

# FREQUENCY OF INCIDENTAL DUROTOMY DURING SURGERY FOR DEGENERATIVE LUMBAR SPINE DISEASE: AN EXPERIENCE IN NEUROSURGERY DEPARTMENT OF A TERTIARY CARE HOSPITAL

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## ABSTRACT

**Objective:** To determine the frequency of incidental durotomy during surgery for degenerative lumbar spine disease.

**Methodology:** It was a descriptive cross sectional study conducted on the admitted patients of degenerative lumbar spinal disease in the Department of Neurosurgery, Lady Reading hospital, Peshawar. Total of 186 patients were enrolled in the study. Laminectomy and fenestration surgery were performed. All the patients were looked for incidental durotomy during surgery and was properly documented.

**Results:** Out of 186 patients about 106 patients were male and 80 were female with male to female ratio of 1.33: 1. Age range was 20–60 years with mean age of  $39.91 \pm 10.584$  years. Incidental durotomy was found in 8 cases (4.30%). Out of these, 5 cases (62.5%) were lumbar stenosis whereas 3 cases (37.5%) were prolapsed inter vertebral disc.

**Conclusion:** Incidental durotomy was a common complication in degenerative lumbar spine surgery. It was more common in spinal stenosis as compared to prolapsed intervertebral disc. It was also more common in males and in patients with age <40 years.

**Key Words:** Degenerative lumbar spine disease, Lumbar spinal stenosis, Prolapsed intervertebral disc, Incidental durotomy

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## INTRODUCTION

Degenerative lumbar spine surgery is one of the most common procedures performed in a neurosurgical unit for lower back and leg pain<sup>1</sup>. Degenerative lumbar spine disease include disc herniation, spondylolisthesis and hypertrophy of the ligaments resulting in the canal stenosis and producing various motor and sensory symptoms. Surgery is undertaken to relieve these symptoms<sup>2</sup>. Surgery for degenerative spine disease is harbored with complications like incidental durotomy, nerve root injury, wrong side and wrong level<sup>1-3</sup>.

Incidental durotomy (ID) is an untoward event in the lumbar spinal surgery resulting from an un-intended rent in the dura mater and is marked by the appreciation of clear fluid in the operative field. Clear fluid in the operative field can come from the cotton patties, rupture of a synovial cyst or from previous attempted lumbar puncture. But unfortunately almost always this is

the cerebrospinal fluid (CSF) resulting from dural tear<sup>3</sup>. When dural injury occurs, in the majority of cases, it is detected intra-operatively and primary repair is mandatory with the established surgical techniques. Unfortunately, not all dural tears can be recognized and repaired primarily and adequately<sup>4</sup>. Incidental durotomy prolongs operative time, increases blood loss, increases risk for blood replacement and prolong the hospital stay. Patients with ID are also having associated headache, cutaneous CSF fistulas and pseudocyst formation. These abnormalities associated with ID, are sometimes responsible for the small proportion of lawsuits, related to spine surgery<sup>5,6</sup>.

Due to the fear of these complications, some preventive measures are in practice, like; primary repair of the dural defect, placement of lumbar CSF drain and bed rest post-operatively<sup>4</sup>. Despite all these measures, the long term outcome of unintended durotomy occasionally remains controversial<sup>6</sup>.

Various risk factors have been associated with ID like increasing age, large disk, complexity of the procedure, hypertrophy of the ligamentum flavum, repeat spinal surgery and decreased experience of the operating surgeon. The reported incidence in literature has been from 14%<sup>3</sup>, 16%<sup>5</sup> and 17%<sup>4</sup>.

People in our set up are more prone to degenerative spinal diseases as a result of heavy weight lifting and carrying loads. Lumbar spine surgery is a common procedure in any neurosurgical department in the province. As mentioned, there are various adverse sequelae of incidental durotomy. This study was conducted to determine the frequency of incidental durotomy during surgery for degenerative lumbar spine disease. We would compare our results with the national and international studies and in the light of that we will review our operative strategy and results will be shared with neurosurgical colleagues to take measures to minimize occurrence of ID.

