INTRODUCTION

Tearing, also known as epiphora means overflow of tears. The clinical spectrum ranges widely from occasional overflow to constant bothersome tearing. Tearing is due to a disruption in the balance between tear production and drainage. This complex system is dependent on the interaction of anatomy and physiology.

NORMAL TEAR FLOW

In order for the eye to remain healthy, it must remain moist. The lacrimal gland is a specialised gland located under the outer one-third of the upper eyelid that produces tears. Blinking spreads the tears over the surface of the eye and the orbicularis muscle "pumps" excess tears into the tear duct drainage system that drains tears into the inferior meatus of the nose (Fig 1). That is why the nose runs when one cries.

CAUSES OF NORMAL TEARING

When the tear volume exceeds that of the normal drainage capacity of the drainage system, the excess tears will "spill over" onto one’s cheek. This can be due to the followings:

- OVERPRODUCTION (lacrimation) of tears due to irritation as in cases of blepharitis (infection of the eyelids), trichiasis (in-turning of the eyelashes), entropion (in-turning of the eyelid), epiblepharon (congenital anomaly of the lid which pushes the lashes against the eyeball) (Fig 2), corneal and conjunctival diseases or even reflex tearing secondary to dry eyes etc.
- PUMP FAILURE in which the pump action of the orbicularis muscle is disturbed like in cases of facial nerve palsy.
- DRAINAGE OBSTRUCTION (obstructive tearing) may occur at the level from the punctum down to the outlet of the nasolacrimal duct in the nose due to various pathologies.

ASSESSMENT OF TEARING

A careful history is essential to provide clues to the diagnosis. Irritation and redness usually signify eyelid or anterior segment (conjunctiva and cornea) pathologies whereas history of facial nerve palsy may point to a pump failure. A full ocular examination is warranted to decide whether the patient is having an overproduction of tears or suffering from an obstructive cause of tearing. In cases of suspected drainage obstruction, further examinations may be needed to define its level and nature. These tests include:

- Syringing and probing – Syringing involves the use of a syringe filled with saline, which is injected through the punctum. Only free-flowing tear drainage will enable the patient to taste the salty water. Probing maybe required once a blockage in the tear drainage is identified from “syringing”. A small probe is guided through the punctum and into the tear drainage system to locate the site of blockage. In addition, probing has a therapeutic role in the management of tear drainage obstruction. This will be discussed below.
- Jone's tests -- Flourescein is instilled in the conjunctival sac. Stain can be recovered from the nose of a patent system.
- Dacryocystography - A special X-ray/CT procedure that is done with contrast media to view the tear drainage of the eye.
- Nasal examination - To rule out any pathology in the nose.
- Further imaging -- If mass obstruction is suspected along the tear drainage system, further imaging is mandatory to rule out any malignancies.

MANAGEMENT

Treatment is directed to correct the underlying cause. This article concentrates on the management of obstructive tearing.

Acute Dacryocystitis

If the lacrimal gland is producing tears properly but the “tear duct” that drains the tears from the eye into the nose becomes nonfunctioning, obstructive tearing occurs. In addition to the bothersome symptoms of tearing as discussed above, the stagnant tears within the system can create a conducive environment to the development of an infection. An acute infection with the “tear duct” causes a painful swelling in the inner corner of the eyelids, which is known as dacryocystitis (Fig 3). The infection can spread to involve surrounding structures.

This is a medical emergency in which systemic antibiotics are necessary. An incision and drainage of the lacrimal sac is needed in some cases. Traditionally, the infection and inflammation of acute dacryocystitis secondary to nasolacrimal obstruction should be well controlled before a definitive dacryocystorhinostomy
three-snips manouvre. This maintains a patent punctum seeker and dilated sufficiently. Scissors are normal tear drainage. The punctum is found with a free of pathology, this procedure re-establishes the punctum (Fig 4). Assuming the rest of the system is definitive surgical correction.

The surgery of choice is punctoplasty (to open up the tear duct, which might otherwise result in failure of the surgery. Success rate of this procedure is high. Most studies report success rates of approximately 90% or higher despite variations in technique and exclusion criteria.


