

## DURAL TEAR: A FEARED COMPLICATION IN LUMBAR SPINE SURGERY

Sohail Amir<sup>a</sup>, Bilal Khan<sup>b</sup>, Aurangzeb<sup>c</sup>, Khaleeq-Uz-Zaman<sup>d</sup>

<sup>a</sup>Assistant Professor, Neurosurgery, Naseer Teaching Hospital, Peshawar.

<sup>b</sup>Senior Registrar, Neurosurgery, Naseer Teaching Hospital, Peshawar.

<sup>c</sup>Associate Professor, Anesthesia, Naseer Teaching Hospital, Peshawar.

<sup>d</sup>Professor and Head Department of Neurosurgery, Pakistan Institute of Medical Sciences Islamabad.

### ABSTRACT:

**OBJECTIVE:** The objective of this study is to determine the incidence of dural tear in lumbar spine surgeries and associated risk factors.

**MATERIAL AND METHODS:** In this descriptive cross sectional study, 117 Patients were studied in the department of Neurosurgery, Naseer Teaching Hospital Peshawar from February 2013 to December 2016. All patients with either gender or age who needed spinal surgery for lumbar disc disease, spinal stenosis, and re-do surgery were included in study while those with trauma, tumor and infection were excluded. Data was collected regarding the age of patients, co-morbid conditions, lumbar spine disease, level of involvement, type of operation, occurrence of dural tear, site of dural tear and complications were recorded on a predesigned proforma. Data was analyzed using SPSS version 20.0.

**RESULTS:** Out of 117 patients 63(53.8%) were male and 54(46.1%) were female. Male to female ratio was 1.2:1. In our study the age of patient ranged from 16 to 80 years with mean age  $38 \pm 2.34$  years Dural tear occurred in 15(12.8%) of patients, among these 5 (4.2%) dural tear in lumbar disc prolapsed, 8(6.8%) in spinal stenosis and 2 (1.7%) in surgery for recurrent disc disease. The complication rate was 19(16.2%), among these the most common complication was cerebrospinal fluid leak (CSF) in 7(5.9%), delayed wound healing in 5(4.2%), discitis in 4(3.4%) and others in 3(2.5%) of patients.

**CONCLUSION:** Dural tear (DT) is not uncommon complication during spinal surgery and represent a serious challenge for both surgeon and patients. Female, obese, older age, re-do surgery are the major risk factor for dural tear.

**KEYWORDS:** Dural tear, Risk factor, Incidence, Laminectomy, Complications.

### INTRODUCTION:

Dural tear (DT) is not an uncommon complication during spinal surgery and represent a serious challenge for both surgeon and patients. Despite effective treatment modalities most of surgeons are feared of this complication<sup>[1]</sup>. The incidence of DT varies from 0.5% to 18% in different studies<sup>[2,3,4]</sup>. The major risk factors were age of patient, surgeon experience, type of surgery, and obesity<sup>[5,6]</sup>. The introduction of complex spinal surgeries and spinal instrumentation in the last few decades has a strong association with increased incidence of dural tear<sup>[2]</sup>. DT occurs either as a direct laceration or due to immense pressure of

the extruded disc or yellow ligaments on dural sac, it may also occur during implantation of spinal instruments<sup>[7,8]</sup>.

In majority of cases, DT can be easily recognized intra operatively by presence of cerebrospinal fluid (CSF) in epidural space, and repaired with establish surgical techniques<sup>[9]</sup>. In some cases there is small punctiform dural tear

*Corresponding Author:*

Sohail Amir

Assistant Professor Neurosurgery,  
Naseer Teaching Hospital, Peshawar.

Email: dr.sohailamir@gmail.com

in which the CSF is mixed with blood and difficult to recognize even by very experienced neurosurgeon. Large DT should be treated with water tight closure of dura whereas in small durotomies fat graft, muscle graft or fibrin glue is effective<sup>[10,11,12]</sup>. The placement of drain is controversial however complete bed rest and intravenous antibiotics are necessary for prevention of CSF leak<sup>[13]</sup>.

The most dreadful complication of dural tear include cerebrospinal fluid leakage (CSF) which leads to formation of pseudomeningocele, dural-cutaneous fistula, arachnoiditis, epidural abscess. Persistent headache, nausea, vomiting, back pain, delayed wound healing and re-do surgery are other complications<sup>[4,14,15]</sup>. The aim of current study is to evaluate incidence and risk factors of dural tear in lumbar spine surgery. The result of this study will be projected to other neurosurgeons and based upon results of this study we can make suggestions and recommendations necessary for prevention and treatment of such feared complication.