### METHODOLOGY

A prospective study was performed in the Department of Neurosurgery, Lady Reading Hospital, Peshawar. Duration of study was six months and total of 186 patients were enrolled in the study. All the patients having degenerative lumbar spine disease (DSLSD) undergoing surgery for the first time and having symptoms for more than six weeks, patients having age from 20-60 years and patients of both genders were included in the study. Patients undergoing lumbar surgery for other causes and patients who were not willing to participate were excluded from the study.

The study was conducted after approval from hospital research and ethical committee. All consecutive patients meeting the inclusion criteria with diagnosis of DLSD including lumbar prolapsed intervertebral disc (PIVD) and lumbar spinal stenosis and having baseline pain grade of moderate or severe on visual analogue scale (VAS) were enrolled in the study through outpatient department and were admitted to neurosurgery ward for further work up. All patients were subjected to MRI spine which was reported by a single expert radiologist. Positive MRI was defined as lumbar spine showing trefoil appearance on axial views as a result of a bulging intervertebral disc ventrally, hypertrophied facet joints laterally and ligamentum flavum hypertrophy dorsally.

The purpose and benefits of the study were explained to the patients and a written informed consent was obtained. The enrolled patients were put on the operation theatre (OT) list for the next available OT day, after performing anesthesia assessment through an expert anesthesiologist. On the OT day laminectomy was performed for lumbar stenosis and fenestration with discectomy was performed for lumbar PIVD under general anesthesia by single expert neurosurgeon having minimum of 5 years of experience. All patients were assessed intra-operatively for possible dural tear. Dural tear was stitched if possible and tears that were not possible to be stitched were sealed with spongostone and water tight closure of all skin layers were performed. In a pre-designed proforma, the variables like name, age, gender and address were recorded.

The data were analyzed using the statistical program SPSS version 17. Frequency/percentage was calculated for categorical variables. ID was stratified among age, gender and the level as well as type of surgery to see the effect modifiers. Results were presented in tables for different variables.

### RESULTS

In this study 186 patients of degenerative lumbar spine disease were observed. Among these, 106 patients were male and 80 patients were female with male to female ratio of 1.33:1. About 104 cases were stenosis for which laminectomy was performed and 82 cases were prolapsed inter vertebral disc for which fenestration and discectomy was performed. Age range was 20-60 years with mean age of 39.91 ± 10.584 years.

Incidental durotomy occurred in 8 cases (4.30%). Out of these, 5 cases (62.5%) were lumbar stenosis whereas 3 cases (37.5%) were prolapsed inter vertebral disc. Gender-wise distribution of incidental durotomy showed that majority of cases (n=5, 62.5%) were male whereas (n=3, 37.5%) cases were female (Table 1). Age wise distribution of incidental durotomy showed that durotomy occurred mostly (n=6, 75%) in the age group of 20-40 years whereas (n=2, 25%) cases were in the age range of 41-60 years (Table 2).

On the basis of level of surgery, (n=6, 75%) cases of incidental durotomy occurred at L4-L5 level and (n=1, 12.5%) case occurred each at L5-S1 level and multiple level stenosis (Table 3).

**Table 1: Gender-wise distribution of incidental durotomy**

Gender	Incidental Durotomy		Total	P-VALUE
	Yes	No		
Male	5	101	106	0.104
Female	3	77	80	
Total	8	178	186	

**Table 2: Age-wise distribution of incidental durotomy**

Age Groups	Incidental Durotomy		Total	P value
	Yes	No		
20-30	1	47	48	0.239
31-40	5	55	60	
41-50	2	48	50	
51-60	0	28	28	
Total	8	178	186	

**Table 3: Incidental durotomy on the basis of level of surgery**

Incidental Durotomy	Level of Surgery					Total	P value
	at L2-L3	at L3-L4	at L4-L5	at L5-S1	Multiple Levels		
Yes	0	0	6	1	1	8	2.56
No	2	7	84	54	31	178	
Total	2	7	90	55	32	186	

**Table 4: Incidental durotomy on the basis of type of surgery**

Incidental Durotomy	Type of surgery		Total	p-value
	Fenestration± Discectomy	Laminectomy		
Yes	3	5	8	0.437
No	88	90	178	
Total	91	95	186	

Five cases (62.5%) of incidental durotomy occurred in laminectomy and 3 cases (37.5%) cases occurred in fenestration and discectomy (Table 4).

