Treatment Strategies for Lateral Sphenoid Sinus Recess Cerebrospinal Fluid Leaks  
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Abstract

Objectives: The management of lateral recess of the sphenoid sinus (LRS) cerebrospinal fluid (CSF) leaks presents unique challenges to the Otolaryngologist. This study highlights concepts critical to achieving successful repair and avoiding intracranial complications.

Methods: Prospective evaluation of patients with LRS CSF leaks from 6/2008 to 6/2010. Results: Thirteen CSF leaks originating in the LRS were surgically repaired in 11 patients – the endoscopic transpterygoid approach was used in 12/13 repairs. Eight patients had one or multiple failed attempts at repair prior to presentation [4 endoscopic sphenoidotomies and 4 middle cranial fossa (MCF) approaches]. One patient presented with a temporal lobe abscess following hydroxyapatite “obliteration” to seal off the LRS. This required a combined MCF/transpterygoid approach to drain the abscess, remove the encephalocele and hydroxyapatite, seal the skull base defect, and establish adequate drainage for the LRS. In two cases, the LRS was left patent due to concerns of inadequate extirpation of mucosa. Median follow up was 5.8 months (0.5 to 17). One patient experienced a failure (2 months post-repair), which was successfully sealed on the second attempt. Postoperative ICP measurements were recorded on 8 patients (average 26.7 cmH20). Ten patients had postoperative intervention for intracranial hypertension (5 ventriculoperitoneal shunts, 5 maintained on acetazolamide).

Background

• Spontaneous CSF leaks often arise in context of benign intracranial hypertension (BIH). CSF leaks carry increased risks of pneumocephalus, meningitis, and brain abscesses.
• When there is a widely pneumatized sphenoid sinus extending into lateral recess of sphenoid sinus (LRS), often standard transanasal/transpterygoid approaches are not satisfactory for approach and repair.
• Our prior studies show the LRS as one of the most common areas for spontaneous CSF leaks (35%).
• Our research also suggests that these leaks are acquired and not a result of patent lateral cranioopharyngeal (Sternberg’s) canal. Lying behind the pterygopatella fossa, proximity to optic nerve and carotid artery cause some to recommend obliteration of the LRS.

Table 1. Patient Data. Opg, operation; ESS, endoscopic sinus surgery; MCF, Middle Cranial Fossa repair; Tptg, Transpterygoid approach.

<table>
<thead>
<tr>
<th>Pl</th>
<th>Prior Surgery</th>
<th>Defect 1</th>
<th>Opg</th>
<th>Defect 2</th>
<th>Opg</th>
<th>Graft</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No</td>
<td>(L) LRS</td>
<td>Tptg</td>
<td></td>
<td></td>
<td>Duragen/Bone</td>
</tr>
<tr>
<td>2</td>
<td>Sphenoidotomy, pack sinus</td>
<td>(R) LRS</td>
<td>Tptg</td>
<td></td>
<td></td>
<td>Duragen/Bone</td>
</tr>
<tr>
<td>3</td>
<td>ESS, ethmoid patch, defect not identified</td>
<td>(R) LRS</td>
<td>Tptg</td>
<td>(R) Ethmoid</td>
<td>Repair</td>
<td>Alloderm</td>
</tr>
<tr>
<td>4</td>
<td>Sphenoidotomy, pack sinus x4</td>
<td>(R) LRS</td>
<td>Tptg</td>
<td></td>
<td></td>
<td>Surgisis/Bone</td>
</tr>
<tr>
<td>5</td>
<td>No</td>
<td>(L) LRS</td>
<td>Tptg</td>
<td>(R) LRS</td>
<td>Tptg/Sept flap</td>
<td>Surgisis/Bone/Fat</td>
</tr>
<tr>
<td>6</td>
<td>MCF</td>
<td>(L) LRS</td>
<td>Tptg</td>
<td>(late failure)</td>
<td>Revis Tptg</td>
<td>Surgisis/Bone/Fat</td>
</tr>
<tr>
<td>7</td>
<td>Sphenoidotomy, Hydroxyapatite – resulted in temporal lobe abscess</td>
<td>(L) LRS</td>
<td>Tptg</td>
<td></td>
<td></td>
<td>Surgisis</td>
</tr>
<tr>
<td>8</td>
<td>H/o GSW, MCF x2</td>
<td>(L) LRS</td>
<td>Tptg</td>
<td>(R) LRS</td>
<td>Not repaired</td>
<td>Surgisis/Fat/Septal flap</td>
</tr>
<tr>
<td>9</td>
<td>Sphenoidotomy partial TPTG</td>
<td>(L) LRS</td>
<td>Tptg</td>
<td>(R) LRS</td>
<td>Not repaired</td>
<td>Surgisis/Bone/Fat</td>
</tr>
<tr>
<td>10</td>
<td>MCF 10y prior</td>
<td>(L) LRS</td>
<td>Tptg</td>
<td>(R) LRS</td>
<td>Tptg</td>
<td>Surgisis/Bone/Fat</td>
</tr>
<tr>
<td>11</td>
<td>No</td>
<td>(R) LRS</td>
<td>Tptg</td>
<td>(L) LRS</td>
<td>Tptg</td>
<td>Surgisis/Bone/Fat</td>
</tr>
</tbody>
</table>

