

REMOVAL OF CHOLESTEATOMA DURING A TYMPANO-MASTOIDECTOMY USING THE OMNIGUIDE CO₂ LASER FIBER

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The patient, a 70 year old female, presented with conductive hearing loss and whitish discoloration of the tympanic membrane suggestive of middle ear to mastoid cholesteatoma. Upon surgical exposure, cholesteatoma was found in the posterior tympanic recess with extension into the mastoid antrum. Disease in the posterior tympanic recess extended to the subiculum, ponticulus, and the inferior convex surface of the posterior crus of the stapes. With a laser mirror, inspection of the stapes arch found hidden cholesteatoma in the arch of the footplate-posterior crus junction. The CO₂ laser fiber (BeamPath™ OTO-M, OmniGuide®) was introduced for non-contact dissection and was used with a 300 µm spot size diameter at power settings of 3-8 watts with 100 ms short pulses. Inert gas flow was used to clear the surgical field and assist with coagulation. The CO₂ laser fiber allowed for atraumatic removal of the posterior crus of the stapes providing access to the posterior oval window niche and the footplate. Cholesteatoma was then removed using the CO₂ laser fiber and bleeding was controlled with the fiber in its coagulation mode. Diseased tissue was removed in its entirety without any trauma to the stapes footplate, the capitulum, or the anterior crus. Once disease removal was complete, further inspection found a fixed stapes footplate which will be repaired by laser stapedotomy in a second procedure 6 months to a year from the date of the initial procedure.

<p>PATIENT PROFILE</p>	70-year-old female with right-sided conductive hearing loss
	No history of previous otologic surgery
	Pathology speculated to be cholesteatoma in the middle ear and around the mastoid
	Following a discussion of the risks and benefits, patient consented to surgery on her right ear

SURGICAL COURSE

- Under anesthesia a postauricular transcanal approach to the right ear was used.
- Cartilage and fascia grafts were harvested.
- Cholesteatoma was confirmed as the pathology, it was found growing subcutaneously in the posterior canal wall back into the mastoid cavity.
- The cholesteatoma had eroded the bony partition between the ear canal and the mastoid and had created its own pocket 1 cm in diameter.
- After removal of posterior tympanic recess cholesteatoma, laser mirror inspection additional disease in the stapes arch, adjacent to the footplate-posterior crus junction (*Fig.1*).
- The CO₂ laser fiber (BeamPath™OTO-M, OmniGuide®) was then introduced for non-contact dissection and was used with a 300 μm spot size diameter at power settings of 3-8 watts with 100 ms short pulses.
- The CO₂ laser fiber allowed for atraumatic removal of the posterior crus of the stapes (8 watts, 100ms pulses) providing access to the posterior oval window niche and the footplate (*Fig.2*).
- The laser fiber was used to trim the stapes muscle (6 watts, 100 ms pulses) following partial drilling of the pyramidal eminence to provide exposure and visualization.
- Bleeding and oozing was coagulated using the CO₂ laser fiber (6W, 100ms pulses), it was fired while slightly retracted from the target tissue in order to disperse the energy and achieve hemostasis.
- The laser fiber was then used to ablate and peel away the cholesteatoma layer by layer (*Fig.3*) off the stapes footplate (3 watts, 100 ms pulses). The diseased tissue was removed in its entirety without any trauma to the stapes bone (*Fig.4*).
- After cholesteatoma removal, inspection found a fixed stapes footplate. A laser stapedotomy will repair the defect at a second procedure 6-12 months after the primary procedure.

<p>POSTOPERATIVE RESULTS</p>	The patient was awakened in the operating room. No symptoms of vertigo were exhibited. Follow-up hearing tests were scheduled for 3 months from the date of the procedure. A second procedure to repair conductive hearing loss was planned 6-12 months from the date of the procedure.
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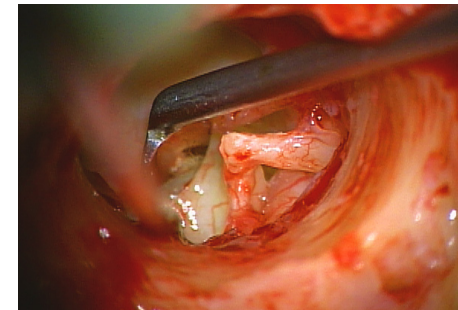


Figure 1: Cholesteatoma in the stapes arch, adjacent to the footplate-posterior

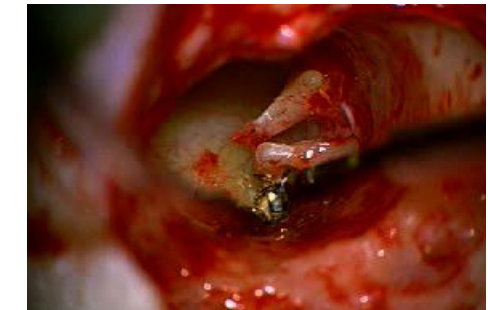


Figure 2: CO₂ laser fiber (BeamPath™OTO-M, OmniGuide®) ablating the stapes crus

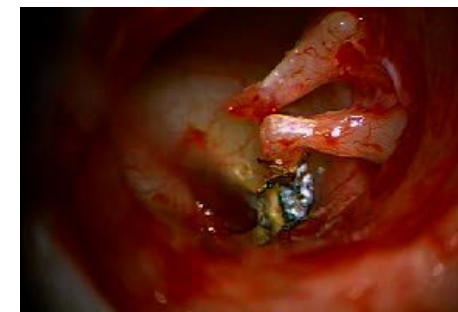


Figure 3: Cholesteatoma on the stapes footplate following gentle ablation

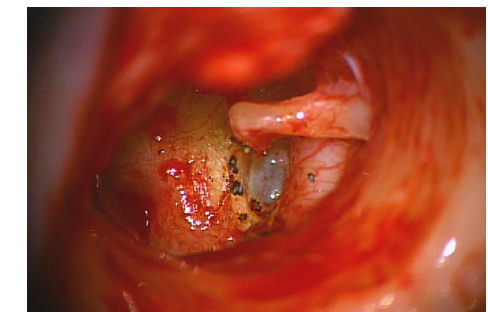


Figure 4: Cholesteatoma removed, footplate exposed

DISCUSSION

The CO₂ laser fiber provided a less traumatic approach to the posterior oval window niche and the stapes footplate than could ever have been achieved with mechanical methods. The fiber-enabled delivery of CO₂ energy allowed for precise layer- by-layer dissection and removal of disease with a minimal-touch, atraumatic technique. Although visible light and line-of-sight CO₂ lasers also use minimal-touch techniques, they lack the cooling inert gas flow of the

OmniGuide CO₂ laser fiber. The gas flow clears the surgical field of blood and debris enhancing the fiber's cutting and coagulation abilities. The flow ensures laser energy is not absorbed by pooling blood and that oozing capillaries are more readily coagulated. The OmniGuide® CO₂ laser fiber enabled precise layer-by-layer removal of diseased tissue in a time-efficient manner which also enhanced safe middle ear surgery, minimizing inner ear risk.