A Novel Technique in Repairing Anterior Skull Base Dural Defects with Nonpenetrating Titanium Clips

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Introduction

Dural repair of the anterior skull base has long been tedious and time consuming. However, inadequate closure may result in postoperative CSF leaks with neurologic sequelae. We report patient outcomes after dural closure of the anterior skull base with nonpenetrating titanium microclips.

Methods

We conducted a retrospective review of data obtained on all patients who underwent a bifrontal craniotomy and subsequently needed dural repair of the anterior skull base between 2013 and 2016 at our home institution. Patients were classified based on underlying pathology and posterior extent of dural repair. We describe a technique of dura closure for the anterior skull base and report patient outcomes using this method.

Results

Twenty-four patients underwent a bifrontal craniotomy with subsequent dural repair of the anterior skull base. Patients were classified as those who received the operation for trauma (n=9), tumor resection (n=11), and for neither trauma nor tumor resection (n=4). Of the patients who underwent an operation, 16/24 (67%) had dural repair at or posterior to the planum sphenoidale. There were no permanent complications. A cerebrospinal fluid leak occurred in one of 24 (4%) patients and 3/24 (13%) patients had a surgical site infection. Artifact did not inhibit postoperative imaging.

Conclusions

Our results suggest that dural repair of the anterior skull base with non-penetrating, titanium microclips is a feasible alternative to suturing dura in confined spaces with limited maneuverability. We offer a method for bypassing a technically challenging aspect of these cases.

Learning Objectives

By the conclusion of this presentation, participants will be able to (1) describe a method of repairing anterior skull base defects using nonpenetrating titanium microclips and (2) learn the postoperative complication and CSF leak rates associated with this method.

Figure 1

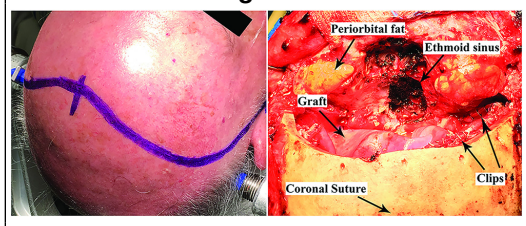

Figure 1. Example of a patient undergoing a bifrontal craniotomy for a meningioma that extends to the tuberculum sellae. Left panel: intraoperative image of the patient being prepped for surgery. The purple line designates location of incision. Right panel: due to the size of the meningioma, large portions of the frontal lobes have undergone encephalomalacia revealing the ethmoid sinus and periorbital fat. The synthetic graft and microclips can be seen just anterior to the craniotomy site.

Figure 2

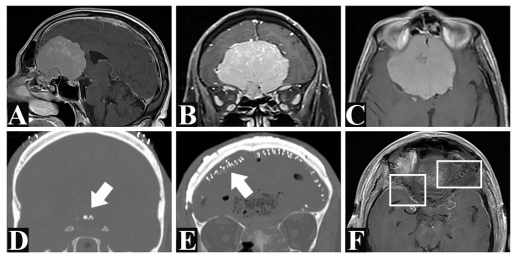

Figure 2. Pre- and postoperative imaging of a patient with a large anterior skull base meningioma. This is the same patient shown in Figure 1. Preoperative images showing contrast enhanced T1-weighted MR imaging of (A) sagittal and (C) coronal views. (C) Axial view of a T1-weighted image without contrast. (D and E) Coronal views of postoperative CT images revealing microclips. (F) T1-wieghted contrast enhanced axial image showing microclips. Microclips are designated with white arrows in image D and E, and with white boxes in F.

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