



MANAGEMENT OF DURAL TEARS IN ENDOSCOPIC LUMBAR SPINE SURGERY – A SYSTEMATIC REVIEW STUDY

<b>Laxmikant Dagdia</b>	Assistant Professor
<b>Kunal Nune</b>	Junior Resident
<b>Aniruddha Patil</b>	Junior Resident
<b>Girish Gadekar*</b>	Professor and HOD *Corresponding Author

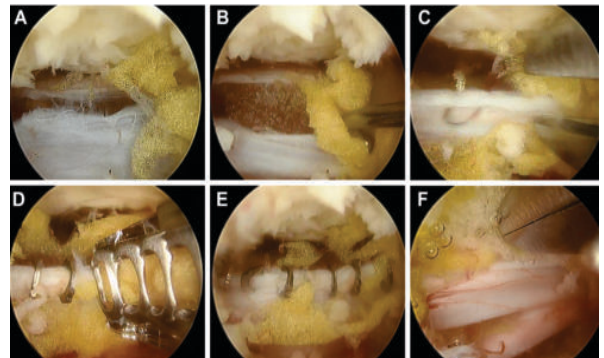
**ABSTRACT** Lumbar degenerative disorders are the most common cause of low back pain with or without radicular pain(1). Lumbar decompression and discectomy are two major and commonly performed surgeries for patients not responding to conservative management. Microscopic lumbar discectomy and decompression are gold standard to treat these diseases(2). Endoscopic lumbar spine surgeries are being done at more and more centers since last decade(3). Dural tears are common but troublesome complication of Endoscopic Spine surgeries. Management of the same is well defined in Microscopic lumbar discectomy but not clearly defined for tears during endoscopic surgeries. Therefore, this study is an attempt to establish management principles after extensive reviewing of studies on management principles of iatrogenic dural tears during endoscopic spine surgeries till date. **Methodology:** PRISMA (Preferred reporting items for systematic reviews and meta-analyses) guideline was used. A search of articles in PubMed, MEDLINE, Embase published between were included in the screening process. For identification of studies included detailed computerized literature search strategies were carried out in these databases. **Study selection:** Total of 1569 studies on 'Dural tears' were identified from electronic database from year 1947 to 2023 searching. Out of those 1569 studies, 180 studies were regarding Dural tears in endoscopic spine surgeries. After exclusion, 7 studies qualified the inclusion criteria and were included as per eligibility criteria for further analysis. **Objective:** Objective of this study is to do a systematic review on present guidelines for management of dural tears in endoscopic spine surgery

**KEYWORDS :** dural tear, endoscopic, management, complication

**INTRODUCTION**

Minimally invasive spine surgery started in true sense by Lyman Smith in 1963 by injecting chymopapain intradiscally called chemonucleolysis which after several innovations over 5 decades evolved to current day widely practiced Endoscopic Spine Surgery (4). Endoscopic spine surgery has Steep learning curve like any other endoscopic procedures (5). Increasing usage of endoscopic spine surgeries has led to increased incidence of complications like dural tear. Nowadays, special instruments and techniques have been devised for repair of incidental dural tears occurring during endoscopic spine surgeries (Figure 1) (6).

However, there is still no single well established and universally accepted guideline or protocol to treat this troublesome complication occurring during endoscopic spine surgery.



**Figure 1:** Repair of Incidental Durotomy Using Sutureless Nonpenetrating Clips via Biportal Endoscopic Surgery

**Table 1. Review of treatment of iatrogenic dural tears in endoscopic spine surgery**

Study	Study Design	No. Of patients	Diagnosis	Endoscopic Surgical technique	No. of dural tears	Conversion to open surgery	Technique of Dural Closure	Bed Rest	Drain age	Clinical symptoms related to CSF Fistula	Repeat ed Surgery
Hong et al., 2020	Retrospective	165	Ipsilateral Laminotomy, Contralateral laminotomy,	PBES			Bed rest, fibrin sealant patch	2 days			
Ahn et al., 2011	Retrospective	816	Lumbar disc herniation L3-L5	Percutaneous system	9	Yes (9)	Suturing, Fibrin glue			Headache, Leg pain, Weakness	No
Kim et al., 2020	Retrospective	330	ESLD	Interlaminar	27	No	Endoscopic patch				
Oertel et al., 2017	Prospective	212	Lumbar stenosis, disc herniation	Tubular system	9	No	Autologous muscle graft with fibrin patch		No	None	No
Park et al., 2020	Retrospective	643		PBES	29	No	Fibrin sealant, Titanium clip, Microsurgery	24 hours			1

Teli et al., 2010	Prospective	70	LDH	Tubular system	6	No	Fibrin glue			
Lee et al., 2021	Retrospective	53	Degenerative spine disease	UBES	7	Yes (2)	Fibrin sealant			

**DISCUSSION**

Most of the dural tears are small and can be managed by compressing with gelfoam and sealants (7). However, one third might need conversion to open surgery due the potential complications.

