

Commentary

Management of anterior skull base defects has seen a paradigm shift since the introduction of transnasal endoscopes, and overall success rate has been reported up to 97%.^[1] However, the frontal sinus remains the most technically demanding area of sinonasal cavity to be addressed endoscopically. Frontal sinus cerebrospinal fluid (CSF) leaks are rare, and their surgical management

is difficult. Though, most of the defects are addressed with endonasal route yet development of better endoscopic instruments and optics are required for repair of frontal sinus CSF leaks (FSCL). Anatomy of the frontal air sinus is the most complex among all the air sinuses with increasing variability in the region of the frontal recess. FSCL can be anatomically classified into three different sites, i.e., adjacent

to frontal recess, direct involvement of frontal recess and in the frontal sinus proper. Among these, the most challenging ones are the defects in the posterior and lateral walls of the frontal sinus, which are beyond the reach of current transnasal endoscopic instruments.^[2] The defects in the posterior and lateral wall of frontal sinus should be evaluated individually for the etiology and size of the defect. The principle of FSCL repair is to repair the defect for the cessation of CSF leak and maintain patency of frontal sinus, all of which cannot be achieved with traditional transcranial intradural repair. The experience with transnasal endoscopic approach to FSCL is limited. Jones *et al.* reported a series of 37 patients with FSCL with transnasal endoscopic approach. The success rate on the first attempt was 91.9%, which increased to 97% with second procedure.^[1] However, these techniques require a thorough knowledge of frontal sinus anatomy and endoscopic CSF leak repair. This knowledge is essential both to ensure closure of the CSF leak and to preserve frontal sinus patency.^[2]

Traditional transcranial approach through unifrontal/bifrontal craniotomy repair is not an ideal modality because it results in a large surgical scar, frontal lobe retraction, complete stripping of mucosa, and obliteration of frontal air sinus. As neurosurgeons have limited experience with the advanced transnasal endoscopic approach, an alternative strategy is required to manage FSCL. In this issue, Sinha describes purely endoscopic pterional extradural (PEPE) approach for repair of FSCL.^[3] PEPE addresses all these issues while avoiding large surgical scar, frontal lobe retraction, and patency of the frontal air sinus by using an overlay/underlay graft sealed with tissue glue depending upon the location of the defect. This is a relatively simple technique for repairing the CSF leak from the anterior cranial fossa in the region of frontal sinus. The concept is simple, and the endoscope is used to limit the craniotomy size. They have neither used the microscope nor the transnasal corridor for repair. Endoscope through a smaller craniotomy offered the advantage of minimal brain retraction and clear and angled visualization of the defect. The authors have successfully employed this technique in 35 patients. The bony defect size ranged from 2 mm to 12 mm, and all cases were managed with this approach. Even for larger defect (up to 12 mm in present series), there were no failures. Though the authors reported success in all cases, still more experience is required. It is known that the chances of surgical failure for repair of any CSF fistula increase with high body mass index, larger defects (>4 mm in size), lateral sphenoid defect location, and spontaneous CSF leaks. Whether this holds true for pterional endoscopic approach or not needs to be validated.

Till now, management of CSF leaks has been considered a domain of otorhinolaryngologists but with increasing practice of extended skull base endoscopic procedures

by neurosurgeons, chances of iatrogenic CSF leaks are also on the rise. Management of CSF leaks remains a technically demanding and seldom a frustrating surgery even in the blessed hands. A failed CSF leak repair may lead to serious complications such as meningitis. As a separate surgical specialty, we neurosurgeons should be able to repair these defects. We should not be skeptical about the endoscopic approach to manage in these traditionally difficult anatomical sites and should learn such techniques for repair in this no man's land. The endoscopic pterional approach highlights the potential for a durable dural repair and complete cessation of CSF leak while maintaining the patency of frontal sinus however it remains to be tested if the results are replicated by the following surgeons. At the same time, we need to be judgmental for the management of CSF leaks. However, in failed cases and revision surgeries, traditional extracranial approaches can be attempted in difficult cases.

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