

To Compare the Frequency of Unintended Durotomy in Open Discectomy Versus Endoscopic Discectomy

Mumtaz Ahmed¹, Muhammad Feroz Nawaz¹, Habib Ullah² and Muhammad Shahid Sameja¹

Frequency of Unintended Durotomy in Open VS Endoscopic Discectomy

ABSTRACT

Objective: To compare the frequency of unintended durotomy in open discectomy versus endoscopic discectomy.

Study Design: Randomized controlled trial study

Place and Duration of Study: This study was conducted at the Department of Neurosurgery, Bahawal Victoria Hospital Bahawalpur from January 2018 to December 2018.

Materials and Methods: A total 172 patients (86 patients in each group) were included in this study. Patients fulfilling the inclusion and exclusion criteria were divided into two groups (A and B). In Group A, patients underwent Endoscopic Discectomy and in Group B, patients underwent open discectomy.

Results: The mean age was 47.02 ± 9.6 years in group A while in group B, 48.83 ± 8.7 years. In group A, 14 (16.28%) patients had unintended durotomy while in group-B, 3 (3.49%) patients had unintended durotomy.

Conclusion: Although the frequency of unintended durotomy in endoscopic discectomy was high, it is one of ideal minimally invasive operative approaches for lumbar spinal region. Endoscopic discectomy is proposed as a safe and effective alternative to open back surgery.

Key Words: Unintended durotomy, Endoscopic discectomy, Open discectomy, Lumbar region, backache, low back pain.

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INTRODUCTION

Backache associated with sciatica is very common problem. One common reason for low back pain is lumbar disc herniation into spinal canal. Symptoms and Signs of sciatica and MRI findings of nerve root compression or displacement by herniated disc are correlated before invasive therapy is undertaken.^{1,2}

Existing studies on endoscopic lumbar discectomy report similar outcomes to those of open discectomy but conflicting results on complications. Lumbar discectomy is usually done by standard open discectomy and endoscopic discectomy. The most common complication was dural tear between open and endoscopic discectomy.³

Endoscopic Discectomy has advantages especially for recurrent disc herniation.^{4,5} Incidental dural tears in spinal surgeries is one of the most important complication as reported in many previous studies regarding spine surgeries with frequency of 1.8% to 17.4%.⁶ During the extraction of big disc extrusion excessive nerve root is one of the important intraoperative mechanism other than direct laceration of dura. If any unintended durotomy is not recognized intraoperatively, the majority of symptomatic patients with a CSF leak typically experience headache and photophobia as soon as they undertake and upright posture postoperatively. Teli et al⁷ showed in a study that frequency of unintended durotomy in open discectomy is 3%.

For the treatment of ruptured or herniated discs of lumbar spine open discectomy is the most frequent performing surgical treatment. Vertebral discs are the cushioning and connecting materials that lie between the bones of the spine called "vertebrae." When the outer wall of a disc, called the annulus fibrosus, becomes weakened through age or injury, it may tear allowing the soft inner part of the disc, the nucleus pulposus, to bulge out. This is called disc herniation, disc prolapse, or a slipped or bulging disc. Once the inner disc material extends out past the regular margin of the outer disc wall, it can press against very sensitive nerve tissue in the spine. The "bulging" disc can compress or even damage the nerve tissue, and this can cause weakness, tingling, or pain in the back area

¹. Department of Neurosurgery, Quaid e Azam Medical College BV Hospital Bahawalpur.

². Department of Neurosurgery, Sahiwal Medical College/DHQ Teaching Hospital, Sahiwal.

Correspondence: Dr. Habib Ullah, Senior Registrar, Department of Neurosurgery, Sahiwal Medical College/DHQ Teaching Hospital, Sahiwal
Contact No: 0312-3131213
Email: drhabibullahkhan@live.com

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and into one or both legs. Discectomy surgical procedure performed to extract the damaged disc and relieve the pressure on nerve tissue and alleviate the pain.⁸ The surgery involves a small incision in the skin over the spine, the removal of some ligament and bone material and the removal of some of the disc material.^{9,10}

