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# COMPARITIVE STUDY BETWEEN AUTOGRAFT DUROPLASTSY AND SYNTHETIC DUROPLASTY IN POSTERIOR FOSSA DECOMPRESSION.

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**ABSTRACT** **Background:** Primary dural closure after posterior fossa decompression is extremely difficult.different types of dural substitutes are available in form of autologous and non autologous substitutes which have their own advantages. **Aim and Objective:** To compare autograft duroplastsy and synthetic duroplasty after posterior fossa decompression interms of post op csf leak,post op infection ,blood loss during surgery,duration of surgery and post op operative stay to conclude efficacy,advantages ,short term and long term prognosis. **Methodology:** Prospective, Comparitive study of patients who undergo posterior fossa decompression under elective and emergency basis in department of neurosurgery, thanajvur medical college between janaury 2021 to september 2022.all patients with cerebellar ich,cerebellar infarct,chiari 1 malformation ,cerebellar sols who underwent posterior fossa decompression were included in study.pediatric patients ,pregnant females and infective brain abscess cases were excluded. A total of 72 patients were included in the study.36 in autograft duroplasty and 36 in synthetic duroplasty. After obtaining written and informed consent patients were divided in to two equal groups . Group 1- 36 patients undergoing emergency and elective posterior fossa decompression were taken up for synthetic duroplasty. Group 2- 36 patients undergoing emergency and elective posterior fossa decompression were taken up for autograft duroplasty. The effectiveness ,quality of recovery were assessed based on operative time,post op healing,prevention of csf leak,blood loss during surgery,postop infection and post operative hospital stay.statistical analysis was done by chi square test,mann-whitney u testand p value less than 0.05 was taken as significant. **Results:** the results showed no significant Differences between the autograft duraplasty and Synthetic dural graft duraplasty groups in overall Operative time (4.9 hours vs 4.1 hours; p = 0.070), Estimated blood loss (229 ml vs 254 ml; p = 0.159), and Duration of hospital stayafter the operation (13.5 Days vs 12.8 days; p = 0.808).in the autograft Duraplasty group, 1 case of meningitis occurred (7.2%).in the synthetic dural graft duraplasty group, The complications included 1 case of meningitis (7.1%) And 1 csf leak (7.1%).the mean cost of hospitalization In the autograft duraplasty group was Significantly lower than that in the synthetic dural Graft duraplasty group ( p = 0.036). **Conclusion:** Compared with synthetic dural graft Duraplasty, autologous duraplasty in situ is a safe, Effective, and cost-effective procedure for the Treatment of duroplasty in posterior fossa Decompression.the long-term outcome of this Procedure requires investigation.

**KEYWORDS :**

## INTRODUCTION

Posterior fossa decompression are complicated by difficulty in achieving watertight dural closure , post op csf leak or blood ingress creates hydronomic complications.Effective watertight closure of dura is neseccary to prevent the complications and reduce the irritating blood products into csf .Duroplasty is a widely accepted procedure in the surgical management of symptomatic patients after posterior fossa decompression.

The keys are to create adequate decompression, regain normal CSF flow, and achieve effective watertight dural closure.Duroplasty can be performed using autologous tissues or commercially available dural patches.The ideal graft should generally be nonimmunogenic, nontoxic, rapidly integrated into native tissues, flexible, strong, easily suturable, and readily available.

The graft should not cause inflammatory reactions or adhesions and should be able to be closed in a watertight fashion.Allografts, xenografts, and syntheticgraft can be used.It is widely accepted that autologous tissues, such as autologous fascia lata, ligamentum nuchae, fat packings, and the pericranium, are the ideal dural graft substrates. However, obtaining these autologous tissues requires extension of the incision or an additional incision.

## AIM AND OBJECTIVES

**Primary Objective-** Comparison between Autograft Duroplastsy and Synthetic Duroplasty after posterior fossa decompression interms of efficacy, advantages ,short term and long term prognosis.

**Secondary Objective-** To Study and Compare

1. Post op CSF leak
2. Postop Infection
3. Blood Loss During Surgery
4. Duration Of Surgery
5. Post Operative Hospital Stay

## METHOD

This study is a Prospective Comparitive Study between 36 patients posted for elective and emergency Posterior Fossa Decompression in the department of Neurosurgery, Thanjavur Medical College Hospital .

### Inclusion Criteria

All patients with cerebellar ich,cerebellar infarct, chiari 1 malformation, posterior fossa sols who were admitted in tmch and underwent posterior fossa decompression were included in the study.

### Exclusion Criteria

Paediatric age group, pregnant and lactating women and brain abscess cases were excluded.

Of the 36 patients initially considered for enrollment in this study, 18 patients underwent duroplasty with autologous tissue as such temporalis fascia,pericranial fascia,fascia lata .

Other 18 patients underwent duroplasty with synthetic collagen based dural graft and their data were included in the analyses.

