, modification of activities, physiotherapy, analgesics and anti-inflammatory drugs. The duration of symptoms ranged from 6 weeks to 8 years and all the patients were followed up after six months of the surgery.

Operative technique

All the procedures were done under general anesthesia. The level of disc is confirmed by lateral radiograph. After the inferior edge of the superior lamina is resected the ligamentum flavum is visible and incised sharply. The dura is inspected and the nerve root is identified. After the root is identified, it is retracted medially and the underlying disc herniation is visualized, which is removed with a pituitary rongeur.

Results

Among the 150 patients, there were 101 male and 49 female patients. The most common age group was 30-39 years (42%), followed by 20-29 and 40-49. Clinically 98% patients presented with low back pain and radicular pain, 20% had focal neurological deficit preoperatively. The commonest level involved was L4/L5 comprising 73 patients (48%), followed by L5/S1, 64 patients (42%) and higher lumbar disc prolapse was found in 8 patients (5.33%) and multiple level disc prolapse was found in 5 patients (3.33%).

Regarding the post operative complications, we had dural tear in 5 patients (3.33%), discitis in 8 patients (5.33%) and increase pain in 2 patients (1.33%) which were all

managed conservatively. There was one post operative death due to intraoperative iliac artery rupture.

Nearly 90% were pain free postoperatively in regular follow up.

Of 150, 105 patients were mobilized on the first post operative day, 32 on the second post operative day and 12 on the fifth post operative day. Out of total cases, 105 patients were discharged on the first postoperative day, 32 on the second and 12 were discharged on the seventh postoperative day.

Regarding the operative time, 10 patients were completed within 30 minutes, 92 patients were completed within 60 minutes, 28 patients within 90 minutes and another 20 patients took more than 90mins.

Regarding the intraoperative findings 15 patients had bulge disc, 35 had contained disc, 95 had sequestered disc and 5 had lateral recess stenosis. At 6 month follow up more than 80% patients were pain free (sciatica) and were able to rejoin their previous jobs. Less than 5% of the pain had persisting radicular pain of varying degree.

Discussion

Back pain with or without radicular symptoms (leg pain) is a very common disorder. Lifetime prevalence in western industrialized countries amounts up to 80%.¹ In about 5% of all patients with acute back pain, lumbar disc herniation is thought to be causing the symptoms. It is assumed that protruded disc material compresses spinal nerve roots and causes irritation. Irritation leads to pain and in some cases to neurological deficits. There have been several minimally invasive percutaneous procedures introduced for LDH such as chemonucleolysis, percutaneous lumbar discectomy and percutaneous laser assisted discectomy.¹ The advantages cited for these techniques are surgery conducted under local anesthesia, early mobilization, no disturbance to posterior structures such as laminae, facet joint and ligamentum flavum, less manipulation in the intraspinal space thus reducing the possibility of epidural fibrosis but till today there is no dependable evidence to recommend their use in routine clinical practice.²

In spite of all these minimally invasive procedures, minimally invasive open lumbar discectomy is still one of the most common operations performed worldwide for lumbar disc herniation. Minimally invasive open lumbar discectomy is indicated for patients with failed conservative treatment, intractable pain, and progressive neurological deficit. It was established that this procedure reduces the incision size, blood loss and morbidity.

The overall results of standard open discectomy range from 68% to 95% in different series.^{5, 15} Though the results of standard open discectomy are equally good, microdiscectomy introduced by Yasargil and Caspar (1977) is considered the gold standard. The success rate of microdiscectomy range from 88% to 98.5% in different series.^{4, 9, 10, 12} Katayama et al compared the results of

macrodiscectomy with microdiscectomy. They concluded that there was no difference between the surgical outcome of both of them but. Advantages of microdiscectomy are small skin incision and less muscle and epidural scarring, less blood loss, less postoperative pain, early rehabilitation, and early return to work. It is natural that if both the procedures have over all same outcome, then the procedure with lesser tissue invasion, lesser length of incision, lesser use of postoperative analgesics with an early return to work is the procedure of choice between them.⁷

Findley et al. in a series of a 10 year follow up of the outcome of lumbar microdiscectomy showed that a successful outcome (resolution of pain) at 6 months was achieved in 91% and at 10 year period was achieved in 83% and concluded that patients satisfaction with the result of microdiscectomy 10 years later was high where as in our series pain subsided in 80% of the patients at 6 month postoperatively and were able to resume previous job.⁴

Leung, et al studied 40 patients with microdiscectomy and had intraoperative dural tears In two cases, discitis in two cases, and recurrence of back pain in 2 cases⁸ where as in our series we had dural tear in five patients, discitis in eight patients, increase pain in two patients.

