AN INFANT WITH CSF LEAK THROUGH THE FALLOPIAN

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Background
Cerebrospinal fluid (CSF) leaking to the air spaces of the temporal bone carries a significant risk of bacterial meningitis hence requires surgical correction. CSF leaks in the pediatric age groups have variable etiologies including trauma, congenital defects and iatrogenic lacerations. Preoperative identification of the exact source of leak is crucial for successful surgical correction as is based on imaging.

Presentation
A 13 month old infant presented with fever, bulging tympanic membrane and retroauricular swelling. Facial nerve function was intact. A presumed diagnosis of mastoiditis triggered myringotomy resulting in profuse CSF leak through the perforated drum. An attempt to locate and seal the source of leak through a tympanotomy and atticotomy failed. The leak seemed to be from the anterior attic. A second attempt was made by resurfacing the middle fossa floor via a temporal craniotomy. The Eustachian tube was transsected and the cut edges ligated. The leak did not subside. Review of CT and MRI scans failed to locate the exact source of leak although a bifid facial nerve at the second genu was noted. Intrathecal Gadolinium MRI proved the source of the leak was within the fallopian canal at the labyrinthine segment and geniculate ganglion. Obliteration of the ear and blind sac closure of the meatus finally controlled the leak. Three years past later there are no external leaks although internal stable pathological communication between the internal and external dural spaces exist. Facial nerve function is intact.

Conclusions
1. CSF leak in the pediatric age group can be sourced to a defect in the fallopian canal.
2. Pre-operative imaging can locate the source of the leak. Intra-thecal Gadolinium enhanced MRI is helpful in highly selected cases.
3. The choice of surgical approach should balance the risk for facial nerve integrity and hearing.

Selected Issues in Decision Making
1. When conventional CT and MRI are inconclusive to the source of the leak should intra-thecal Gadolinium be used?
   1. This is a no FDA approved test
   2. It may have complications
2. Choice of surgical approach
   A middle fossa approach with packing of the internal auditory canal medial to the labyrinthine segment can control the leak but carries some risk to the abnormally shaped facial nerve. Subtotal petrosectomy with blind sac closure of the external meatus and sealing the Eustachian tube orifice has little risk to facial nerve function but results in a large conductive hearing loss.

Figure 1. Images of CT scan of the temporal bone with intrathecal injection of Gadolinium A – Coronal cuts demonstrating the enlarged geniculate ganglion space (blue arrow). Compare to the normal right side. B – sagittal-oblique view depicting enlarged geniculate ganglion space and bifid facial nerve (blue arrow).

Figure 2. Images of MRI scan of the temporal bone with intrathecal injection of Gadolinium A – Axial cuts demonstrating the Gadolinium colored CSF in filling the geniculate ganglion space (blue arrow) and escaping to the ear and soft tissue. Compare to the normal right side. B – sagittal-oblique view depicting the flow of CSF through the fallopian canal to the soft tissue (involving the ear spaces) (blue arrow).

Figure 3. Histopathological correlate of CSF filled arachnoid accompanying the extra-crural facial nerve (reference 2).

REFERENCES