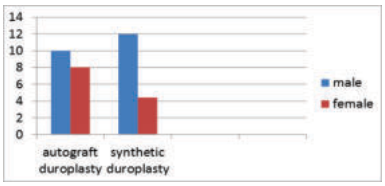
### Statistical Analysis

Categorical data were analyzed using Pearson's chisquare test. Continuous data were analyzed using the Student t-test. All analyses were performed with SPSS 22.0 software (IBM Corp.). A p value < 0.05 was considered significant. Mean values are presented ± SD.

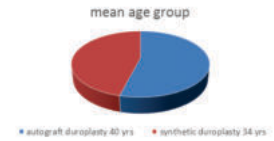
## RESULTS

In the autograft duraplasty group, the mean age of the patients was 40 ± 15 years (range 11–59 years) and the mean BMI was 23.3 ± 5.3 kg/m2 (range 14.8–33.8 kg/m2 ).

In the synthetic dural graft duraplasty group, the mean age was 34 ± 13 years (range 13–56 years) and the mean BMI was 23.3 ± 4.1 kg/m2 (range 18.5–33.8 kg/m2 ).




**Graph 1 : Graph Depicting Age Distribution**




**Graph 2 : Chart Depicting The Age Distribution.**

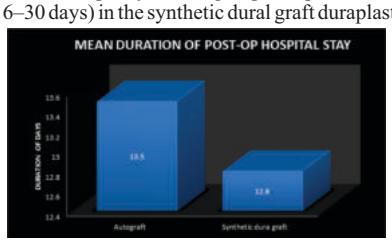
The mean overall operative time for the autograft duraplasty group was 4.9 ± 1 hours (range 3.5–7.0 hours) compared with 4.1 ± 1 hours (range 2.5–5.5 hours) for the synthetic dural graft duraplasty group.


**Graph 3 : Depicting Operative Time**

The mean EBL was 229 ± 176 ml (range 30–600 ml) in the autograft duraplasty group compared with 254 ± 82 ml (range 50–300 ml) in the synthetic dural graft duraplsty group.


**Graph 4: Chart Depicting Estimated Blood Loss**

The mean hospital stay after the operation was 13.5 ± 8.2 days (range 7–37 days) in the duraplasty in situ group compared with 12.8 ± 6.0 days (range 6–30 days) in the synthetic dural graft duraplasty group.




**Graph 5: Depicting Mean Hospital Stay**

The hospital cost was higher in the synthetic dural graft duraplasty group than in the duraplasty in situ group, and this difference was significant.

**Complications**

**Table 1 : Depicting Complications In Both Groups**

| | AUTOGRAFT DUROPLASTY | SYNTHETIC DUROPLASTY |
|---|---|---|
| CSF LEAK | 0 | 1 |
| MENINGITIS | 1 | 1 |
| PSEUDOMENINGOCELE | 0 | 0 |
| SURGICAL SITE INFECTION | 0 | 0 |

## RESULTS

36 patients were enrolled in this study, 18 in the autograft duraplasty group and 18 in the synthetic dural graftduraplasty group.

The results showed no significant differences between theautograft duraplasty and synthetic dural graft duraplasty groups in overall operative time (4.9 hours vs 4.1 hours; p = 0.070), estimated blood loss (229 ml vs 254 ml; p = 0.159), and duration of hospital stay after the operation (13.5 days vs 12.8 days; p = 0.808).

In the autograft duraplasty group, 1 case of meningitis occurred (7.2%). In the synthetic dural graft duraplasty group, the complications included 1 case of meningitis (7.1%) and 1 csf leak (7.1%).

The mean cost of hospitalization in the autograft duraplasty group was significantly lower than that in the synthetic dural graft duraplasty group ( p = 0.036).

The study is limited by several factors. First, the performance of this procedure by only 1 surgeon may introduce doubt regarding its repeatability; however, the use of a single surgeon also eliminated bias due to differences in surgeon expertise.

Second, the size of our sample was small. The major limitation was the the absence of long-term follow-up. These issues need to be resolved in future studies.

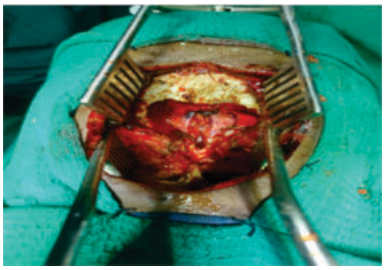


**Figure 1: Showing Posterior Fossa Sub Occipital Craniotomy**

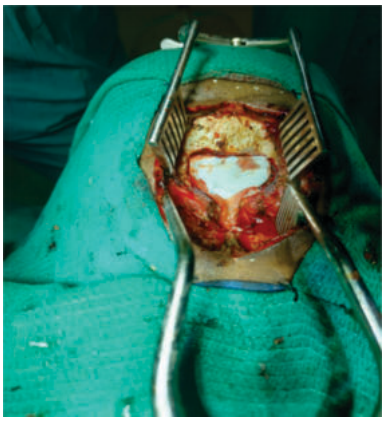


**Figure 2: Showing Post Operative Synthetic Dural Graft-duragen.**

## DISCUSSION

It is often not possible to obtain watertight dural closure after posterior fossa decompression due to shrinkage of dura.complications due to inadequate dural closure is high in posterior decompression than supratentorial which accounts to around 30% and 10 –15% subjectively[1].