Goffin et al studied 100 lumbar microdiscectomy and follow-up examination found 3(3%) patients with persistent moderately intense pain and 1 of backache of an invalidating degree. 4 (4%) patients needed a second operation for a recurrent herniation at the same or another level. Eventually, 96 patients were able to resume their previous job where as in our series less than 5% had varying degree of sciatica at six month follow up period¹³ and more than 80% were able to resume their previous jobs.

Nygaard et al underwent microdiscectomy in 132 patients and found out that out of 132 patients, 108 (>75%) patients returned to work within the 1st year after surgery, the result of this series is comparable to our series in which 80% of the patients were able to resume the previous work.

Schoeggel et al underwent microdiscectomy in 672 patients within eight years time and found out that a total of 64% of the patients were relieved of their complaints after lumbar disc surgery.

Postacchini et al underwent microdiscectomy in 116 patients and found out that 88 patients had full recovery postoperatively, Of the remainder, 15% had persistent weakness of a single muscle and 10% had two or more muscles weakness and found out that inverse relationship between both the severity and the duration of preoperative muscle weakness and the ability to recover complete motor function.

Conclusions

Minimally invasive open lumbar discectomy still remains a standard surgical technique for symptomatic

lumbar disc herniation and produces excellent results with minimum postoperative complication.

References

1. Chedid KJ, Chedid MK. The tract of history in the treatment of lumbar degenerative disc disease. **Neurosurg Focus** 16: 2004
2. Dagmar Luhmann, Tatjana Burkhart hammer, Cathleen Borowski, Heiner Raspe. Minimally invasive surgical procedure for the treatment of the lumbar disc herniation. **GMS Health technology Assessment** 1: 2005
3. F Postacchini, G. Giannicola, G. Cinotti. Recovery of motor deficits after microdiscectomy for lumbar disc herniation. **J Bone Joint Surg** 8: 1040-1045, 2002
4. Findlay GF, Hall BI, Musa BS, Oliveira MD, Fear SC. A 10-year follow-up of the outcome of lumbar microdiscectomy. **Spine** 23: 1168-1171, 1998
5. Gibson JN, Waddell G. Surgical interventions for lumbar disc prolapse updated cochrane review. **Spine** 32: 1735-1747, 2007
6. Hijikata S. Percutaneous nucleotomy: A new concept technique and 12 years' experience. **Clin Orthop Relat Res** 238: 9-23, 1989
7. Katayama Y, Matsuyama Y, Yoshihara H, Sakai Y, Nakamura H, Nakashima S, et al. Comparison of surgical outcomes between macro discectomy and micro discectomy for lumbar disc herniation: A prospective randomized study with surgery performed by the same spine surgeon. **J Spinal Disord Tech** 19: 344-347, 2006
8. Leung P.C Complication in the 40 cases of microdiscectomy . **Journal of Spinal disorder** 1988vol-1
9. Loupasis GA, Stamos K, Katonis PG, Sapkas G, Korres DS, Hartofilakidis G. Seven-to 20-year outcome of lumbar discectomy. **Spine** 24: 2313, 1999
10. Maroon JC. Current concepts in minimally invasive discectomy. **Neurosurgery** 51: 137-145, 2002
11. Mixter WJ, Barr JS. Rupture of the intervertebral disc with involvement of the spinal canal. **N Engl J Med** 211: 210-215, 1934
12. Mariconda M, Galasso, Beneduce T, Volpicelli R, Della Rotonda G, Secondulfo V. Minimum 25 yr. outcome of standard discectomy for lumbar disc herniation. **J Bone Joint Surg Br.** 88:152-153, 2006
13. Nygaard OP, Kloster R, Solberg T. Duration of leg pain as a predictor of outcome after surgery for lumbar disc herniation: a prospective cohort study with 1-year follow up. **J Neurosurg** 95: 281-282, 2001

14. Schoeggl A, Reddy M, Matula C. Functional and economic outcome following micro discectomy for lumbar disc herniation in 672 patients. **Spinal Disord Tech 16:** 150-155, 2003
15. Toyone T, Tanaka T, Kato D, Kaneyama R. Low-back pain following surgery for lumbar disc herniation: A prospective study. **J Bone Joint Surg Am 86:** 893-896, 2004
16. Yasargil MG. Microsurgical operation for herniated lumbar disc. In: Wullenweber R, Brock M, Hamer J, Klinger M, Spoerri O, editors. *Advances in neurosurgery*. Berlin: Springer-Verlag; 1977. pp 81.