

A Detailed Anatomical Study for Posterior Petrosectomy by Exposing the Round and Oval Windows

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Abstract

- This study provides a detailed anatomical evaluation of the posterior petrosectomy technique, focusing on drilling between the facial nerve (CN VII) and the chorda tympani to expose the round and oval windows.
- Four cadaveric dissections were performed at the University of Wisconsin-Madison Microneurosurgery Laboratory. Key bony landmarks, including the semicircular canals, jugular bulb, and Trautmann's triangle, were identified before exposing the tympanic cavity.
- The approach facilitated the identification of the cochlear promontory, enhancing surgical access to the middle ear.
- The findings support the clinical utility of this technique in managing tumors extending into the middle ear and performing cochlear implant surgeries.

Introduction

- Study objectives are to demonstrate a step-by-step approach to posterior petrosectomy, including drilling the petrous bone between the facial nerve (CN VII) and the chorda tympani, to expose the round and oval windows.
- Posterior petrosectomy serves as a crucial technique for skull base surgery but presents challenges due to anatomical intricacy.
- Exposure of the oval and round windows aids identification of the promontory and the cochlea, vital landmarks in the middle ear.
- This approach is beneficial for addressing tumors invading the middle ear and for facilitating cochlear implantation during the same procedure.

Methods and Materials

- Four posterior petrosectomies were performed on cadaveric specimens at the University of Wisconsin-Madison Microneurosurgery Laboratory.
- A C-shaped retroauricular incision was made, followed by the exposure of bony landmarks for the posterior petrosectomy. Subsequent drilling of the petrous bone enabled identification of the semicircular canals, jugular bulb, Trautmann's triangle, the atrium with the incus bone, the facial nerve, and the chorda tympani.
- The next step involved drilling the bone between the chorda tympani and facial nerve, thus exposing the tympanic cavity and identifying the ossicles, round and oval windows, and the cochlear promontory.

Results

- Drilling the temporal bone between the chorda tympani and the facial nerve, with or without labyrinth removal, broadens the surgical approach and facilitates identification of the round and oval windows, as well as the promontory.
- This technique proves advantageous for lesions extending into the middle ear and for patients requiring cochlear implantation in the same surgery.



Figure 1. C shaped retroauricular incision. Bony landmarks for the posterior petrosectomy. Exposure of the Semicircular canals (SSC), Sigmoid Sinus (SS), Jugular bulb (JB). Complete posterior petrosectomy exposing: sigmoid sinus (SS), jugular bulb (JB), Trautmann's triangle (TT), lateral semicircular canal (LSC), Superior semicircular canal (SSC), Posterior semicircular canal (PSC), facial nerve (FN) and chorda tympani. The black arrow shows the area that should be drilled to expose the tympanic cavity to expose round (RW) and oval windows (OW), and the cochlear promontory (P).

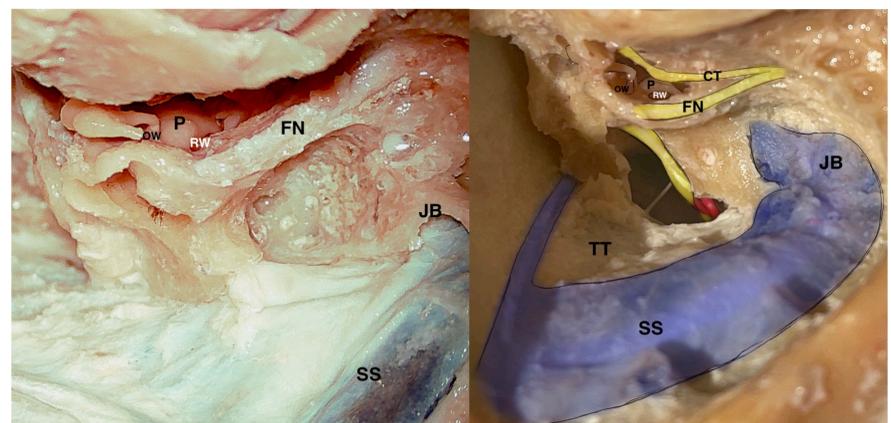


Figure 2. complete expose the tympanic cavity and identification of: round (RW) and oval windows (OW), and the cochlear promontory (P). On the right: illustration over cadaveric dissection showing: oval windows (OW), and the cochlear promontory (P), Sigmoid sinus (SS), jugular bulb (JB), Trautmann's triangle (TT), Facial nerve (FN) and chorda tympani (CT)

Discussion

- This approach optimizes access to the middle ear while preserving critical neurovascular structures. Compared to conventional techniques, it provides a direct and safe route for addressing tumors that extend into the middle ear.
- The exposure of key anatomical landmarks is crucial for surgical navigation, particularly when combining tumor resection with cochlear implantation.

Conclusions

- Posterior petrosectomy is a complex yet significant approach for skull base surgeons. Opening the bone between the chorda tympani and the facial nerve offers access to the middle ear, which can provide substantial value for treating lesions in this area and for performing cochlear implant surgeries.
- Opening the bone between the chorda tympani and the facial nerve offers access to the middle ear, proving to be invaluable for treating lesions in this area and for performing cochlear implant surgeries.

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