

Incidence of Dural Tears in Spine Surgery in a Tertiary Care Center of North India: A Retrospective Study of 300 Cases with Review of Literature

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Abstract

Background: Dural Tears (DT) are encountered with variable range of 1 to 17%. Dural rents can be diagnosed intraoperatively and should be managed to have a better outcome postoperatively.

Material and Methods: We retrospectively reviewed 300 consecutive cases involving patients who underwent a surgical procedure for the treatment of various spinal problems at our institution between January 2015 and December 2017.

Results: In 300 operations (126 women and 174 men; mean age 58.9 years; range 19 - 83 yrs), an incidental DT (in 5% cases) was either identified intraoperatively or suspected retrospectively. The bulk of involved procedures were discectomy followed by, traumatic spine fixation, decompression and fusion, performed either at two levels or more or a single-level and carries spine.

Conclusion: In conclusion, the reported incidence of DT in spine surgery was 5% in our study. Risk factors included older age, increased comorbidities, and high hospital caseload. DT increased the rate of in-hospital complications and mortality and health care burdens.

Keywords: CSF Leak; Dural Tears; Incidence; Spine

Introduction

Intra operative dural tear is relatively frequent complication which could happened during variety of spine surgeries. Its incidence is quite variable as per current review of literature and it could be as high as 17% and lowest as 1% [1-5]. Attributing factors behind so much variability depends upon level of experience, volume of surgery and complexity of surgery [4,6,7]. This intra operative complication is quite stressful situation for operating surgeon and requires significant attention and appropriate management as this complication could be associated with cerebrospinal fluid (CSF) leakage, wound dehiscence, pseudomeningocele, CSF fistula formation, infective meningitis, worsening of neurological deficit. All these complications and treatment methods leads to increased hospital stay, treatment cost along with medico-legal issues. So, surgeons cannot take this situation lightly and when it happens during surgery it has to be recognized, intraoperatively and repaired primarily with established surgical techniques. However, not all Dural Tears can be closed primarily and those that are not closed in an appropriate way and went unrecognized could be further managed with bed rest, postoperative lumbar drains.

Materials and Methods

We retrospectively reviewed 300 consecutive cases involving patients who underwent a surgical procedure for the treatment of various spinal problems at our institution between January 2015 and December 2017. These operations were performed by one primary surgeon who had more than 30 years of experience in spine surgery. A patient data were collected from hospital records who underwent spine surgery during the above mentioned period. Their demographic variables like age, sex, diagnosis, type of surgical procedure, hospital stay were noted. All the records collected from the CR office and main OT data entry register for intra operative dural tear along with its risk factors and compared with the previous literature. Authors also noted the type management done for dural tear along with its associated complication if any occurred postoperatively.

Results

In a 3 year retrospective study, from 2015 to 2017, an incident of dural tears was observed among patients operated for spine pathologies. In 300 operations (126 women and 174 men; mean age 58.9 years; range 19 - 83 yrs), an incidental DT (in 5% cases) was either identified intraoperatively or suspected retrospectively (Table 1). The bulk of involved procedures were discectomy followed by, traumatic spine fixation, decompression and fusion, performed either at two levels or more or a single-level and carries spine (Table 2). Maximum percentage of dural tear was found in revision cases (50%). Most of the intraoperative dural tears were managed with end to end repair (n = 13). In 2 cases dural tear could not be repaired because of severely adhered cord and thinned out dura. Persistent DT-related symptoms (i.e. headaches, nausea and continued clear drainage), continued for 2 months despite conservative treatment, but automatically weaned off after 2 months.

Total patients: 300 Male: 174 Female: 126	Dural tears: 15	%age 5%
Lumbar discectomy- 81	3	3.4%
Single level LCS- 23	2	9%
Cauda equine syndrome- 12	1	8.5%
Multiple level LCS- 21	4	18%
Caries spine anterior decompression- 26		
Caries spine posterior decompression- 8		
Traumatic spine posterior decompression - 38		
Traumatic spine anterior decompression- 13		
Tumour anterior decompression- 10		
LYSTHESIS- 20	3	15%
Cervical myelopathy with ACDF- 23		
Cervical myelopathy with lateral mass screw 4		
Revision surgery- 4 (all in lumbar region) 4 2 Disc surgeries 2LCS	2	50%
Others- synovial cyst 1		
Posterolateral bone grafting- 1		
Sacral tumour- 4		
Congenital scoliosis- 3		
Idiopathic scoliosis- 1		
Implant removal - 3		
Compressive myelopathy (tumours)- 4		

Table 1: Showing the total number of patients operated for different spine pathology.

Age group	Incidence of DT	Level of DT (thoracic, cervical, lumbar)	Intraop management of DT
20 - 40	2	Lumbar	Primary suturing
41 - 60	5	4 lumbar, 1 thoracic	Primary suturing
61 - 80	8	Lumbar	Primary suturing, Drain

Table 2: Incidence of dural tears in a diverse range of spine surgeries.

