A Modification to the Fascia-Bone-Fascia Technique for Repair of the Middle Fossa Floor

William R. Copeland III, M.D.¹ Colin L.W. Driscoll, M.D.^{1, 2} Michael J. Link, M.D.^{1, 2}

¹Department of Neurological Surgery, Mayo Clinic, Rochester, Minnesota

²Department of Otolaryngology, Mayo Clinic, Rochester, Minnesota

Address for correspondence and reprint requests Michael J. Link, M.D., Department of Neurologic Surgery, 200 First Street SW, Joseph Building, Room 1-229, Rochester, MN 55905 (e-mail: link.michael@mayo.edu).

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Abstract

Keywords

- spontaneous cerebrospinal fluid otorrhea
- meningoencephalocele
- superior semicircular canal dehiscence
- middle fossa repair

A commonly used method for resurfacing of the middle fossa floor is the fascia-bone-fascia technique. One disadvantage of this technique however is the occasional migration of the bone graft. To prevent this, we have modified the technique to include securing of the graft using simple craniotomy fixation materials. We have now used this method in five patients, all of whom have had satisfactory clinical outcomes. Follow-up imaging has demonstrated the grafts to have remained in their original position.

Indications for resurfacing of the middle fossa floor include superior semicircular canal dehiscence, meningoencephalocele, and spontaneous cerebrospinal fluid leakage. A commonly used and effective method of resurfacing is the fascia-bone-fascia technique.^{1–4} Critics of this method, however, point to reports of bone graft migration^{5,6} or resorption.^{6,7} To prevent the former we have modified the technique to include securing of the graft using simple craniotomy fixation materials. This has resulted in good clinical outcomes and has maintained proper graft position on postoperative imaging.

Technique

For repair of spontaneous, postsurgical, or posttraumatic middle ear and mastoid meningoencephaloceles extending through the middle fossa floor, or when performing repair of superior semicircular canal dehiscence, we prefer a standard middle fossa approach with intraoperative facial nerve monitoring. A curvilinear incision is made beginning in front of the tragus of the ear and ending at the temporoparietal junction. During dissection, the scalp and pericranium are separated from the temporalis fascia which is harvested for later use. The muscle is then released from its bony origin and turned inferiorly to expose the squamous temporal bone, root of the

zygoma, and external auditory canal. A craniotomy is performed equidistance anteriorly and posteriorly to the external auditory meatus and attempts are made to keep the inferior margin flush to the floor of the middle fossa. The temporal dura is dissected off the skull base in a posterior to anterior direction to avoid injuring the greater superficial petrosal nerve or dehiscent geniculate ganglion and facial nerve. Intraoperative mannitol (0.5 mg/kg IV) is given to assist with atraumatic elevation of the temporal lobe. As appropriate to the operative indication, encephaloceles are amputated and breaches in the dura are repaired with 5–0 or 6–0 Prolene suture (Ethicon, Somerville, NJ). Any obvious encephalocele is carefully removed from the middle ear taking great care not to disarticulate the ossicles. If dehiscent, the superior semicircular canal is occluded with bone dust and bone wax (Angiotech, Vancouver, BC). The middle fossa floor is then resurfaced using the fascia-bone-fascia technique. A generous piece of temporalis fascia is first laid over the tegmen defect(s). A split-thickness bone graft at least three times the size of the tegmen defect is next harvested from the craniotomy flap. Rather than simply placing this over the fascia, however, we have modified our technique to include fixing the graft to the inferior edge of the craniotomy margin using a single straight plate and two screws from a

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Figure 1 This repair was performed for left-sided tegmen dehiscence with resultant meningoencephalocele and cerebrospinal fluid leak (top). Computed tomography images from postoperative day one (bottom left) and follow-up 4 months later (bottom right) demonstrate fixation of the bone graft using a single plate and two screws. Given the limitations of single-image slices, the entirety of the plate/screw construct cannot be seen, but can be deduced from the combination of images.

craniotomy fixation system (OsteoMed, Addison, TX). Finally, the remaining temporalis fascia is laid over the secured bone graft, against the native subtemporal dura, completing the fascia-bone-fascia sandwich. The entire construct is then covered with fibrin sealant (Baxter, Deerfield, IL). The craniotomy and wound are closed in typical fashion.

Discussion and Conclusion

We have now performed this modification in a total of five patients. Mean postoperative follow-up in this series is 3 months. All patients have had satisfactory clinical outcomes with no evidence of recurrent meningoencephaloceles or cerebrospinal fluid leak. In addition, follow-up has included computed tomography with dedicated temporal bone images and these have demonstrated the grafts to have remained in their original position with good reconstruction of the middle fossa floor (►Fig. 1). This technique has eliminated our frustration with migrating small bone grafts during repair of defects in the floor of the middle cranial fossa.

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