ENDOSCOPIC TRANSNASAL REPAIR OF CEREBROSPINAL FLUID LEAKS IN THE AREA OF THE PARanasal SINUSES AND CLIVUS

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Objectives

With the development of endoscopic techniques, Cerebrospinal Fluid (CSF) repair has advanced from large open, craniotomy-based procedures to less invasive approaches. The principles of endoscopic repair places emphasis on site identification, site preparation, accurate graft placement and post-operative management. Management of patients with CSF rhinorrhea has undergone significant transformation. In this case series, we present 5 patients who underwent endoscopic CSF leak repair in the area of the skull base and paranasal sinuses.

Our objectives are:

- To explain how to identify the site of CSF leak and plan the successful repair of the leak. The participant will be able to discuss the correct steps in obtaining the tissue that will properly seal the leak.
- To demonstrate how to correctly find the site of the leak using omniqapec or omniqapec isternograms combined with thin section CT scans and MRI’s of the skull base with gadolinium.

Methods

Study Design:

The patients were evaluated to be sure an active CSF leak was present using clinical exam including sinus endoscopy and radiologic techniques. Endoscopic repairs in association with microneurosurgical approaches were employed to close the leak. Still photographs will demonstrate the techniques.

Methods:

- 5 patients who presented with CSF leaks between the years 2002-2009 were evaluated according to the etiology of the leak. An active CSF leak was confirmed in all patients and the site identified. A repair was planned using either vascularized septal mucosal flaps or free grafts of nasal mucosa. Preparation of the graft recipient site is important. A tissue glue either Tisseal or in the later cases Duraseal held the graft in place and assisted in sealing the leak. The patients were followed for 3 to 5 years to determine if the leak was successfully sealed.

- The transphenoidal approaches were all endoscopic with transfusion of the bony septum anterior to the anterior sphenoid wall and removal of the bony posterior septum and wide sphenoidotomy including resection of the sphenoid rostrum. Mucosa in this region was preserved for pedicled mucosal flaps.

Results

Case #1: JF is a 61 y/o ♀ who presented with a spontaneous CSF leak from the sphenoid sinus (1A). An omniqapec cisternogram confirmed the site of the leak at the postero-lateral aspect of the sphenoid on the right side. Two previous attempts at repair of the leak using combined Neurosurgical and Otolaryngologic teams had failed. After the sphenoidotomy, CSF appeared to well up in the left sphenoid. Only after wide bilateral sphenoidotomy and complete removal of all intersphenoidal septa did the site of the leak correlate with the omniqapec cisternogram. The leak was centered posteriorly in a small contracted right sphenoid sinus which had to be opened completely by removing an inter-sphenoid septum and fat. We covered the recipient site for the graft were absolutely flat and flat of all mucosa (1B). Prior to sphenoidotomy, two superiorly based pedicled septal mucosal flaps were developed from the lateral extreme of the nasal septum and the anterior sphenoid wall (1C and 1D).

A free graft of fascia lata was used to fill the defect and the two pedicled mucosal flaps were layered over the fascia lata (1E). Duraseal was used to secure the flaps in place and Tisseel was placed over the flaps along with a small abdominal fat graft (1F).

CASE #1: FIGURE 1

CASE #2: FIGURE 2

Case #2: AD is a 45 y/o ♀ who developed a spontaneous CSF leak postoperatively after a transphenoidal, translacical resection of a clival chordoma. The same approach was established with exposure of a 1 mm defect in the anterior wall of the clivus (2A). There was an intermittent flow of CSF out of the defect and a small portion of the basilar artery could be seen with brusk pulsations (2B and 2C). A free graft of mucosa and submucosa was harvested from the right inferior turbinates and it measured approximately 1.5 x 2.0 cm (2D). A 2-3 mm portion of this graft was used to plug the small hole in the clivus (2E). This small graft was covered with Tisseel and the larger graft was placed over the small plug and held in place with more Tisseel (2F and 2G). Fat was placed over the large mucosal graft (2H).

CASE #3: FIGURE 3

Case #3: JF is a 61 y/o ♀ who was noted to have a pulsatile mass protruding into the left infero-lateral aspect of the sphenoid sinus. A wide sphenoidal flap including mucosa of the anterior sphenoid wall was fashioned. The flap was positioned posteriorly and inferiorly on the most inferior aspect of the left anterior sphenoid wall. A small biopsy of the mass produced fluid of CSF. The diagnosis of meningoencephalocele was established. The distal aspect of the septal mucosal flap was positioned so that the deep mucoperiosteal surface of the flap was facing the left lateral sphenoid wall and covering the defect. The mucosal surface was facing outward. The encephalocele was ablated with bipolar cautery and the flap was placed over the site of the CSF leak. Duraseal was used to hold the flap in place and fat was placed over the flap.

Case #4: MM is a 33 y/o ♀ who involved in a motorcycle accident and developed a brain abscess which was drained by the neurosurgical service. He then underwent repair of an encephalocele of the frontal region with brain and overlying dura protruding into the frontal recess. A complete removal of anterior ethmoid air cells exposed a second oval shaped protrusion of the brain and dura. These were both covered with fascia lata. A septal mucosal flap was constructed making the superficial incision very close to the sellar suture. The inferior incision was made approximately 1.5cm below that. The flap was extended anteriorly to very close to the most anterior edge of the nasal septum. This was done so that on rotation, the flap would fit into the ethmoid and frontal recess and seal the area where the prolapsed brain was noted. A fascia lata graft was carefully fashioned to fit over the prolapsed brain. Then the posteriorly based septal mucosal flap was rotated 90 degrees with the perichondrial region facing upwards towards the fascia graft and prolapsed brain and the mucosal portion, of course, facing towards the nasal inferiorly. Gelfoam was placed over the flap.

Conclusions

In conclusion, the preoperative identification of the site of the leak and the correct choice of graft remain crucial steps if one wants to prevent recurrences using the endoscopic technique when closing CSF leaks.

The best way to identify the site of the leak is to employ omniqapec or omniqapec cisternograms combined with thin section CT scans and MRI’s of the skull base with Gadolinium. This is followed by development of a plan to repair the CSF leak. The patients were evaluated to confirm an active CSF leak was present using clinical exam including sinus endoscopy and radiologic techniques. Endoscopic repairs in association with microneurosurgical approaches were employed to close the leak. All 5 CSF leaks were closed successfully.

The combined use of nasal mucosa either as a vascularized pedicled flap or as a free graft both held in place by Tisseal and/or Duraseal can successfully close the majority of skull base CSF leaks.