## DISCUSSION

Incidental or unintended durotomy has been reported in literature in patients with surgeries for lumbar degenerative spine diseases. Furthermore, even among surgeons with high professional skills and qualifications, it is reported to be a common phenomenon. The incidence of unintended durotomy in the literature ranges between 1% and 14%<sup>4</sup>.

In the current study, the frequency of ID was 4.3%, which was on the lower side in the range of reported incidence in the current literature. Incidental durotomy was more common in males and in the 4th decade of life. It was also more common in spinal stenosis as compared to PIVD. In our study, ID was 4.81% in lumbar stenosis whereas it was 3.65% in lumbar PIVD. The high incidence of incidental durotomy reported in few studies in the literature makes it one of the most common complications in lumbar spine surgery for degenerative diseases. Having said that, majority of the studies concentrated on problems such as its incidence, contribut-

ing risk factors, management and long term sequelae. However, the potentially devastating short-term sequelae of CSF leak, like the formation of pseudo-meningocele and meningitis, have been well described which is associated with a poorer long-term clinical outcome in these patients<sup>7</sup>.

We compared our study with national and international studies and we found that it was comparable in most of its aspects. According to one study Blecheret al<sup>8</sup> the incidence of incidental durotomy was 6.8 % which was similar to our study. In one of the studies, the rates of incidental durotomy were different for different procedures, as in discectomies it was reported to be 3.5%, in spinal stenosis it was 8.5% and 13.2% for revision discectomy<sup>9</sup>. In another study performed by cammisa et al<sup>10</sup>, the incidence of incidental durotomy was found to be 3.1% which is also comparable with our study. Moreover they also found that ID was more common in revision surgeries. Similarly, another study by Desai et al<sup>97</sup> showed that the incidence of incidental durotomy was 3.2% comparable to our study.

A study by Farooq et al<sup>12</sup>, showed the overall frequency of incidental durotomy as 7%. In his study, ID was common in females (11%) than males (4%). One

possible reason for the increased incidence in male in our study may be that in our setup we operate mostly on male patients as compared to female patients due to some socio-cultural reasons.

In the study by Abdulwahid et al<sup>13</sup> the frequency of incidental durotomy was 8.33%. They have also found that ID was more common (in laminectomy for spinal stenosis as compared to discectomy for PIVD (12.5% vs. 6.66%, respectively). These results are also comparable with our study. In a recent study by Khan et al<sup>14</sup> the incidence of ID was found to be 6.6 % and they found that about 2.81% of ID occurred in laminectomy procedure whereas other case occurred for fusion procedures. It was comparable to the findings of our study.

## CONCLUSION

Incidental durotomy was a common complication in degenerative lumbar spine surgery. It was more common in lumbar stenosis as compared to PIVD. It was also more common in males and in patients with age <40 years.

## CONCLUSION

Surgeries need to be performed in spinal stenosis with caution so that the drastic complication of ID could be prevented. The surgery should be performed by experienced hands, tight stenosis should be operated with caution and small size upcut should be used. Multipl level stenosis is also a risk and should be operated by experienced neurosurgeon and patients should be counseled pre-operatively.

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## CONTRIBUTORS

WU conceived the idea, planned the study and drafted the manuscript. ZK helped acquisition of data and did statistical analysis. MA critically revised the manuscript and supervised the study. All authors contributed significantly to the submitted manuscript.