SURGEON’S CORNER

Traumatic Sinolacrimocutaneous Fistula Managed With Endonasal Dacryocystorhinostomy and Anterior Ethmoidectomy

Pari N. Shams, MRCP, FRCOphth; Dinesh Selva, FRACS, FRANZCO

A 31-year-old man with epiphora and mucous discharge from a traumatic lacrimal fistula underwent a computed tomographic dacryocystogram, revealing a fistula extending from the anterior ethmoid air cells through the lacrimal sac to the overlying skin with coexisting nasolacrimal duct obstruction. Endoscopic dacryocystorhinostomy enabled complete marsupialization of the lacrimal sac and agger nasi air cell, removing the tract between these structures. Simultaneous probing of the common canaliculus and fistula tract under direct visualization allowed the identification of the internal fistula origin in relation to the internal ostium on the lateral sac wall. The fistula was excised with a trephine over a guide wire via an external approach. Use of the endoscopic technique for excision of acquired lacrimal fistulas may be especially helpful in cases with coexisting nasolacrimal duct obstruction where the fistula extends to the sinus cavity or suspected foreign bodies.

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A 31-year-old man had a discharging fistula at the inferior aspect of the left medial canthus. Two years earlier, he had been assaulted with a broken glass bottle, sustaining a deep laceration below the left medial canthal area. A glass fragment was removed from the wound at the site of the fistula in the emergency department at the time, and 2 further fragments self-extruded from the same location in the next few weeks. Two months prior to his visit, a fourth fragment of glass self-extruded from the scar; subsequently, he had developed a discharging fistula. He was able to blow air through the fistula during respiration with his mouth closed. On examination, the opening of the fistula was visible above the scar and both mucous and clear tears were seen extruding from it onto the skin (Figure, A). He also had epiphora from his left eye. Endonasal examination revealed a very large pneumatized middle turbinate (Figure, B). A computed tomographic dacryocystogram with cannulation of the fistula revealed a communication between the fistula tract, the lacrimal sac, and the agger nasi ethmoidal air cell. The patient underwent submucous resection of the pneumatized middle turbinate and endoscopic dacryocystorhinostomy (DCR) under controlled hypotensive general anesthesia.

SURGICAL TECHNIQUE

The DCR was performed using a variant of the mechanical endonasal DCR technique previously described by Wormald.

A left middle turbinectomy was performed to enable access to the lacrimal sac. Bone removal was continued superiorly above the attachment of the middle turbinate to expose the fundus of the sac and the agger nasi cell, which was marsupialized. With the aid of a Bowman lacrimal probe passed into the lacrimal sac, it was fully marsupialized, ensuring the flaps were reflected onto the lateral nasal wall without any tension. The posterior wall of the sac was found to be significantly scarred adjacent to the anterior wall of the agger

Author Affiliations: South Australian Institute of Ophthalmology, Department of Ophthalmology and Visual Sciences, Adelaide University, Adelaide, South Australia, Australia.
nasi, representing the site of connection with the air cell. This area was excised with through-cutting Blakesly forceps. The common canalicular opening was inspected and appeared normal. The fistula was probed transcutaneously with a second Bowman probe (Figure, C); both were visualized endonasally as entering the lateral lacrimal sac wall 5 mm anterior to the common canalicular opening (Figure, D). A 3-mm trephine was passed over a guide wire along the fistula tract into the lacrimal sac (Figure, E), and the fistula was then excised from an external approach along the tract using sharp dissection owing to the presence of scar tissue. The tract of the excised fistula and the skin was sutured with 6-0 Vicryl. The nasal mucosal flap was trimmed and reflected back to oppose the edge of the posterior lacrimal sac flap. A small gel foam patch was used to keep the flap anastomosis in position for the initial healing period.

Histological examination of the excised fistula showed a cystically dilated tubuloductal structure with surrounding fibrous connective tissue. The deeper aspect of the cystic structure was lined by non-keratinizing stratified squamous epithelium. The surrounding cyst wall showed evidence of fibrosis and chronic inflammation. Focal granulomatous inflammation with foreign body–type giant cell reaction was also seen within the deep fibrous connective tissue. At the 6-month postoperative review, the patient’s epiphora had completely resolved and the site of the fistula had fully healed (Figure, F).

**COMMENT**

Lacrimal fistulas are anomalous tracts that connect two epithelium-lined organs. Lacrimocutaneous fistulas can rarely be congenital, originating from the common canaliculus, sac, or duct and opening onto the skin inferomedial to the lower punctum. They also occur rarely following incision and drainage of the lacrimal sac for the treatment of acute dacryocystitis. Lacrimal sac fistulas can also form between the maxillary or ethmoid sinususes following surgery, such as antral-ethmoid orbital decompression, or consequent to midfacial trauma. Because a sinolacrimal fistula can allow the free passage of tears into the nasal cavity, an unknown number of patients may be symptom free following this type of injury in the lacrimal area. To our knowledge, this is the first report in the English literature of a traumatic sinolacrimalocutaneous fistula repaired through an endonasal approach and trephination.

The management of lacrimal fistulas is largely based on surgical treatment of the congenital type via an external approach. It is now clear that because almost all congenital lacrimal fistulas arise from the common canaliculus, simple probing, cauterizing, or closed excision may result in damage to the lacrimal drainage system. While some advocated that symptomatic congenital lacrimal sac fistulas are successfully treated with excision alone (closed technique) or excision with nasolacrimal intubation, others proposed that a DCR is necessary (open technique) owing to the coexistence of nasolacrimal duct obstruction in a significant proportion of congenital lacrimal fistulas. Opening the lacrimal sac also facilitates surgical dissection with exposure of the internal fistula ostium and accurate ligation and removal of the fistula from its origin, minimizing the risk of damage to the common canaliculus. In addition, the incidence
of recurrence of the fistula should be reduced following a DCR because of the decreased resistance to outflow of tears. Intubation of the common canaliculus is recommended in all cases in which the common canaliculus has been manipulated. Subbaiah\textsuperscript{11} reported 7 cases of acquired lacrimal fistulas, all of which were successfully treated with endoscopic DCR with excision of the fistulous tract. Ross et al\textsuperscript{12} described a modified endonasal DCR approach to the excision of a congenital fistula to minimize skin incisions and also to address outflow obstruction; complete marsupialization of the lacrimal sac medial wall facilitated direct visualization of the internal fistula origin on the lateral sac wall and excision with a 3-mm punch biopsy trephine over a cannula guide. This case illustrates the advantages to direct intranasal visualization of the internal fistula ostium, helping to ensure complete excision of the fistula especially in cases of acquired or traumatic lacrimal fistulas where there may be great anatomical variation and distortion by the presence of scar tissue. Simultaneous probing of the common canaliculus and the fistula tract can help to identify canalicular involvement, prompting the use of a lacrimal stent and also avoiding canalicular injury when excising the fistula tract. The endonasal endoscopic approach was also advantageous in this case for the following: (1) treatment of coexisting nasolacrimal duct obstruction; (2) treatment of concha bullosa, which would have prevented adequate access to the nasal mucosa via an external approach; (3) exploration for possible foreign bodies following trauma; and (4) examination and removal of the ethmoid cells involved in the fistulous tract.

**CONCLUSIONS**

An endoscopic approach to excision of lacrimal fistulas may be beneficial especially in the presence of a communication to the sinuses. Direct intranasal visualization of the fistula ostium can aid in its identification and complete excision, minimizing the risk of injury to adjacent structures such as the common canaliculus.

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