Table 2. Summary

• Patients: 11
• CSF Leaks: 13
• Tptg approach: 13
• Median age 56yrs
• Median BMI 35.6
• Female 72%: Male 18%
• Empty Sella Synd: 63%
• Etiology of CSF leak:
  • GSW 1 of 13
  • Spontaneous 12 of 13
  • Avg postop ICP (meas in 8 of 11): 26.7
  • VP shunt: 5 of 11
  • Acetazolamide 5 of 11
• 92% successfully repaired on 1st attempt

Summary

Exposure

• Adapted from the approach first described by Bolger
• Neurosurgical placement of lambar drain, measurement of opening pressure, and injection of intraolfacial fluorescein.
• Standard FESS with wide maxillary antrostomy to posterior maxillary wall, off of which mucosa is elevated.
• Identification/detection of sphenopalatine neurovascular bundle from medial to lateral
• Pterygopatella fossa exposed by removing posterior wall using 2mm Kerrison punches and 15deg diamond bur.
• Adipose tissue meticulously removed, blunt dissection identifies IMA for ligation, preserving vidian n., infraorbital n., and sphenopalatine ganglia.
• Posterior wall of pterygopatella fossa encountered and the face of the pneumatized pterygoid process removed superomedially to the pterygoid muscle attachments using drill or Kerrison rongeurs.

Repair

• Encephalocele ablated to the level of the skull base using radiofrequency coblation [Coblator, ArthroCare ENT, Austin, TX].
• Transpterygoid Bipolar cautery.
• Goal is complete mucosal extirpation from LRS – this dictates obliteration (fat graft) vs. maintaining sinus patency.
• Advocated multilayer repair of skull base defect:
  • Allograft inlay [Modern [L]Graft, Duragen/InPreg, Surgicel [Cook Medical]]
  • Bone graft harvested from septal vomer
  • Overlay tissue graft (free tissue vs. mucosal graft)
• +/- Free fat graft or pedicled septal flap
• Tissue Sealant

Conclusion

• Endoscopic transpterygoid approach is the definitive approach for access and repair of pathology in the LRS lateral to V2.
• Extirpation of sphenoid sinus mucosa prevents the formation of mucoceles and decreases the potential for temporal lobe abscesses or other intracranial complications
• Identification of the entire skull base defect is crucial

References


Disclosures: Dr. Woodworth is a consultant for Gyrus ENT, ArthroCare ENT, and is on the GlaxcoSmithKline speaker’s bureau.