MATERIALS AND METHODS

This randomized controlled trial was conducted at Department of Neurosurgery, Bahawal Victoria Hospital Bahawalpur from 1st January 2018 to 31st December 2018. A total number of 172 patients of lumbar disc herniation were selected and divided into two groups, A (n=86) and B (n=86). Open microdiscectomy was performed in Group A and endoscopic microdiscectomy was performed in Group B. Provisional diagnosis of herniated disc was confirmed by MRI findings i.e. bulging of lumbar intervertebral disc posteriorly into the spinal canal causing compression of the contents of the canal or any nerve root. Patient’s ages 18 to 60 years having persistent radicular pain from 6 to 8 weeks and to had disc herniation by MRI were included. Patients with previous history of same surgery with cauda equine syndromes spondylolytic or degenerative spondylolisthesis, with central spinal canal stenosis, pregnancy or having severe somatic or psychiatric illness were excluded. Double Halo sign is observed by pouring 1 ml of hemorrhagic fluid on a cotton gauze piece; if it spreads over the gauze in form of two rings, red in center and clear watery ring around it then sign is termed as positive. If only a single red or pink coloured ring is formed then Double Halo sign was termed as negative. For open discectomy, a small midline skin incision was made. Muscles were dissected sub-periosteally. Fenestration or hemilaminectomy was done. Flavectomy was done and dura and nerve roots were retracted. Discectomy was done and wound was closed in reverse order. For endoscopic discectomy, a relatively small para-median skin incision made. Muscles were split. Tubular retractor was inserted. Endoscope was passed and a key hole was made in the lamina. Flavectomy was done and nerve roots and dura retracted with tubular retractor. Discectomy was done and wound was closed. All the necessary information was recorded in data collection proforma. Patient was re-examined at 3rd postoperative day and final findings were recorded. The data collected was entered in computer software SPSS version 20. Chi-square test was used for unintended durotomy in both groups taken $P \leq 0.05$ as significant.

RESULTS

The mean age was 47.02 ± 9.6 years in group A while in group-B, it was 48.83 ± 8.7 years. Ninety (52.33%)

patients were female and 82 (47.67%) patients were male (Table 1). Fourteen (16.28%) patients had unintended durotomy in group A while 72 (83.72%) patients had no unintended durotomy in group B. In group-A (endoscopic discectomy), 3 patients in 18-30 years age group had unintended durotomy while 4 patients had no unintended durotomy, 6 patients in 31-45 years of age group had unintended durotomy while 23 patients had no unintended durotomy and 5 patients in 46-60 years of age group had unintended durotomy while 45 patients had no unintended durotomy with insignificant p value of 0.064. In group-A (endoscopic discectomy), 6 male and 8 female patients had unintended durotomy while 37 male and 35 female patients had no unintended durotomy with insignificant p value of 0.559. In group-B (open discectomy), 3 (3.49%) patients had unintended durotomy while 83 (96.51%) patients had no unintended durotomy. In group-B (open discectomy), 1 patients in 18-30 years age group had unintended durotomy while 3 patients had no unintended durotomy, 1 patients in 31-45 years of age group had unintended durotomy while 25 patients had no unintended durotomy and 1 patients in 46-60 years of age group had unintended durotomy while 55 patients had no unintended durotomy with insignificant p value of 0.050. In group-B (open discectomy), 2 male and 1 female patients had unintended durotomy while 37 male and 46 female patients had no unintended durotomy with insignificant p value of 0.450. Comparison of unintended durotomy between group-A (endoscopic discectomy) and group-B (open discectomy) came up with a significant p value of 0.005 (Tables 2-3).

Table No. 1: Unintended durotomy in age and gender of patients in endoscopic discectomy.

Variable	Unintended durotomy		p-value
	Yes	No	
Age (years)			
18 – 30	3 (42.9%)	4 (57.1%)	0.046
31 – 45	6 (20.7%)	23 (79.3%)	
46 – 60	5 (10%)	45 (90%)	
Gender			
Male	6 (6.98%)	37 (43.02%)	0.559
Female	8 (9.3%)	35 (40.7%)	

Table No.2: Unintended durotomy in different age groups of patients in open discectomy

Variable	Unintended durotomy		p-value
	Yes	No	
Age (years)			
18 – 30	1 (1.16%)	3 (3.48%)	0.046
31 – 45	1 (1.16%)	25 (29.06%)	
46 – 60	1 (1.16%)	55 (63.95%)	
Gender			
Male	2 (2.33%)	37 (43.02%)	0.450
Female	1 (1.16%)	46 (53.59%)	

