

The *endolymphatic sac (ELS)* can be found in a thickened portion of the *posterior fossa dura* medial to the *sigmoid sinus* and inferior to the *posterior canal*. A classic landmark that consistently defines the upper boundary of the ELS is known as “*Donaldson’s line*”. This line is drawn through the lateral semicircular canal (SCC), which bisects the posterior SCC; the ELS is usually at and below this line.

After completing a cortical mastoidectomy with identification of the lateral SCC, the posterior SCC should be delineated by removing the surrounding *perilabyrinthine air cells*. The approximate location of the vertical segment of the fallopian canal can be identified by the relative anatomy of the SCCs and the posterior canal wall, which is gradually thinned out. The *fallopian canal* is further delineated from behind while skeletonizing the sigmoid sinus and removing the *retrofacial air cells*. In this manner, the bone deeper (medial) to the sigmoid sinus is gradually removed to reveal the posterior fossa plate that covers the dura and the ELS (Figs. 10.1, 10.2 and 10.3). If the sigmoid sinus is very prominent or very anterior, the overlying bone may have to be uncovered partially or completely to permit compression and exposure of the ELS. When the bony plate over the dura is removed anterior to the sigmoid sinus, the ELS becomes recognizable as a thickened area at and below the Donaldson’s line.

Landmarks

- Horizontal semicircular canal
- Short process of incus
- Superior semicircular canal
- Posterior semicircular canal
- Common crus
- Fallopian canal
- Posterior fossa dural plate
- Endolymphatic sac
- Endolymphatic duct

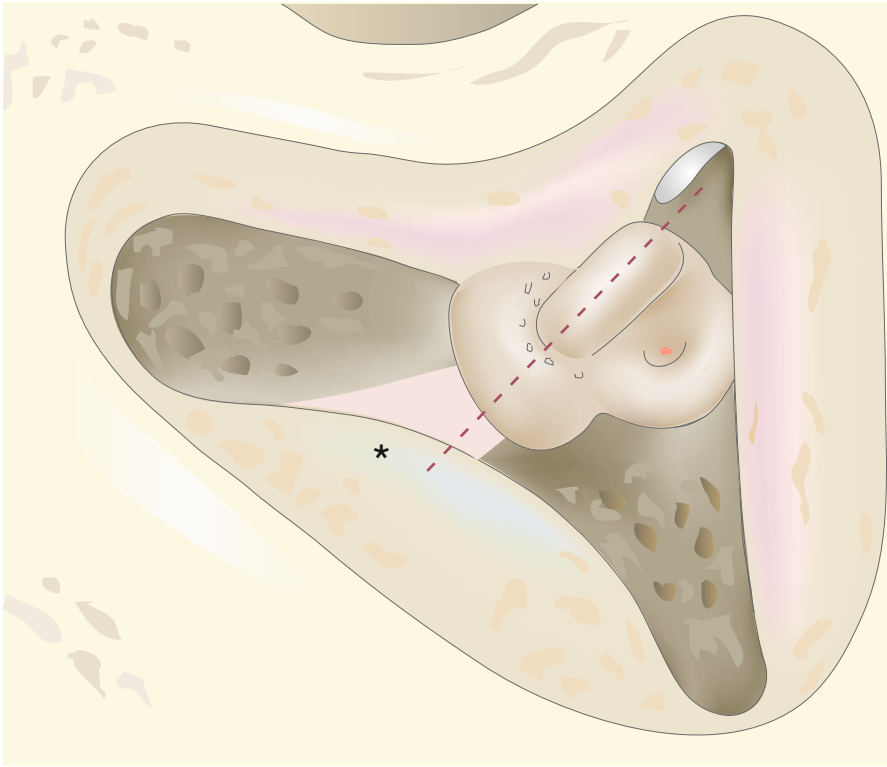


Fig. 10.1 Localization of the endolymphatic sac; the Donaldson's line is an imaginary line through the horizontal semicircular canal and defines the upper limit of the endolymphatic sac (*asterisk*)

Landmarks

- Horizontal semicircular canal
- Short process of incus
- Superior semicircular canal
- Posterior semicircular canal
- Common crus
- Fallopian canal
- Posterior fossa dural plate
- Endolymphatic sac
- Endolymphatic duct

At this point, perilyabyrinthine dissection should be completed to fully delineate the three SCCs. By hugging the *middle fossa dural plate* (tegmen) and carefully removing the *subarcuate air cells*, the superior SCC and the posterior SCC can be found to merge together to form the *common crus*. It is important to note that this region represents the deepest part of the bony labyrinth. Further, it is also important to know that the ampullated end of the posterior SCC is hidden medial to the *second genu of the fallopian canal* that is not easily accessible except in a very well pneumatized bone.

