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Laser Dacryocystorhinostomy: Part 2. Laser-Assisted Endonasal Endoscopic Dacryocystorhinostomy with the Holmium:YAG Laser

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The endonasal approach to dacryocystorhinostomy (DCR) offers various advantages over the external approach, such as minimal tissue injury, lack of cutaneous scar, excellent hemostasis, minimal operative and postoperative morbidity, shorter surgery time, ease of surgery under local anesthesia, and no interference with lacrimal pump function. The improvement in fiberoptic endoscopes ensures excellent visualization during nasal surgery and has resulted in a revival of interest in endonasal DCR. The use of a laser to perform the surgery rather than using surgical instruments has become popular in view of the ease of the procedure and has proved a viable alternative in cases of nasolacrimal duct obstruction. It is important for the surgeon to be familiar with the normal nasal anatomy and its variants. The authors always undertake laser-assisted endonasal DCR in conjunction with otorhinolaryngologists because of their expertise in endonasal surgery and the ability to manage unexpected nasal problems which may otherwise result in abandoning the procedure once started.

Patient Preparation

Laser-assisted endoscopic DCR is only indicated in obstructions to tear drainage distal to the lacrimal sac. It is mandatory to inquire about previous nasal trauma and surgery. A history of recurrent nasal infections indicates nasal pathology which must be addressed before undertaking DCR.

Prior to the patient arriving in the operating room, the appropriate side of the nasal cavity is sprayed with a combination of lidocaine hydrochloride 5% and phenylephrine hydrochloride 0.5%. The procedure is performed under local anesthesia with an injection of 2.5 mL of 2% lidocaine combined with 1 : 200,000 epinephrine via a postcarun-

cular approach to the medial orbital wall region. A Merocel (Medtronic Xomed, Jacksonville, FL) nasal packing is inserted into the appropriate nasal cavity and the lidocaine/phenylephrine (Aurum Pharmaceuticals, Essex, UK) combination instilled into the nasal cavity to ensure good contact with the nasal mucosa at the expected operative site. The authors do not undertake skin preparation preoperatively. The surgical area is draped using a fenestrated ENT drape. Once in the operating room, the nasal packing is removed and three Codman surgical pads, which have been soaked in 10% cocaine, are inserted into the proposed surgical site to further decongest and anesthetize the nose.

Technique

A fiberoptic light source is passed, after punctal dilatation, through the lower lacrimal punctum, into the inferior canaliculus, and advanced along the canaliculus into the lacrimal sac. The light source is then inclined inferonasally to locate the most inferior aspect of the sac. It is then secured in position over the drape with the help of a small artery clip. Nasal endoscopy using a 0- or 30-degree scope is performed and the lacrimal sac is identified by observing the illumination within the sac.

A holmium:YAG laser (PowerSuite, wavelength 2100 nm; Lumenis Corp., London, UK) is applied via a handheld fiberoptic wire under direct endoscopic visualization. The nasal mucosa is opened and a bony ostium is formed at the site of the illuminated lacrimal sac. The usual settings of the laser are 0.6–0.8 Joules/Hz (equivalent of 6–8 watts) for mucosal application and 1.0 Joules/Hz (equivalent of 10 watts) for application to bone. Once the connection between the lacrimal sac and the nasal cavity is established, the nasolacrimal system is intubated in the usual manner with a bicanalicular stent, which is secured in the nose by passing the stent through a Watzke sleeve [retinal implant silicone sleeve (0.76 mm); Labtichna Ophthalmics Corp., Canada]. The stent is left in place for 12 weeks. After stent removal, a sac washout is performed to assess patency of the new channel.

Complications

Complications after endonasal laser DCR are relatively infrequent. These can be:

1. Stent prolapse occurs infrequently because the mucosal and bony ostium diameters are narrower than the diameter of the Watzke sleeve encapsulating the stent. A prolapsed stent should ideally be repositioned and only in rare cases will it need to be removed prematurely.
2. Granulomas may develop at the operative site.
3. Local hematoma formation in the lids or cheek area can result from local anesthetic injection.

4. "Cheese-wiring" of the lacrimal puncta caused by excessive tension on the bicanalicular stent.

5. False passage formation as the light source is advanced along the lacrimal canaliculus.

6. Incorrect localization of the sac illumination and subsequent incorrect location.

7. Failure of the procedure is usually attributed to a complete healing of the nasal mucosa, which looks previously untouched when these patients are endoscopically reviewed. Alternatively, an adhesion between the site of the nasal mucosal opening and the middle turbinate may lead to a surgical failure.

8. Systemic reaction to topical cocaine used to aid nasal anesthesia/decongestion.

The anatomic success rate after the procedure varies between 90% and 95%. Most series suggest up to 60% of patients have complete resolution of symptoms with another 20% noticing an improvement in symptoms to a tolerable level. Lower eyelid malposition and lacrimal pump failure may result in less than satisfactory outcomes in some patients. The authors have observed that success rates are higher in younger patients, in those with a shorter duration of symptoms, and in those without any previous surgical intervention.

The keys to success are proper positioning and size of the ostium and prevention of late closure of the nasal mucosal opening. Variation in nasal anatomy or previously undetected nasal pathology may make surgery technically difficult and one would be best advised to undertake such surgery with an otorhinolaryngologist.

The ease of the surgical procedure from the surgeon's point of view and the ability to perform rapid and, when required, bilateral surgeries make laser-assisted endonasal DCR an acceptable alternative to external DCR in suitable patients.

Acknowledgment. The authors appreciate the work of Vickie Hase, who assisted in preparation of this chapter.