

Outcome of Duralplasty With Fascia Lata Graft For Dural Defects

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ABSTRACT

Objective	To assess the outcome of duralplasty with fascia lata graft for dural defects in neurosurgical procedures.
Study design	Descriptive case series.
Place & Duration of study	Department of Neurosurgery at Neurospinal & Cancer Care Institute Karachi, from April 2020 to April 2024.
Methods	Fascia lata was used as a dural substitute because of the insufficient tissues available in the adjacent region in patients who underwent surgical procedures due to trauma, brain tumors, infections or cerebrospinal fluid (CSF) leak. The data collected included demographic characters, clinical presentation, location of the pathology, operative procedures done, graft size, postoperative CSF leakage, meningitis, wound infection and donor site complications. Descriptive statistics were used to present the data.
Results	Duralplasty with fascia lata was done in 61 patients. This included 42 (68.8%) males and 19 (31.2%) females. The age was from 15 - 62 years with the mean age of 38±10 years. The size of the grafts applied varied from 3.5 cm × 7 cm to 6 cm × 8 cm. Operative indications included gunshot wound and trauma in 30 (49.1%) patients, tumor in 14 (22.9%), cerebrospinal fluid fistula in 10 (16.4%) and post-infection in 7 (11.4%) patients. Twenty (32.7%) procedures were done in emergency. The mean duration of the operative procedure was 145±25 minutes. The most common surgical sites for dural repair were the frontal region (n=21 - 34.4%), followed by the parietal (n=18 - 29.5%), and occipital (n=12 - 19.6%) regions. Three (4.9%) patients developed postoperative CSF leakage. Four (6.5%) patients expired in this series.
Conclusion	Fascia lata graft was effective and readily available dural substitute in reconstruction of the large defects with minimal complication in our patients. Moreover, the secondary incision which was necessary for the harvesting the graft did not add to the major morbidity.
Key words	Fascia lata, Dura defects, Brain trauma, Brain tumor. Cerebrospinal fluid.

INTRODUCTION:

The dura mater is an investing layer of the brain.¹ An optimal dural substitute when needed during surgery should be non-neurotoxic, non-immunogenic,

non-inflammatory, virus and prion-free, non-adhesive to the surrounding tissues, watertight, viscoelastic, and biomechanically durable. Human dura contains abundant collagen and elastin tissues that meets all the above criteria, making it an ideal material for closure of the dural tears. It is less likely to cause adverse reactions compared to the grafts from other autologous sources, including those from the galea-pericranium, fascia lata, fat, or temporal fascia.²

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In many neurosurgical procedures the dura may be affected as it is opened up by the surgeons when access to the brain or spinal cord is required. It is also damaged in patients with cranial trauma, or due

to the tumor invasion such as meningioma. In all the above situations careful repair of dura is required.³ There are a number of dural substitutes available in the form of autografts, allografts, xenografts, as well as new synthetic materials. They offer a range of options for neurosurgeons when planning dural repair or replacement.⁴ The deep fascia of the thigh, the fascia lata, is one of the tissues that can be used as a substitute.⁵ The main benefit of autografts as dural substitutes is their natural resemblance to the patient's own dura mater.⁶⁻⁷ Fascia lata, which is more abundant and appropriate for larger defects, is often needed because the pericranial tissue is rarely sufficient for covering sizeable dural defects.⁸

Fascia lata has been used as a dural substitute for duralplasty for long. However, the evidence related to its complications is less often reported in literature. This study was therefore conducted to evaluate the effectiveness of fascia lata as a dural substitutes in different neurosurgical procedures in our set-up.

METHODS:

Study design, place & duration: This cross sectional study was conducted at Neurospinal & Cancer Care Institute Karachi, from April 2020 to April 2024.

Ethical considerations: Ethical review committee approval was taken (letter no. IRB: 1566/2021) and informed consent was obtained from all the patients or guardians depending upon the neurological status of the subject.

Inclusion and exclusion criteria: Patients with large cranial defects due to gunshots, traumatic brain injury, brain tumors, intracranial infections, and CSF fistulae who underwent surgery but dura closure was not possible, were included. Patients with GCS score below 10 and those with multiple injuries were excluded.

