Transcanalicular Laser-Assisted Dacryocystorhinostomy

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Introduction

Advances in endoscopic and fiberoptic technology have led to the development of innovative, minimally invasive approaches for lacrimal surgery. Lacrimal endoscopy, endocanalicular drilling, trephination, electrocauterization, and endocanalicular laser-assisted dacryocystorhinostomy (ELADCR) are techniques being used to treat nasolacrimal duct obstruction. In the endocanalicular laser-assisted DCR, a laser fiberoptic probe (Fig. 40.1) is inserted in the punctum and advanced along the canaliculus to the nasolacrimal sac. Once in the sac, the laser is used to make the osteotomy between the sac and middle meatus. Advantages of the ELADCR approach include avoidance of an external scar, improved hemostasis, limited intranasal instrumentation and tissue dissection, decreased operative time, and presumably faster recovery. A variety of lasers have been used in this method, including the argon laser, the holmium (HO):YAG laser, the potassium titanyl phosphate (KTP):YAG laser, the neodymium (Nd):YAG laser, the erbium (Er):YAG laser, and more recently, the diode laser [1–7]. The diode laser, with a 600-micron fiberoptic probe, is a portable, semiconductor contact laser of 810 nm wavelength that achieves efficient tissue dissection and instant vaporization. The laser coagulates blood vessels with minimal damage to adjacent structures, giving surgeons an alternative method for DCR surgery.

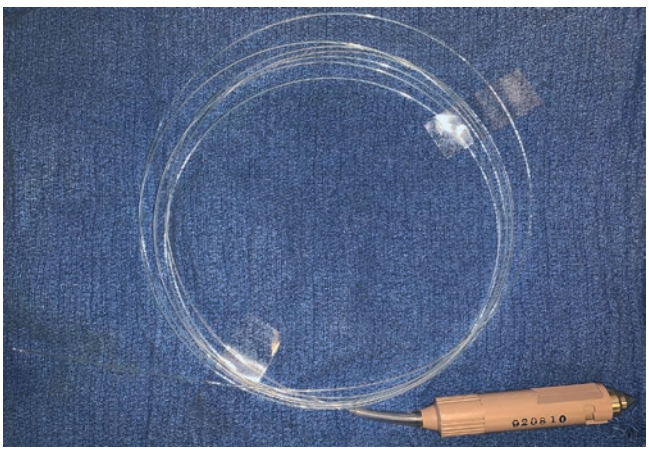

Fig. 40.1 Laser fiberoptic probe. (Courtesy of John Nguyen)

Selection of Patients

The endocanalicular approach is ideal for patients who are concerned about external scarring, as well as those with blood dyscrasias or cannot be taken off anticoagulating/antiplatelet agents. As with other endoscopic DCR techniques, a careful preoperative evaluation with intranasal endoscopy should be performed to assess the intranasal anatomy and exclude nasal pathologies such as polyps or a deviated septum that could make surgery challenging. Relative contraindications to ELADCR include suspected dacryolith, canalicular or common canalicular obstruction, canaliculitis, lacrimal sac tumor, and intranasal mass.

Description of Procedure

Thirty minutes prior to arriving in the operating room, two doses of oxymetazoline 0.05% nasal spray are administered to the ipsilateral nostril. The procedure is performed under

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local anesthesia with intravenous sedation or general anesthesia. The operative side of the nose is packed with neuropaddies soaked in 4% cocaine solution placed in the middle meatus. This packing is left in place for 5 minutes and removed. A 0- or 30-degree rigid 4-mm nasal endoscope is then inserted into the nasal cavity. The middle turbinate, uncinate process, and lateral nasal wall anterior to the middle turbinate are injected with a 50/50 mixture of 2% lidocaine with epinephrine 1:100,000 and 0.5% bupivacaine with epinephrine 1:100,000. The area is repacked with cocaine-soaked neuropaddies for an additional 5 minutes. Laser-protective corneoscleral shields are inserted over both eyes.