The dependant drainage of csf into p-fossa and retention of csf in residual cavity will be the complications.Steinbok et al[2] reviewed the series of174 p-fossa surgeries and reported 53 cases of pseudomeningoceles,[3] of which presented with CSF leaks(24.5% of cases).

The large single institutional review of 500 patients reported a 31.8% complication rate in their p-fossa craniotomies with a 13% of CSF leak[4].

Persistent CSF leakage can give way to meningitis, wound dehiscence, and infection.

The ideal graft should not cause inflammatory reactions or adhesions, can be closed in a watertight fashion, is readily available, is inexpensive, and can easily be sterilized[5]. Synthetic materials are costly and may produce toxic or inflammatory reactions[18], whereas allogenic patches can cause immune-allergic reactions and have been reported to be a source for pathogenic transmission of Creutzfeldt-Jakob disease[6].

The ideal graft is one that disappears when replaced by dura mater with time[7]. Such is the advantage of collagen-based allograft products such as DuraGen, which do not promote inflammatory reactions and act as a matrix for ingrowth of neodura[8].Abla and colleagues[9] published a review comparing the various types of dural grafts used in Chiari decompression surgery in the pediatric population.

They included study specifically comparing 2 different types of dural substitutes and, from the 108 articles that were reviewed, reported 3 studies that were relevant to their search criteria. One study by Attenello et al10 compared synthetic dural graft(n = 27) with

pericranium (n = 40) in 67 patients with Chiari type I; the second study by Danish et al11 compared 2 types of allograft (acellular human dura vs bovine collagen matrix) in 101 patients; and the third study by Vanaclocha and Saiz-Sapena[12] compared cadaveric dura with fibrin sealant (n = 13) to autologous pericranium without sealant (n = 13) in a cohort of 26 patients. outcomes of these 3 studies showed mixed results with a increased rate of resurgery(10% vs 5%, P = .25) and CSF leaks (4% vs 2%, P = .61) in the pericranium group, but higher rates of aseptic meningitis (8% vs 2%, P = .31), pseudomeningocele formation (16% vs 8%, P = .16), and wound infection (2% vs 0%, P = 1.00) in the nonautologous graft group; however, these studies were not able to demonstrate superiority between groups.

DuraGen is a synthetic collagen based dural substitute, is made from a controlled collagen source and is treated with a proprietary process designed to remove antigenic components, yielding our Ultra Pure Collagen[9].

When hydrated, it is conformable and contours instantly and effectively to the complex surfaces of the underlying anatomy, allowing rapid formation of the fibrin clot to protect against CSF leakage. Platelets infiltrate the matrix and initiate fibrin clot formation, forming an effective layer that prevents CSF leakage and initiates the dural repair process[8].

The pore size is optimized to allow fibroblasts to rapidly enter the matrix and lay down natural collagen fibers. The optimized 99% porosity, even distribution, and pore interconnectivity promote uniform tissue regeneration throughout the matrix. This microlayer is activated by fluid to create safe and temporary hydrostatic attraction between the graft and the dural margins[3]. The microlayer is water soluble and dissolves within 24-72 hours after activation .The hydrated graft conforms intimately to the complex surfaces of the exposed brain or spinal cord. Matrix rapidly fills with the patient's blood and plasma exudate.

Type 1 collagen matrix rapidly initiates platelet aggregation. Upon contact with the collagen matrix, platelets degranulate and release clotting factors that initiate fibrin clot formation. The fibrin clot creates a watertight barrier and binds the implanted matrix to the patient's dura.

Ultra Pure Collagen, in combination with the open pore structures, promotes fibroblast activity and acts as a scaffold for cells to deposit new collagen[9].

The graft structure features pores of 50 to 150 microns, within the optimal size for rapid fibroblast infiltration. Fibroblasts begin to migrate into the matrix 2 to 3 days after implantation and start the process of laying down new collagen. Within two weeks of implantation, a neodural membrane has formed between the dural margins to permanently close the dural defect.

After 6-8 weeks, the implant is resorbed and replaced by dura[8]. After 1 year, the neodura has developed into mature dura.One argument against the use of pericranial graft in p-fossa surgery is the need to stage a second incision for graft harvesting itself.However, we have been able to successfully harvest an adequate amount of pericranium in all our cases by adapting a technique described by Stevens and colleagues12 whereby extension of the incision 7 cm above the inion allows for access to good-quality pericranium.

## CONCLUSION

Compared with synthetic dural graft duraplasty, autologous duraplasty in situ is a safe, effective, and cost-effective procedure for the treatment of duroplasty in posterior fossa decompression. The long-term outcome of this procedure requires investigation.

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