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ORIGINAL ARTICLE

# Surgical dural tears: Prevalence and updated management protocol based on 1359 lumbar vertebra interventions

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## KEYWORDS

Dural tear;  
Incidental durotomy;  
Cerebrospinal fluid  
leak;  
Glue;  
Fibrin sealant;  
Iatrogenic  
meningocele

## Summary

**Introduction:** The dural tear is a dreaded complication of lumbar surgery.

**Hypothesis:** Our management protocol has made it possible to deal with this problem effectively.

**Materials and methods:** Retrospective review of 1359 patients operated between 2000 and 2010. In the event of dural tear, a therapeutic protocol was applied: suturing the dural wound if possible. A collagen patch lined with a layer of fibrin glue protected the suture. If the suture was considered tight, a non-aspirating drain was set up for 48 h. In the other cases, no drain was set up. All the patients were left supine for 48 h and they received intravenous antibiotics for the same duration. We analyzed the number and the type of breaches, the possibility of suturing, clinical symptoms (headache), and delayed complications (dural fistula or meningoceles).

**Results:** The 1359 procedures included 23 dural tear complications (1.7%). The tears were often small in size and reparable. There were no late complications detected: no symptomatic fistula or meningocele. None of the patients had a second surgery.

**Discussion:** This protocol provided effective management of dural tears in lumbar surgery, with no application problems. We suggest a number of improvements: the use of the Valsalva maneuver to test the suturing, a stand-up test for the patient, and a systematic late MRI to detect meningoceles. There is no reason to change the other points in the protocol: suturing, controlled drainage for watertight wounds, no drainage for the non-watertight wounds, antibiotics, and supine bed rest position 48 h.

**Level of evidence:** Level IV. Retrospective study.

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## Introduction

The dural wound is a dreaded complication in lumbar surgery because of the cascade of more or less serious secondary effects, most particularly neurological (dural fistula, intracranial hematoma, meningitis), that can be set off.

Paradoxically, there are few standardized protocols to guide management of these patients. The objective of this study was to assess our patient management protocol, compare it with existing protocols, and propose improvements for the measures to be taken in these cases.

## Material and methods

### Material

This was a retrospective study: 1359 patients were operated by a single operator (SW) at the lumbar level from 2000 to 2010: these were interventions with a posterior spinal approach. Fractures were excluded because they generate dural wounds. The closed canal procedures were excluded, as were extended deformities. The series included 51% females, the mean age was 46 years (range, 16–88 years, SD = 15). The mean follow-up was 5 years.

The main diagnoses are reported in Table 1.

### Protocol

The treatment protocol was consistent, following a decisional tree (Fig. 1).

In cases of saturable dural tear, polypropylene suture with a thick layer of fibrin glue lined with a layer of collagen was used.

Non-aspirating drainage was set up if the wound was perfectly watertight. The patient was kept in the supine position for 48 h and the drain removed after 48 h. Drainage was installed to prevent hematomas.

In cases of tears that could not be sutured (particularly in minimally invasive surgery), a collagen patch was applied followed by covering the zone with a thick layer of fibrin glue; no drainage was set up and the patient was kept in a supine position for 48 h.

In cases of dural breach with no arachnoid opening: a layer of fibrin glue covered with a layer of collagen was used; no supine position was imposed; drainage was used for conventional surgery and no drainage for cases of minimally invasive surgery.

Injectable antibiotic therapy was systematic for 48 h (cefazolin or vancomycin if the patient was allergic to penicillin).

## Methods

The data were collected from a computerized registry of our interventions. This registry contains essential information: patient identity, diagnosis, surgical technique, and intra- and postoperative complications.

Using a query, we identified the dural wounds and studied the surgical reports and observations kept in the computerized patient file. The number and type of tears, whether suturing was possible, clinical symptoms (headache), and delayed complications (fistula or meningocele) were recorded.

The patients were systematically seen 1 month and 6 months after the intervention. MRI was not systematic.

PubMed was searched to establish the bibliography using the following keywords: “dural tear,” “incidental durotomy,” “cerebrospinal fluid leak,” “glue,” and “fibrin sealant” as well as the main sealants cited: Tissucol®; Tachosil®; Beriplast®; Duraseal®; Vivostat®; Pangen®; Surgicel®; and Bioglu®.

Articles that had a high number of patients operated, dural tears, those that proposed a complete protocol or a fully described or original technique were retained; literature reviews were also studied.

## Results

### Descriptive analysis

The 1359 procedures included 23 dural tears detected (1.7%) (Table 2).

There were four types of tears encountered: punctiform with leakage (7) or with no leakage (5), less than 1 cm (9), and between 1 and 2 cm (7).

In five cases, the breach was considered unsuturable given its location and the type of approach. The wounds were described as anterolateral.

### Risk factor analysis

In this series, we found no particular risk factors: few revisions were complicated by dural tears (2/23; 8.7%).

### Progression and later complications

There were no early revisions for dural cerebrospinal fluid leakage.

The later clinical progression was uneventful. Five MRIs were performed and did not show meningocele.

**Table 1** Surgical indications of the patients included in the series.

Diagnosis	Frequency (%)	Treatment
Herniated nucleus pulposus	40	Microdiscectomy <sup>a</sup> : 87%
Lumbar stenosis	40	open: 13%
Spondylolisthesis	15	37% with osteosynthesis
Tumors	5	63% with no material
		Arthrodesis with laminectomy, PLIF or TLIF
		60% with osteosynthesis
		40% laminectomy

<sup>a</sup> Minimally invasive procedure with microscope.

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