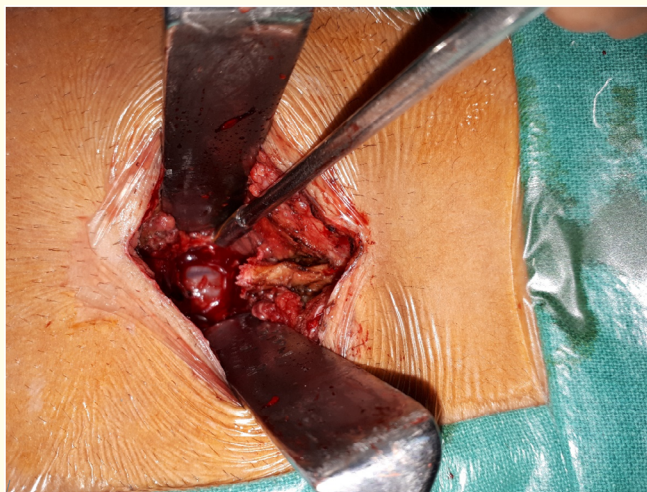


Figure 1: Showing thinned out duramater with bluish discoloration of underlying arachnoid mater.

Discussion

In this retrospective study, we reviewed data of patients who had undergone spine surgery for different etiologies. Incidence of dural tear in various spine surgeries in our study was 5% which is comparable to the previous studies [1-6]. As a retrospective study, Cammisa, *et al.* reported 3.1% (74/2,144) and Guerin, *et al.* reported 3.84% (51/1,326) overall incidence of DT for all spine surgeries, and Ruban and O’Toole reported 9.4% (53/563) for minimally invasive spine surgery [4-6]. Recently, as a prospective study, Williams, *et al.* reported 1.6% (1,745/108,478), Baker, *et al.* reported 10% (161/1,591), and McMahon, *et al.* reported 3.5% (104/3,000) overall incidence of DT for all spine surgeries [1-3]. Wang, *et al.* observed 14% incidence of dural tears in a review of > 600 consecutive patients of lumbar surgery [7].

Moreover, incidence of dural tear found to be higher in multiple level canal stenosis, revision surgeries followed by listhesis, single level canal stenosis and discectomy and these findings were similar to found by Blecher, *et al* [8]. Strengthening previous studies, we observed that revision surgery is a strong risk factor for dural tear [3,5,8]. The reason we thought could be adhesions, fibrosis and irrelevant anatomy which can mislead even an experienced surgeon. So above data made us think strongly to be cautious and slow while performing revision spine surgery specially around the fibrotic area.

Age has been previously suggested to be a risk factor for DT which is further supported by our study [1,7,9]. Possible reasons for age as a risk factor include normal signs of aging such as narrowing the spinal canal, thicker ligamentum flavum, and osteophyte formation [10]. Shortening of the spine by degeneration may also cause redundant dura, which is more easily trapped between the jaws of a Kerrison rongeur [11]. In addition, in elderly patients, the dura tends to have a more friable appearance, which may predispose it to DT [2]. Experience level of surgeon also has been reported as a risk factor for DT [12,13]. High hospital caseload institutions are usually the teaching hospitals. At a teaching hospital, spine surgeries are assisted by residents and fellows, and the incidence can be higher from the experience standpoint. Further, difficult cases such as revision cases are often referred to the hospitals that perform the most procedures.

The mean hospital stay was 2 days longer in patients with DT than in those without DT which is comparable to study done by Yoshihara, *et al* [14].

A CSF leak leads to increased level of patient apprehension and the consequences can be disastrous. Symptoms include spinal headache, nausea, vomiting, radiculopathy and in severe cases herniation of brainstem. A persistent CSF leak halts the wound healing and acts as a risk factor for direct entry of the organisms to the meninges. Possible sequelae of Superficial infections could be cutaneous fistula, arachnoiditis, epidural abscesses and meningitis. Prolonged CSF leak may lead to pseudomeningocele which can cause compressive myelopathy and press upon nerve rootlets causing radiculopathy. Excessive and prolonged leaks can alter the blood-CSF flow balance and lead to cerebellar tonsillar herniation, intracranial haemorrhages, intracranial hypotension and cerebral vasospasm. The CSF poses adverse reactions on bone graft and decreases its potential to heal with the native bone. A surgeon should explain the patient about the risk factors of dural tears, CSF leak and further consequences CSF leaks which can prevent the surgeon from going into Medico-legal trap [15].

Closure of dural rents should be the top priority whenever they are encountered. Closure of dural rents causes tamponade effect on the epidural veins and stops epidural bleed. Blood in the CSF can lead to late arachnoiditis and other serious manifestations, so best effort required to prevent mixing of blood with the CSF. Non-resorbable silk (5-0) with a muscle patch was the most common method to seal of dural rents with a interrupted suture technique. Incorporation of the muscle patch is easier with interrupted suturing technique.

CSF output is < 100 ml in 24 hours set as criteria for the removal of drain. In case of CSF leak from the drain site/wound site, additional stitch may be taken in the ward to achieve water tight closure. Antisecretory drugs, caffeine and fluid intake were advised to the patients with dural tear but Epstein, *et al.* questioned the use of anti-secretory drugs (Acetazolamide) [16].

Conclusion

Dural tears and CSF leaks should be kept in mind while performing spine surgery specially revision surgeries. These complications increase the apprehension level, recovery period and economic burden of the patient in the post-operative period, taking concentration away from the rehabilitation aspect of otherwise well performed surgery. Knowing the risk patients, meticulous surgery, solving the dural rent intraoperative and detailed counselling of the patient can help to decrease the incidence of dural tears and patient satisfaction. In conclusion, the reported incidence of DT in spine surgery was 5% in our study. Risk factors included older age, increased comorbidities, and high hospital caseload. DT increased the rate of in-hospital complications and mortality and health care burdens.

Conflicts of Interest

None.

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