

# REMOVAL OF ADHESIONS AND A COLLAGEN GRAFT DURING A REVISION STAPEDECTOMY USING A HAND-HELD CO<sub>2</sub> LASER FIBER

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The patient, a 50 year-old female who had previously undergone a primary stapedectomy elsewhere, presented with conductive hearing loss. The loss of conductive hearing suggested that the prosthesis was malposed and a revision stapedotomy was scheduled. Upon surgical exposure, adhesions were found extending from the tympanic membrane to the incus bone. A previously placed tissue seal was found covering the oval window niche, obscuring visualization of the footplate. The CO<sub>2</sub> laser fiber (BeamPath™ OTO-S) was introduced for non-contact dissection. The CO<sub>2</sub> laser fiber allowed for atraumatic removal of the adhesions and tissue seal, providing access and visualization of the posterior oval window niche and footplate. Diseased tissue was removed in its entirety without any trauma to the incus bone or stapes footplate. The laser was used to enlarge the previous stapedotomy and a heat-activated stapes prosthesis was placed. The prosthesis was crimped using a single pulse of laser energy.

## PATIENT PROFILE

50 year-old female presented with conductive hearing loss

Primary stapedectomy was performed by another surgeon

Following a discussion of the risks and benefits the patient chose to undergo surgery

## SURGICAL COURSE

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- Under anesthesia, a transcanal approach to the middle ear was used.
- Upon surgical exposure, adhesions were found extending from the tympanic membrane to the incus bone.
- The CO<sub>2</sub> laser fiber (BeamPath™ OTO-S) was introduced for non-contact dissection and was used with a 250 μm spot size diameter at power settings of 4-6 watts and 0.1 sec single pulses.
- The CO<sub>2</sub> laser fiber allowed for atraumatic removal of the adhesions between the tympanic membrane and incus bone (*Fig. 1*). The incus bone was completely freed of adhesions to the tympanic membrane using non-contact laser dissection (*Fig.2*).
- A previously placed tissue seal was found covering the oval window niche, obscuring visualization of the footplate.
- The fiber was used to vaporize the tissue seal and provide access and visualization of the posterior oval window niche and footplate.
- Diseased tissue was removed in its entirety without any trauma to the incus bone or stapes footplate.
- Bone regrowth was noted and the laser was used (power setting of 5 watts, 0.1 sec pulses) to enlarge the existing stapedotomy.
- A heat-activated stapes prosthesis was placed and then crimped using a single pulse of laser energy at a power setting of 4 watts, 0.05 sec pulses (*Fig.3&4*).

## POSTOPERATIVE RESULTS

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.

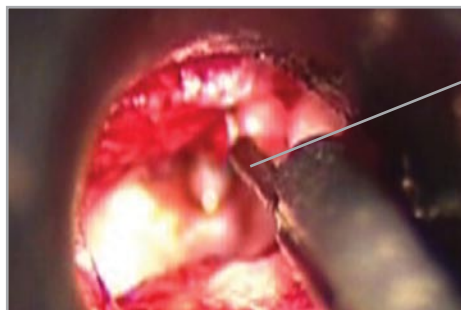


BeamPath™  
OTO-S Fiber

*Figure 1:  
Removal of adhesions  
between tympanic  
membrane and  
incus using the  
BeamPath™ OTO-S*

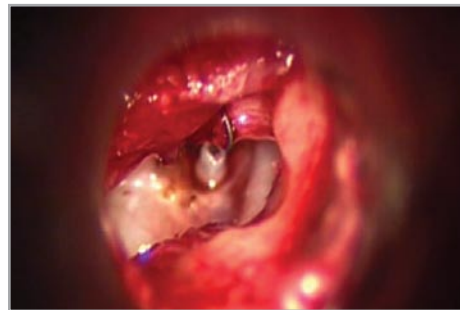


*Figure 2: Incus bone  
freed from adhesions*



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*Figure 3: Crimping  
of prosthesis using the  
BeamPath™ OTO-S  
fiber in contact mode*



*Figure 4: Prosthesis  
crimped following  
one laser shot*

## DISCUSSION

The fiber-enabled delivery of CO<sub>2</sub> laser energy allowed for atraumatic, fine dissection of adhesions and precise vaporization of the tissue seal. Use of a non-contact laser technique avoided the need to risk damaging middle ear structures with mechanical manipulation. In addition, the CO<sub>2</sub> laser fiber served as a safe tool for layer-by-layer removal of the tissue seal which was obscuring visualization of the underlying footplate. Due to the

complete absorption of CO<sub>2</sub> laser energy in perilymph, it could be safely used to enlarge the existing stapedotomy without risking injury to inner ear structures. The fiber also served as an efficient tool for crimping the heat-activated prosthesis. The BeamPath™ OTO-S fiber (OmniGuide®, Cambridge, MA) enabled precise layer-by-layer removal of diseased tissue in a safe and time-efficient manner.