### **MATERIAL AND METHODS:**

This descriptive cross sectional study was done in the department of Neurosurgery, Naseer Teaching Hospital, Peshawar from February 2013 to December 2016. All patients with either gender or age between 16 to 80 years having lumbar disc disease, lumbar spinal stenosis, and those patients who need re-operation for recurrent disc disease were included in the study, however patient presented with spinal trauma, infection, tumour, and listhesis were excluded from the study.

The study was conducted after approval from hospital ethical and research committee. Patient fulfilling the inclusion criteria were included in study. Informed consent was taken from all the patients. After detailed history and clinical examination patients were sent to radiological investigation Magnetic resonance imaging (MRI) was done in all patients to identify the disease.

Data was collected regarding the age of patients, co-morbid condition like hypertension, obesity, ischemic heart diseases, and diabetes. Lumbar spine diseases like

lumbar disc herniation, spinal stenosis, recurrent disc, level of involvement, type of operation like unilateral interlaminar, bilateral interlaminar, hemilaminectomy and laminectomy, occurrence of dural tear (lateral, anterior, root sheath, root axilla) and complications like cerebrospinal fluid leakage (CSF), pseudomeningocele, dural-cutaneous fistula, arachnoiditis, epidural abscess were recorded on a predesigned proforma. Large dural tear were closed with suture 4-0 silk and covered with fat graft and spongistone. In small dural tear and those difficult to repair were covered with fat graft, muscle graft and spongistone. All patients were followed for three months. Data was analyzed using SPSS version 23.0 and presented in form of tables.

### **RESULTS:**

Out of 117 patients 63(53.8%) were male and 54(46.1%) were female. Male to female ratio was 1.2:1. In our study the age of patient ranged from 16 to 80 years with mean age  $38 \pm 2.34$  years. In our study 64(54.7%) patients presented with lumbar disc prolapsed, 44(37.6%) patients with spinal stenosis and 9(7.6%) patients had recurrent lumbar disc prolapsed. The co-morbid conditions were hypertension in 21(17.9%), diabetes mellitus in 18(15.7%) and obesity in 11(9.4%) of patients table-I.

The most common level involved was L5-S1 in 48(41%), followed by L4-L5 in 42(35.8%) of patients. L3-L4 level was involved in 20(17%) cases. In 4(3.4%) of patients 2 levels were involved and in 3(2.5%) 3 levels were involved. Unilateral fenestration and discectomy done in most of cases 36(30.7%), laminectomy and discectomy in 31(26.4%), hemilaminectomy in 32(27.3%) and bilateral interlaminar decompression done in 18(15.3%) of cases table-II.

In current study dural tear occurred in 15(12.8%) of patients, among these 5(4.2%) dural tear in lumbar disc prolapsed, 8(6.8%) in spinal stenosis and 2(1.7%) in surgery for recurrent disc disease. The most frequent site of dural laceration was anterior 8(6.8%), followed by lateral in 3(2.5%) of patients. Dural tear in root sheath and axilla constitute about

4(3%) of cases.

In our study the complication rate was 19(16.2%) among these the most common complication was cerebrospinal fluid leak (CSF)

in 7(5.9%), delayed wound healing in 5(4.2%), discitis in 4(3.4%) and others in 3(2.5%) of patients table-III.

**Table-I. Demographic profile (n=117).**

CHARACTERISTICS	FREQUENCY	PERCENTAGE
<b>SEX</b>		
Male	63	53.8%
Female	54	46.1%
<b>CO-MORBID CONDITIONS</b>		
Obesity	21	17.9%
Diabetes mellitus	18	15.7%
Hypertension	11	9.4%

**Table-II. Characteristic of patients (n=117).**

CHARACTERISTIC	FREQUENCY	PERCENTAGE
<b>DISEASES</b>		
Lumbar disc prolapsed	64	54.7%
Spinal stenosis	44	37.6%
Re-currence	9	7.6%
<b>TYPE OF SURGERY</b>		
Unilateral fenestration and discectomy	36	30.7%
Laminectomy and discectomy	31	26.4%
Hemilaminectomy	32	27.3%
Bilateral interlaminar approach	18	15.3%
<b>LEVEL OF INVOLMENT</b>		
L3-L4	20	17%
L4-L5	42	35.8%
L5-S1	48	41%
2 levels	4	3.4%
3 levels	3	2.5%