Sample size estimation: A formal sample size was not calculated and all patients managed during the study period fulfilling the inclusion criteria were enrolled with non-probability consecutive sampling technique. A total of 61 patients of both genders were enrolled

Study protocol: Fascia lata was used to close the dural defects when the local tissues like pericranium or temporalis fascia were not available due to trauma, brain tumors, and in those with CSF fistulae. Preoperative investigations including x-ray skull, CT scan and MRI scans as indicated. Demographic

characteristics, clinical features, the location of the lesion, the type of surgical procedures performed, graft size, and presence of any CSF leakage, meningitis, and wound infection after the procedures were recorded on a pre designed form. All patients received standard neurosurgical care during the hospital stay. Donor site surgical outcome was also noted. Follow up was advised after the discharge to document any mid-term issues.

Statistical analysis: Descriptive statistics were used to present the numerical and categorical data as mean and standard deviation, frequency and percentages.

RESULTS:

In this study 61 patients were included. There were 42 (68.2%) male and 19 (31.8%) female patients. The age of the patients was from 15 to 62 years. The mean age of the patients was 38 ± 10 years. All procedures were performed under general anesthesia. Operative indications included gunshot wound and trauma in 30 (49.1%) patients, tumor in 14 (22.9%), cerebrospinal fluid fistula in 10 (16.4%) and post-infection in 7 (11.4%) patients. Among these, 20 (32.7%) procedures were done in emergency in trauma patients. The mean duration of the operative procedure was 145 ± 25 minutes.

The most common surgical sites for dural repair were the frontal region ($n=21$ - 34.4%), followed by the parietal ($n=18$ - 29.5%), occipital ($n=12$ - 19.6%), and orbital-frontal regions ($n=10$ - 16.3%). Graft sizes varied from 3.5 cm $\times$ 7 cm to 6 cm $\times$ 8 cm. There were no intraoperative graft-related complications noted. Three (4.9%) patients developed postoperative CSF leakage and were managed conservatively. Seven (11.4%) patients had meningitis related to trauma. Surgical intervention was required in three of them. Meningitis developed in three patients postoperatively. These patients were managed with a 15-day course of broad-spectrum antibiotics. The mean hospital stay was 10.2 ± 1.5 days.

CSF leak recurrence occurred in six (10%) patients of whom four were successfully treated with lumbar drainage and two with strict bed rest and head elevation. The lumbar drains were maintained for an average of 4.7 ± 1.4 days. A total of eight patients underwent lumbar drainage, all of whom recovered completely without any need of further intervention. Wound infections occurred in 6 (9.8%) patients; one was culture-positive for *Staphylococcus aureus*, while the rest showed no microbial growth. Wounds were managed with dressings.

No intraoperative adverse events related to fascia lata harvest were reported. Functional neurological outcomes were not formally graded but all surviving patients reported satisfactory recovery with no long-term deficits related to the duraplasty. However, 4 (6.5%) patients expired who had sustained severe traumatic brain injury due to gunshot wounds and axe injuries. No mortality was observed in elective or tumor-related cases.

DISCUSSION:

In this study, we have presented our experience of use of fascia lata graft as dural substitute for different neurosurgical procedures and found it useful. Cerebrospinal fluid leakage is a frequent complication following various neurosurgical procedures, often arising when it is challenging to achieve a watertight dural closure. While primary suturing is sometimes used to repair dural defects, it is not always feasible, particularly in cases where the defect is large and irregular. Achieving a watertight closure can also be complicated by factors such as dural shrinkage, which may occur due to prolonged dissection or retraction during surgery.⁹

In our series CSF leak was not an appreciably important issue contrasting with previous reports. This difference indicates that there are other risk factors for the CSF leak during the surgical procedures.¹⁰ Autologous fascia lata duraplasty reinforced by free muscle flap is a useful technique to treat chronic cerebrospinal fluid leaks. This method is particularly useful in situations where dural vascularity and viability are compromised.¹¹

Fascia lata graft is simple to harvest and effective for dural reconstruction even in patients with severe infection. This is reflected in our data. The complex and laborious tissue transfer operations are therefore avoided.¹² Our study added to the literature the usefulness of the fascia lata graft in patients where dural defects cannot be bridged with the adjacent tissues because of either non availability or size of the graft that may be required.

Limitations of the study: This is a single center study with descriptive design. There was no comparison made with other dural substitutes.

CONCLUSION:

Trauma was the major cause of significant dural loss. Fascia lata was cost-effective dural substitute for repairing the large defects. There were no major complications noted in this series. The long-term outcome was also satisfactory.

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