Cerebrospinal fluid rhinorrhea

Cerebrospinal fluid (CSF) rhinorrhea often indicates a defect in the anterior fossa floor involving both bone and dura. Of the various etiologies, traumatic CSF rhinorrhea most often stops with conservative management. Usually, spontaneous rhinorrhea and delayed postsurgical leaks would require a surgical approach to seal the defect.

The transcranial approach as described by Dandy in 1926 involves a standard bifrontal craniotomy to access to the cribriform plate and roof of the ethmoid. Though several tissue grafts including fascia lata grafts, muscle plugs, and pedicled galeal or pericranial flaps have been used for the repair, pedicled pericranial grafts have been the most favored.

While reflecting the pericranial flap, most surgeons will include the loose areolar connective tissue underlying the galea aponeurotica along with the pericranium. Though this flap appears thin, it is strong enough and has a rich blood supply from the supratrochlear and supraorbital arteries. In addition, as it is harvested from the surgical field, it does not require additional incision such as the fascial grafts. Inclusion of galea in the reflected flap is more time-consuming, as it requires dissection immediately subjacent to the hair follicles. It also results in paresthesia as it sections the sensory branches of the nerves which run within the galeal plane of the scalp. Another potential complication is scalp necrosis, especially in patients who have received prior radiation therapy as vascularity of the scalp is decreased by the dissection of the galeal flap. Nevertheless, at times a galeal or pericranial-galeal flap is the only alternative to a free vascularized flap in revision surgeries, as the pericranium may be scarred and flimsy enough not to provide an adequate cover.

The transcranial approach provides direct access to the defect for a satisfactory closure. It also permits for repairing of multiple and bilateral defects as often seen in traumatic fistule. The associated brain retraction, loss of smell, and morbidity of a craniotomy are certainly the disadvantages of this technique. The intracranial approach is easily combined with a craniotomy and resection of the skull base tumor with large and multiple skull defects.[1]

In past two decades, endoscopic endonasal approaches have become more popular in the repair of small defects in the anterior cranial fossa and provides excellent exposure of the ethmoid roof, cribriform plate, and the sphenoid sinus. Intraoperatively, intrathecal fluorescein can be used to aid in identification of the skull base defect. Once the skull base defect is identified and the extent of defect is localized, the defect is plugged with a graft covered with a tissue sealant such as fibrin glue. The various grafts used include temporalis fascia, muscle plugs, mucosal grafts, autologous fat, cartilage, or bone grafts (nasal septum). Significant overcorrection for closure of the defect is recommended as postoperatively, usually 20% shrinkage of the free graft is expected. Placement of a bone or cartilaginous graft added with a fascial or mucosal graft often is required to close large defects to prevent a secondary encephalocele. A lumbar drain is often placed to keep the repair site dry. In recent years, posteriorly based pedicled nasal septal flaps based on the posterior septal artery have become the primary mode of reconstruction following extensive endoscopic cranial base resections. A properly, endoscopically harvested flap is usually large enough to cover large dural defects. Vascularized flaps often demonstrate enhancement on postoperative magnetic resonance imaging (MRI), which can cause some confusion in postoperative MRI readings following tumor resection. Anteriorly based pedicled pericranial flaps can be used when a nasoseptal flap cannot be harvested.[2]

Endonasal endoscopic approaches have high success rates of around 90% for primary CSF leaks with low complication rates. Excellent visualization with identification of the defect as well as graft dislodgement is considerable advantages of the technique, whereas the risk of hemorrhage, infection, and graft failure is some of the disadvantages.

The authors in the article titled "Purely Endoscopic Pterional Extradural approach: A novel technique for repair of CSF rhinorrhoea" have described a relatively simple technique for repairing the CSF leak from the region of frontal sinus in the anterior cranial fossa.[3] After a small pterional craniotomy, the authors place a tissue graft with glue to patch the dural defect. The endoscope is advanced intracranially through the craniotomy site in the extradural plane used to access the defect. This limits the size of the craniotomy and reduces the morbidity associated with bifrontal craniotomies. The location of the craniotomy in

the pterional region spares obliteration of the frontal sinus which is usually required in the sub frontal approaches. As the authors point out, repair of bilateral leaks would require bilateral approach as the visualization of the contralateral defect is difficult from ipsilateral side.

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