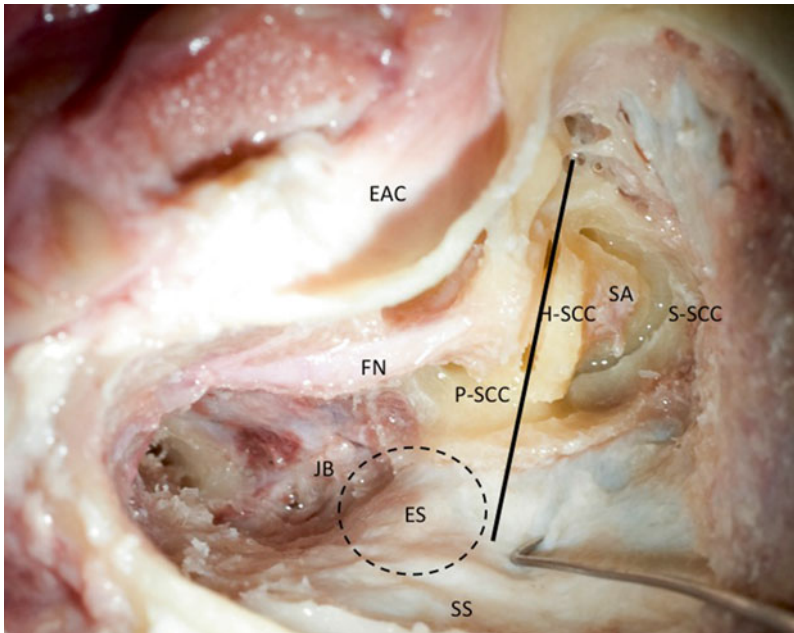


Fig. 10.2 Localization of the endolymphatic sac; the Donaldson's line is an imaginary line through the horizontal semicircular canal (*EAC* external auditory canal, *FN* facial nerve, *H/S/P-SCC* horizontal/superior/posterior semicircular canal, *SA* subarcuate artery, *ES* endolymphatic sac, *SS* sigmoid sinus, *JB* jugular bulb)

The ELS is sometimes only identifiable as a *thickened white area* next to the normally darker, single-layered dura, or by the presence of increased vascularity on its surface. Also, when the posterior fossa dura is gently retracted with an instrument, the membranous *endolymphatic duct* can be visualized as it connects the sac with the osseous *vestibular aqueduct* (Fig. 10.3). This structure travels medial to the posterior SCC, entering the medial aspect of the vestibule. Finally, the ELS can be incised with a #15 blade to fully appreciate its thickness, in contradistinction to the dura. Stenting the ELS with a small tapered piece of silastic while avoiding a breach in the dura should be attempted.

Landmarks

- Horizontal semicircular canal
- Short process of incus
- Superior semicircular canal
- Posterior semicircular canal
- Common crus
- Fallopian canal
- Posterior fossa dural plate
- Endolymphatic sac
- Endolymphatic duct

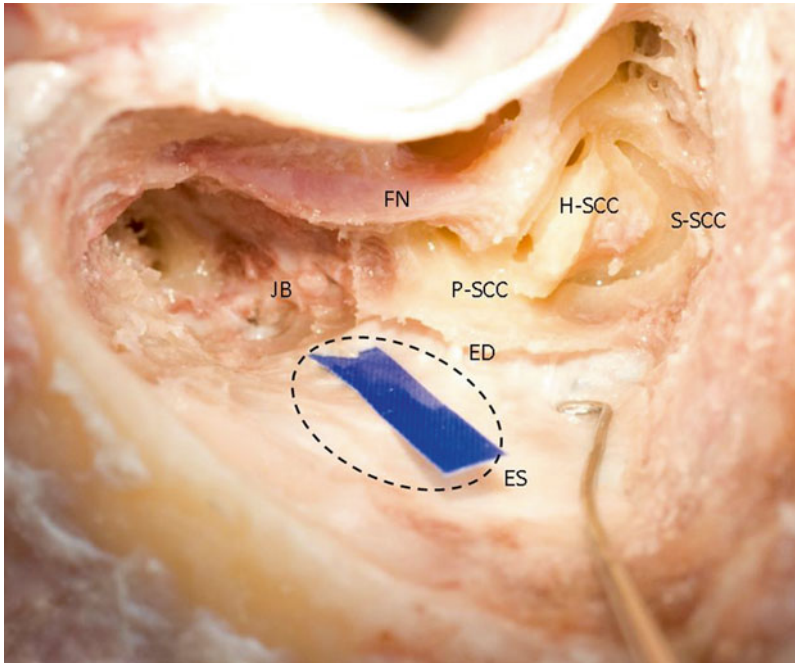


Fig. 10.3 Localization of the endolymphatic sac: After retraction of the posterior fossa dura, the endolymphatic duct can be visualized (*FN* facial nerve, *H/S/P-SCC* horizontal/superior/posterior semicircular canal, *ES* endolymphatic sac with piece of silicone, *ED* endolymphatic duct, *JB* jugular bulb)