Frequency and Outcomes of Dural Tear in Lumbar Spine Surgery

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ABSTRACT

Objective	To determine the frequency and outcome of dural tear during lumbar spine surgery for degenerative diseases.
Study design	Descriptive cross sectional study.
Place & Duration of study	Department of Neurosurgery, Liaquat university of Medical and Health Sciences, Jamshoro, from January 2022 to June 2025.
Methods	Patients admitted through the outpatient department with degenerative lumbar spine diseases were enrolled. A total of 361 patients fulfilled the inclusion criteria. Surgical procedures performed included laminectomy and hemilaminectomy. All patients were intraoperatively assessed for the presence of incidental durotomy, and any occurrence was appropriately identified, managed and documented. Descriptive statistics were used to present the data.
Results	There were 221 (61.2%) males and 140 (38.8%) females with male to female ratio of 1.57:1. The age of the patients was between 28 and 67 years with a mean age of 48.41±4.12 years. The incidental durotomy was detected in 14 (3.8%) patients. Out of all these cases, 8 (57.1) were related to the surgery done for lumbar spinal stenosis and 6 (42.9) were related to lumbar disc prolapse operation.
Conclusion	Dural tear was more common in patients above 45 years of age with adherent thick ligament flavum, chronic cases and female gender.
Key words	Dural injury, Intervertebral prolapsed disc, Lumbar stenosis, Incidental durotomy.

INTRODUCTION:

Lumbar spine surgery is one of the most frequently performed operations in degenerative disc diseases that result in low back pain and radiculopathy. In the course of the surgery, incidentally a dural tear can result. This leads to the leakage of cerebrospinal fluid (CSF). This is one of the known complications of lumbar spine operations.[1] It has been reported that multiple factors contribute like to this incidental injury.[2] Spine surgery can also result in various intraoperative complications like nerve root injury, wrong-level and wrong-side surgery.[3] Intentional dural opening is also required in some clinical scenarios.[4,5] However, for degenerative conditions it can be avoided.

Other than direct dural laceration, over traction of the nerve roots, which is frequently reported during the excision of spinal disc herniation or during spinal instrumentation can lead to dural injury during surgery.[6] Such injuries are typically diagnosed intraoperatively and treated immediately with primary repair by conventional surgical methods. However, primary dural closure by suturing may be technically difficult because of insufficient operative space. The practices of spine surgeons often varies for management of dural tears.[7,8] A dural defect

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that is not realized or is not repaired properly may lead to a postural headache which is usually accompanied by nausea, vomiting, neck or back pain and stiffness. Other symptoms are also reported. Constant cerebrospinal fluid leakage may lead to fistula, pseudomeningocele, meningitis, arachnoiditis, and epidural abscess.[9,10] The treatment of dural defects is best done by primary repair, which has a good long-term outcome. Alternative methods include muscle, fascia or fat grafts, application of fibrin glues with topical adjuncts like pliable sponge made from dried and sterilized porcine skin gelatin.[11] Due to the paucity of literature on the subject and considering it an important incident during spinal surgery this study was conducted to find out the burden of this complication in our setup.

METHODS:

Study design, place & duration: This descriptive cross sectional study was conducted in the Department of Neurosurgery, Liaquat university of Medical and Health Sciences Jamshoro, from January 2022 to June 2025.

Ethical considerations: The Institutional Review Board (IRB No: LUMHS/REC/1132 – 30.9.2025) approved this research, and all study participants gave their informed consent.

Sample size estimation: All patients who presented with symptoms as mentioned in inclusion criteria were enrolled in the study. It was taken as a whole population rather than sample.

Inclusion and exclusion criteria: Patients who presented with persistent symptoms like low back pain for more than four weeks duration of either sex in whom primary lumbar surgery was planned for degenerative lumbar spine diseases (lumbar disc herniation and lumbar spinal stenosis) diagnosed on findings of x ray lumbosacral spine and confirmed by magnetic resonance imaging (MRI) were included. Patients who needed spinal fixation (spinal pedicle screw) were excluded.

Study protocol: All patients underwent lumbar fenestration or discectomy under general anesthesia. During the operation on finding incidental dural tears a primary suture repair was done whenever possible. If primary suture could not be performed, autologous fat grafts were used which were reinforced with pliable gelatin sponge patch. In every instance, careful multilayered watertight wound closure was done.

Statistical analysis: Statistical software Statistical Package of the Social Sciences (SPSS), version 27 was used to enter the data and perform statistical analysis. Frequencies and percentages were computed to describe categorical variables.

RESULTS:

In this study a total of 361 patients were included. There were 221 (61.2%) and 140 (38.8%) female patients with male to female ratio of 1.57:1. The varies from 28 to 67 years with the mean age of 48±4.12 years. Incidental durotomy occurred in 14 (3.8%) patients. Among these eight (57.14%) were patients with lumbar stenosis and 6 (42.85%) with disc prolapse. Details are given in table I. Most of the patients were above 50 years of age. Table II shows the frequency of dural level with the spine level. Dural tear was more common at L4-L5 level.

DISCUSSION:

In the present study the frequency of dural tear was at 3.8% which is at the higher end of the range as reported in the literature. Tears on the dura were more often seen in the female patients especially in the fourth decade of life. This happened especially in those aged above 45-years and in chronic cases

Table I: Frequency of Dural Tear in Different Age Groups

Age groups (years)	Dural Tear (n)	Total (n%)
25-35	01	23 (6.37%)
36-45	03	58 (16.0%)
46-55	03	131 (36.28%)
>56	07	149 (41.27%)
Total	14	361

Table II: Frequency of Dural Tear in Relation to Spine Level

Spine level	L3-L4 (n %)	L4-L5 (n %)	L5-S1 (n %)
Total: n=361	65 (18%)	182 (50.41%)	114 (31.57%)
Dural tear n=14	3 (21.42%)	7 (50%)	4 (28.58%)

with adherent and thickened ligamentum flavum. In literature the incidental durotomy recorded complication is reported in patients who had surgery due to lumbar degenerative conditions of the spine. It varies from 1% to 14%.[12] We included patients with similar disease pattern including the demographic profile.

Many variables may predispose to an unintended durotomy. The risk of complications must be minimized by following the principles of surgery. However, as pointed out chronic cases pose a challenge. Prompt intraoperative indentification and repair of the tear avoids postoperative issues that include persistent cerebrospinal fluid leakage and chances of meningitis.[13] The postoperative complications noted in this series was surgical site infection (1%) that was managed with intravenous antibiotic therapy based on the culture and sensitivity findings. There was no subsequent progress or neurological impairments. This is the recommended approach in most of the cases.[14]

The frequency of dural tear in the minimal invasive surgical (MIS) technique is low as compared to the conventional open-surgery procedures in the treatment of degenerative lumbar spine conditions. MIS also leads to faster recovery and back to the routine daily life.[15] It is important to mention that in this study most of the patients resumed their normal routine activity despite the incidental dural tears who underwent open procedures. A number of comparative studies have reported a high rate of risk related to the use of the micro-endoscopic discectomy (MED) method. MED technique is cost intensive as it requires specialized surgical equipment, real-time imaging, and increased surgical time. It is pertinent to mention that the importance of a stringent selection of patients and skills of the surgeon matters a lot.[16]

Limitations of the study: This was a single center study with focus on frequency estimation of single complication in patients who were subjected to open surgical technique.

CONCLUSION:

Dural tear was more common in female patients above 45-years of age with adherent thick ligamentum flavum. The frequency of complication was more frequent in chronic cases.

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