Closure of Dural Defects after Anterior Clinoid and Optic Canal Roof Removal: Technical Note

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ABSTRACT

A technique using vascularized pericranium to close dural defects after anterior clinoid and/or optic canal roof removal is described. This approach is simple, inexpensive, and uses autologous tissue. This method has provided satisfactory dural closure and has avoided cerebrospinal fluid leaks or extradural accumulation of cerebrospinal fluid.

KEYWORDS: CSF leak, dural reconstruction, pericranial graft

Occasionally, removal of dura after resection of bone over the anterior clinoid and/or optic canal roof will leave a dural defect of varying size that cannot be closed primarily. If a watertight dural reconstruction is desired, a variety of alternatives can be considered. This report describes the use of a vascularized pericranial flap to close such a defect.

TECHNIQUE

After dural closure, the defect is assessed. When the scalp has been opened in two layers (Fig. 1A), the pericranium is left vascularized, elevated from the bone, and protected at the beginning of the

operation. If the scalp is raised in a single layer (Fig. 1C), the pericranium is dissected free from the underside of the scalp. If the dural defect is located behind the orbit and the pericranium can directly reach the defect (Fig. 1A), the pericranium is trimmed and sewn in place with individual 4-0 braided nylon sutures (Fig. 1B). If the pericranium cannot directly reach the dural defect, the pericranium is partially disconnected from its base to allow the vascularized pedicle to reach the target (Fig. 1C). The pericranium is then trimmed to fit the defect and closed similarly with interrupted 4-0 braided nylon (Fig. 1D). In either case, the suture line is reinforced with biologic adhesive. The remainder of the closure proceeds similar to a standard craniotomy.

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Figure 1 Dural reconstruction after anterior clinoid/optic canal roof removal. Inset shows patient position and scalp incision. Drawing illustrates technique for vascularized pericranial graft to close dural defect. See text for discussion of technical details.

RESULTS

This type of closure has been used in three cases. One patient, who had multiple intracranial meningiomas and deteriorating vision, underwent a lateral orbitotomy combined with a frontotemporal craniotomy¹ to decompress the optic nerve and subtotally remove a sphenoid wing meningioma. The second patient underwent extensive removal of an enlarged, hyperostotic anterior clinoid and unroofing of the optic canal in conjunction with removal of a large meningioma (Fig. 2). The third patient underwent unroofing of the optic canal before radiation therapy for an optic sheath meningioma.

In these latter two cases, a frontotemporal craniotomy was performed in which the scalp was opened in a single layer. No patient developed a cerebrospinal fluid (CSF) leak or an extradural accumulation of CSF.

DISCUSSION

Reconstruction of the skull base after tumor resection is a critical feature in the management of certain skull base lesions.² Occasionally, after anterior clinoid resection or unroofing of the optic canal,

Figure 2 Anterior clinoid meningioma. Axial computed tomographic images with bone window settings (A–C) and with brain window settings after contrast (D–F) from inferior to superior show a hyperostotic anterior clinoid (arrows in A–C and asterisks in D–F) and meningioma attachment to the anterior clinoid (D–F). Coronal T1-weighted magnetic resonance images after contrast (G, H) show the location and attachment of the tumor.

a watertight dural closure cannot be achieved by primary reapproximation. If left open, this defect can represent a site for CSF egress resulting in CSF leakage^{3,4} or extradural accumulation of CSF. Various techniques and materials can be used if closure of the defect is attempted, including free patch

grafts⁵ with autologous tissue (pericranium, galea, fascia lata, temporalis fascia/muscle) or with dural substitutes. These situations may arise infrequently, but the present approach, which uses autologous, vascularized pericranium, can be used to close the dura in a relatively watertight fashion. The

technique adds little time to a complex surgical procedure.

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Commentary

The author has reported an interesting and useful technique. In my practice, dural reconstruction is unnecessary after resection of the anterior clinoid process or decompression of the optic nerve unless an opening has been created into the sphenoid sinus. Collections of subgaleal fluid are infrequent and almost always transient. The following question remains: When such a long flap is used to repair a small dural defect at such depth, to what extent does the tip of the flap remain vascularized? Nevertheless, this is a good technique to have in one's armamentarium to prevent cerebrospinal fluid leaks.

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