Kim et al concluded that endoscopic patch blocking dural repair technique should be considered in type I to type 3A dural tear having good prognosis and clinical outcome whereas in types 3B, 3C and 4 which need conversion to open surgery have fair to poor prognosis (Figure 2) (8)

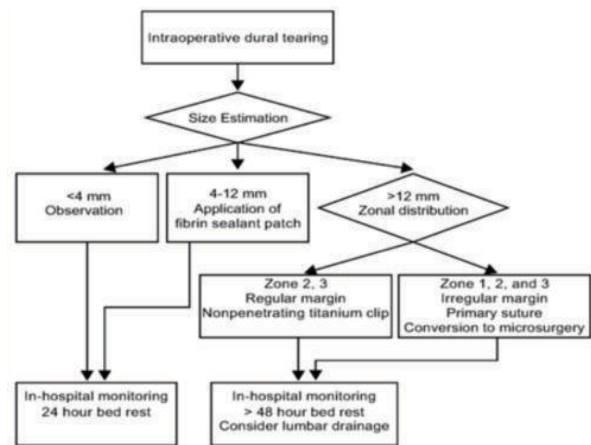
Location	Type
Coronal plane	
Lower third of the surgical field	I
Middle third of the surgical field	II
Upper third of the surgical field	III
Sagittal plane	
Dorsal (median or para-median)	A
Lateral (nerve root axilla or lateral recess)	B
Ventral	C

**Fig 2: Two plane anatomic Classification of Dural tears**

Hong et al concluded that use of a dural protector attached to scope was safer and were able to achieve water tight sutures without conversion to microscopic surgery (Figure 4) (9)

Oertel et al made a point regarding combination of autologous muscle graft and fibrin sealant patch as safer and faster technique to manage dural tears in endoscopic spine surgery (10). Muller et al's review concludes the same (11)

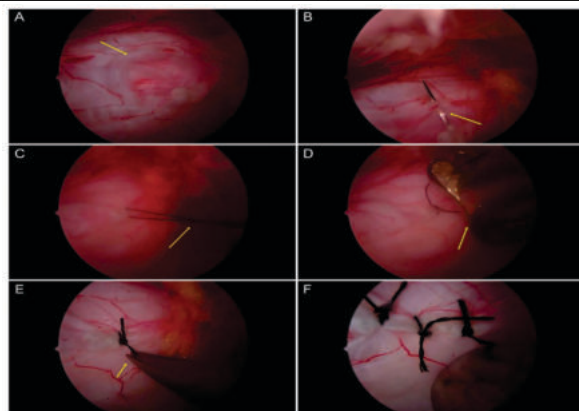
Park et al presented an algorithm based on anatomical location and size of dural tear in their study to manage dural tears during endoscopic spine surgery (12)



**Figure 3: Treatment algorithm according to anatomical location and size of the dural tear(12)**

Source: Park, H. J., Kim, S. K., Lee, S. C., Kim, W., Han, S., & Kang, S. S. (2020). Dural Tears in Percutaneous Biptoral Endoscopic Spine Surgery: Anatomical Location and Management. *World neurosurgery*, 136, e578–e585. <https://doi.org/10.1016/j.wneu.2020.01.080>

Lee et al concluded that dural injury can also occur because of various anatomical features of meningo-vertebral ligaments. (13).



**Figure 4: Endoscopic suture using the specially designed pusher. (A) An incidental thecal sac lesion during durotomy is shown by the yellow arrow. (B) The 4:0 silk needle used to suture both lateral margins, including the needle holder, shown by the yellow arrow. (C) The silk suture used is crossed to form a knot (yellow arrow). (D) The pusher is used to strengthen the knot to obtain a watertight suture (yellow arrow). (E) The ends of the silk suture are cut using microscissors (yellow arrow). (F) The completed water-tight suturing is shown.**

**Source:**Novel Instruments for Percutaneous Biptoral Endoscopic Spine Surgery for Full Decompression and Dural Management: A Comparative Analysis(9)

**CONCLUSION:**

Most iatrogenic endoscopic dural tears can be managed through endoscopic view, without the need to convert to open surgery .Most of the dural tears can be managed by mechanical compression with gelfoam or fibrin sealant which are easily available with good long term outcome .Incidence of iatrogenic dural tears in endoscopic spine surgery was more in interlaminar approach than transforaminal approach and incidence increased with usage of Powerdrills .Newer techniques and instruments available like dural protector are efficacious and safer .Pre-operative counselling and patient education alongwith reassurance post-op is equally important if dural tear occurs .

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