**Table-III. Dural tear and complications.**

CHARACTERISTIC	FREQUENCY	PERCENTAGE
<b>DURAL TEAR</b>		
Disc herniation	5	4.2%
Spinal stenosis	8	6.8%
Re-currence	2	1.7%
<b>SITE OF DURAL TEAR</b>		
Anterior	8	6.8%
Lateral	3	2.5%

Root sheath	3	2.5%
Root axilla	1	85%
<b>COMPLICATIONS</b>		
CSF leak	7	5.9%
Discitis	4	3.41%
Delayed wound healing	5	4.2%
Others	3	2.5%

## DISCUSSION:

Any disruption of dural integrity recognized during surgery was considered as dural tear (DT). Visualization of the arachnoid and/or outpouching of the arachnoid associated with loss of dural integrity was also counted as dural tear irrespective of cerebrospinal fluid leak<sup>[16]</sup>. Dural tear is a common complication during lumbar spinal surgeries and despite advancement in operating procedure and effective treatment modalities, it is generally feared by Neurosurgeons. Literature review shows a wide range of incidence of dural leak in spine surgery. The reported incidence varies between 0.5-18%, in our study the incidence was 15% which was on higher side<sup>[17]</sup>. In current study DT occurred more commonly in elder population, this is because of degenerative changes like narrowing of canal, thickening of ligamentum flavum and additionally the dural is thin in elderly people. Cammisa et al<sup>[1]</sup> and Takahashi et al<sup>[10]</sup>, reported that patient with DT were older than those without DT and female gender were more effected than male. Among the co-morbid conditions obesity was most common in our study and similar result were obtained by Wolff S et al<sup>[6]</sup>. DT more frequently occurred in patient operated for recurrent disc herniation. The high incidence of duratomies in recurrent cases can be explained through the fact that previously wide laminectomy was done which left behind extensive epidural scar, removing of such scar result in DT. Salmon B et al<sup>[16]</sup> reported revision surgery is one of the commonest risk factor for dural tear and is most probably due to loss of anatomical landmarks and post operative adhesions. In our study durotomy did not associate with damage to spinal nerve and had not created new neurological deficit. In addition it doesn't have deleterious effect on outcome almost similar finding were observed by Jones AA et al<sup>[18]</sup>. In our study the complication rate was 19(16.2%) among these the most common complication was cerebrospinal fluid leak (CSF) in 7(5.9%),

delayed wound healing in 5(4.2%), discitis in 4(3.4%) and others 3(2.5%) of patients. Almost similar results were observed by study done in Romania in 2015<sup>[19]</sup>. Post operatively bed rest and prolong antibiotic therapy were recommended to Prevent complications Adam D et al<sup>[19]</sup> retrospectively reviewed 1259 cases and reported incidence of DT was 3.6%. Farooq G et al<sup>[20]</sup> studied 200 cases and showed incidence was 7%. In our study dural tear occurred in 12% of patients, which is on higher side. There were several limitations in our study. Firstly, the sample size was small. Secondly, the patients should have been followed in order to know which treatment modality they received. Thirdly, only Naseer Teaching Hospital was the study place, extension of the study to the other hospitals of same locality could have given us better impression about the frequency of this condition in that particular area.

## CONCLUSION:

Dural tear (DT) is not an uncommon complication during spinal surgery and represent a serious challenge for both surgeon and patients. Female, obese, older age, re-do surgery are the major risk factor for dural tear. Timely diagnosis and proper management of dural tear intraoperatively is needed to prevent further complications.

## CONFLICT OF INTEREST:


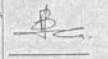


There is no declared conflict of interest.

## ETHICAL REVIEW COMMITTEE:

Ethical review committee of the said institute has reviewed and approved this article.

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AUTHORS NAME	CONTRIBUTION	SIGNATURE
1. DR. SOHAIL AMIR EMAIL: dr.sohailamir@gmail.com	Conception and Design, Collection and assembly of data, Analysis	
2. DR. RIZAL KHAN EMAIL: khana@spine.com	Interpretation of Data Drafting article	
3. DR. ANWARUL EMAIL: anwarul@gmail.com	Statistical Expertise	
4. DR. KHALEED EMAIL: khaleed@gmail.com	Critical revision of article & important intellectual content final approval	

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