Table No.3: Comparison of unintended durotomy between endoscopic discectomy and open discectomy

Group	Unintended Durotomy		P value
	Yes	No	
Endoscopic discectomy	14 (16.3%)	72 (83.7%)	0.005
Open discectomy	3 (3.5%)	83 (96.5%)	

DISCUSSION

Incidental or unintended dural tear is one of the most common morbidity found in spine surgeries and microdiscectomy is considered a procedure of choice for dural tears.^{1,2} This article describes the operative techniques and outcomes reported in the literature for both lumbar microdiscectomy and microendoscopic discectomy. Currently some of studies regarding spine surgeries, in which surgeons uses the less invasive micro-surgical procedure with advance endoscopic procedure. They have developed new systems for endoscopic posterior discectomy, either with a conic “freehand” working channel or with a tubularretractor.¹¹

In the present study, the frequency of unintended durotomy was 16.28% in open discectomy and 3.49% in open discectomy. These results were comparable to the results of other studies. A study conducted by Desai et al¹² showed similarity to our study in which the incident rate of durotomy was 3.1% and the basis of differences analyzed between the groups, the durotomy group was found to have significantly increased operative duration, operative blood loss, and length of inpatient stay.

Another study regarding lumbar spine surgery showed the incidental rate of incidental durotomy was 9% and there was significant difference between durotomy group and other group in mean hospital stay, blood loss and operative time p-value >0.05¹³ there were also no differences in incidence of nerve root injury, mortality, additional surgeries, or primary outcomes at yearly follow-ups to 4 years.

A study conducted by Wong et al¹⁴ regarding laparoscopic discectomy group there were 15 CSF leaks (4.7%), and 49 CSF leaks (9.0%) in the open group. Patients undergoing the laparoscopic discectomy had significantly lower reoperation rates for CSF leak repairs (open = 25% of open CSF leak cases, the laparoscopic discectomy = 0%, P < .01).

Another study conducted by Cammisa et al¹⁵ showed that total of 2144 patients were reviewed, and 74 were found to have dural tears occurring during laparoscopic surgery. Incidental durotomy occurred at the time of laparoscopic surgery in 66 patients (3.1% overall incidence). Jones et al¹⁶ conducted a study and showed that unintended incidental durotomy is most common complication of laparoscopic spinal surgery (incidence,

0.3-13% reported). In this study patients were evaluated at long-term follow-up (mean, 25.1 months); and their results were compared with controls matched for age, diagnosis, procedure, and length of follow-up. No differences of statistical significance could be identified in comparing the outcomes of the two groups. Incidental durotomy, when recognized and repaired intraoperatively, does not increase perioperative morbidity or compromise final result.

Ruban et al¹⁷ also showed that unintended durotomy occurred in 53 (9.4%) of 563 patients with open discectomy. The mean age at surgery was 60.7 years (range 30-85 years). These results showed a little difference to our study.

In modern era many of endoscopic techniques for lumbar spine herniation in term of minimal invasive spine surgeries shows better outcomes as compared to other conventional open surgeries. There have been few previous studies on the outcomes of endoscopic discectomy for recurrent lumbar disc herniation. The success rates are in general quite high with all surgical procedures for new herniated lumbar discs.¹⁸.

CONCLUSION

Endoscopic discectomy and open discectomy have the similar therapeutic effect, but endoscopic discectomy eliminates the shortcomings of traditional open discectomy. Although the frequency of unintended durotomy in endoscopic discectomy was high, it is one of ideal minimally invasive operative approaches for lumbar spinal region. Endoscopic discectomy is proposed as a safe and effective alternative to open back surgery. We believe that in few years the endoscopic approach will become the new “gold standard” for lumbar disc surgery.

Author's Contribution:

Concept & Design of Study:	Mumtaz Ahmed
Drafting:	Muhammad Feroz Nawaz
Data Analysis:	Habib Ullah, Muhammad Shahid Sameja
Revisiting Critically:	Mumtaz Ahmed, Muhammad Feroz Nawaz
Final Approval of version:	Mumtaz Ahmed

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