Safety and Effectiveness of Pericranial Autograft with Fibrin Sealant Augmentation for Duraplasty in Posterior-fossa Decompressions: A Review of 103 Cases

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Introduction

Posterior fossa (pfossa) surgery is a standard neurosurgical procedure performed worldwide and usually requires the use of some graft material for dural closure. There are numerous autologous and foreign materials currently available for use, but few have been thoroughly studied and no superior standard has been established [1]. One concern is that non-autologous materials have been associated with various complications. Current literature suggests that, when available, autologous tissue such as pericranium, represent a cost-effective and inert substrate [2]. We herein report our experience of 103 cases of pfossa surgeries using autologous pericranium for duraplasty and dural sealant augmentation.

Methods

Retrospective review of 103 cases of pfossa surgeries using autologous pericranium for duraplasty with dural sealant augmentation performed at a single institution by the senior author (EMK). Cases were reviewed radiographically and clinically at 4 weeks, 3 months, 6 months, and 1 year, for surgical site infection, graft dehiscence, cerebrospinal fluid leak, and development of a symptomatic pseudomeningocele. In brief, a extending the surgical incision 1 inch above the superior nuchal line (Figs. 1A & 2A) allows for harvesting of the pericranium (Fig. 2B). Moon-shaped craniectomies were made to allow for piecemeal removal of the bone flap (Fig. 2C).

Pericranial graft is secured with nonabsorbable sutures (Fig. 2D) and dural sealant augmentation (Figs. 1C & 2B) followed by Gelfoam onlay (Fig. 2F) and meticulous multilayered watertight wound closure. Of the 103 cases, 1 patient developed a delayed full thickness graft dehiscence requiring revision as well as a medication-induced aseptic pleocytosis secondary to an NSAID allergy.

The pericranial graft is secured using nonabsorbable sutures (Fig. 2D) followed by dural sealant augmentation (Fig. 2E). Gelfoam is used to cover the surgical site (Fig. 2F) prior to a meticulous multilayer watertight closure.

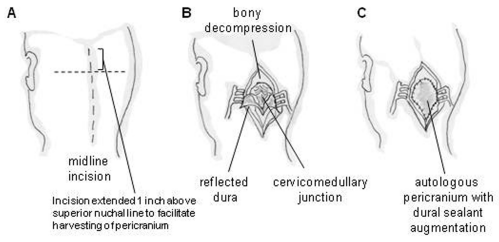
Results

Table 1 outlines the dataset demographics.

Table 1. Demographics of the study.

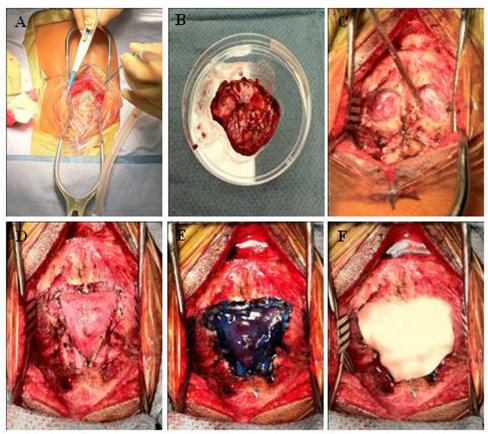
Number of Cases	**103**
Male	58
Female	45
Avg Age	**56.2 yrs**
Min Age	22 yrs
Max Age	94 yrs
Breakdown of Cases	**Cases**
Tumors	**67**
Vascular	**12**
Hemorrhagic infarct	2
Hypertensive bleed	7
Ruptured aneurysm	3
Compressive Syndromes	**19**
Chiari malformation	17
Vascular compression	2
Trauma	**3**
Epidural hematoma	1
Subdural hematoma	1
Traumatic cerebral edema	1
Miscellaneous	**2**
Pseudomeningocele	1
Hydrocephalus unknown etiology	1
Total	**103**

Figure 1. Schematic of a typical pfossa surgery.



Of the 103 cases, 1 patient developed a delayed full thickness graft dehiscence requiring revisionas well as a medication-induced aseptic pleocytosis secondary to an NSAID allergy. There were no complications with any other patients at all follow-up timepoints.

Figure 2. Intraoperative images of pfossa decompression with autologous pericranium and dural sealant augmentation.



A) midline incision extending above superior nuchal line. B) Harvested pericranium. C) Double moon-shaped craniotomy leaving midline keel intact allowing for enbloc removal of bone flap. D) Y-shaped pericranium graft. E) Dural sealant augmentation. F) Onlay Gelfoam prior to watertight multilayer wound closure.

Conclusions

Autologous pericranium duroplasty with dural sealant augmentation is a safe and effective method for dural closure in pfossa surgeries. Our results suggest that compared to the literature, this technique produces superior results and may prevent exposure of patients to morbidities associated with other (allograft/xenograft) materials. Further validation is required with a randomized comparison study.

References

1. Cosgrove, G.R., et al., Safety and efficacy of a novel polyethylene glycol hydrogel sealant for watertight dural repair. J Neurosurg, 2007. 106(1): p. 52-8.
2. Stevens, E.A., et al., Simplified harvest of autologous pericranium for duraplasty in Chiari malformation Type I. Technical note. J Neurosurg Spine, 2009. 11(1): p. 80-3.

Learning Objectives

By the conclusion of this session, participants should be able to: 1) Become familiar with the technique of autologous pericranium harvesting for duraplasty in pfossa surgeries, 2) Discuss in small groups the different types of dural graft substitutes available today for use, 3) Identify a safe and effective method of duraplasty for pfossa surgeries.