After the packing is removed, infracture of the middle turbinate can be performed with a periosteal elevator in cases of an unusually narrow middle meatus. Infracture of the middle turbinate can improve exposure and protect the turbinate from the laser probe. The superior and inferior punctae are dilated with a punctal dilator. The 600-micron Multidiode™ fiber optic (Multidiode Endo Laser™) is then passed through the inferior punctum and fed through the canalicular system until a hard stop is felt at the medial wall of the lacrimal sac. The nasal endoscope, attached to a video monitor, is then placed into the nasal cavity. The light on the nasal endoscope is turned down in order to visualize the aiming beam of the laser as it illuminates the lateral nasal wall. Once the light appears to be in adequate position, the laser is placed on a continuous wave/pulse setting at 10 watts of power to create an osteotomy (Fig. 40.2). The power is then decreased to 5–8 watts, and the osteotomy is enlarged to prevent sump effect and stenosis of the osteotomy (Fig. 40.3). The laser is then carefully withdrawn after verifying that laser power is deactivated. Silicone tubes are then passed through the inferior and superior canaliculi and retrieved within the nose. The tubes may be tied as a single square knot and sutured to the lateral nasal wall with 6-0 vicryl.

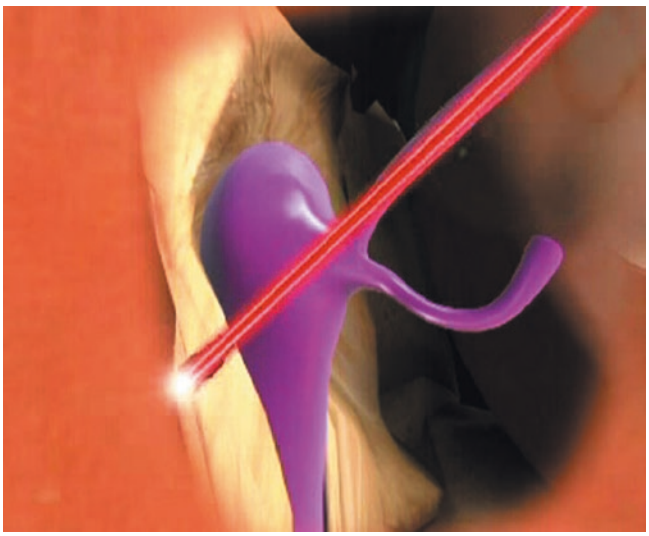

Fig. 40.2 Diagram of the laser probe placed on a continuous wave/pulse to create an osteotomy

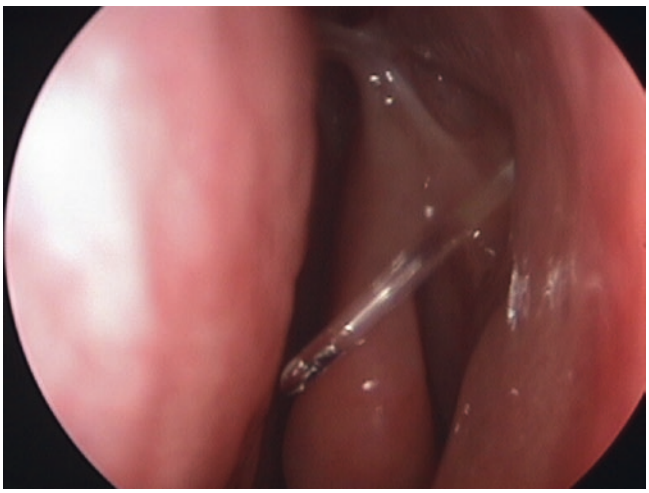

Fig. 40.3 Intranasal visualization of the laser probe. (Courtesy of John Nguyen)

Postoperative Care

A combined solution of topical antibiotic and steroid eye drops are used four times a day in the operative eye for 2 weeks. If nasal bleeding is present, 0.05% oxymetazoline nasal spray is recommended twice a day during the first 24–48 hours. The patient is examined at routine follow-up appointments, and the silicone tubes are typically removed in the office after approximately 3 months, when ostium contraction has presumably stabilized.

Outcomes

The success rates of surgical procedures to correct nasolacrimal duct obstruction vary depending on the technique used. The procedure thought to be associated with the highest success remains the external DCR, with success rates in the literature between 80% and 100% (majority around 90%) [8–10]. The success rates for the ELADCR are also variable, with efficacy rates in the literature between 60% and 90% [1, 2, 4, 5, 7, 11–13]. With the recent prospective study [13] indicating a 1-year success rate of 74%, the procedure in its current state is generally not used for primary DCR. Studies have suggested that there may be a role for intraoperative use of mitomycin C during endocanalicular laser-assisted DCR; however, there is not enough clinical evidence to support its continued use at this time [4, 6]. The endocanalicular laser-assisted DCR can be used for revi-

sion DCR or as a primary DCR technique for patients who are unable to discontinue antiplatelet and/or anticoagulant medications.

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