(III) At the level of the canaliculus:
Canaliculus is the part in the tear drainage system that links up the punctum and the lacrimal sac. Canalicular malfunction may occur in cases with physical or irradiational injuries, infections such as herpes simplex or trachoma and systemic diseases like Steven Johnson Syndrome involving the canaliculus. Many of these cases can be successfully managed with an external or endoscopic dacryocystorhinostomy as mentioned above with meticulous dissection of the obstructed canaliculus together with placement of silicone tubes. However, some cases may require a by-pass surgery. This is done by inserting a by-pass tube, known as Lester Jones’ tube, which connects the globe surface directly to the middle meatus of the nose via an ostium created by a dacryocystorhinostomy. The Lester Jones’ tube is a tube of about 15 millimetres in length and a few millimetres in width, and is hollow. It allows tears to run into the nose through it. When in its final position it is nearly invisible. (Fig 7)

(B) Non-invasive management
Probing of the tear drainage system may be offered to patients who do not wish to undergo a formal surgical procedure. A probing procedure is an office procedure, which takes about 10 minutes. A dilator first dilates the punctum. Then a thin, blunt metal wire is gently passed through the tear duct to open any obstruction. Sterile saline is then irrigated through the duct into the nose to make sure that there is an open path (Fig 8). It has the merits of low morbidity rate, ease of use and low cost. However, its major draw back is the high failure rate and rate of recurrence. Tsai et al8 suggests the use of anti-metabolite in this procedure, which increased the success rate at least in the first 9 months post operatively.

Balloon catheterisation of the lacrimal duct is another option. In this procedure, a tube is advanced through the blocked tear duct, utilising an inflatable balloon to help dilating the drainage pathway into the nose. The inflatable balloon is similar to the type of balloon used in coronary artery angioplasty procedures. Silicone tubing is then inserted in the dilated tear duct system, which is generally removed 4 to 6 months later. Again, this procedure has a relatively high failure rate.

membrane is incised and removed or retracted, to allow for the creation of an ostium on the lacrimal bone and the adjacent bones mechanically by bone rongeur. A vertical incision is made in the lacrimal sac, which creates a new drainage pathway for tears to drain into the nasal cavity (Fig 6). Silicone tubes can be inserted to assist long-term patency just as in external dacryocystorhinostomy. Proponents of endoscopic dacryocystorhinostomy cite increasing success rates approaching that of external dacryocystorhinostomy. The major advantage of the procedure over the external approach is the avoidance of an external scar and also preventing the complication of cribiform plate fracture. Camera et al recently reported a success rate of 99% with the adjunctive use of mitomycin C. Some surgeons suggest the use of laser to create the bony ostium in endoscopic dacryocystorhinostomy, but its reported success rate is much lower than mechanical endoscopic dacryocystorhinostomy.

The surgery of choice is punctoplasty (to open up the punctum) (Fig 4). Assuming the rest of the system is free of pathology, this procedure re-establishes the normal tear drainage. The punctum is found with a free of pathology, this procedure re-establishes the punctum (Fig 4). Assuming the rest of the system is definitive surgical correction.

Chronic Tearing Secondary to Obstructive Causes
(A) Surgical management
If tearing per se causes severe symptoms, surgery can be performed to re-establish the drainage system. This depends on the level of the obstruction.

(I) At the level of the punctum (punctal stenosis):
Stenosis of the lacrimal punctum can be due to numerous causes including infections like herpes simplex, herpes zoster, chlamydia, actinomyces, human papilloma virus etc. Direct or thermal trauma, usage of topical or systemic chemotherapy and irradiation may also lead to stenosis of the punctum. Some underlying causes should be managed and stabilised prior to definitive surgical correction.

The surgery of choice is punctoplasty (to open up the punctum) (Fig 4). Assuming the rest of the system is free of pathology, this procedure re-establishes the normal tear drainage. The punctum is found with a punctum seeker and dilated sufficiently. Scissors are then used to excise the edge of the punctum with a three-snips manouvre. This maintains a patent punctum for tears to drain through.

(II) At the level of the nasolacrimal duct (Nasolacrimal Duct Obstruction):
Obstruction of the nasolacrimal duct is most commonly due to idiopathic or involutional causes. Infectious, cicatricial, traumatic and neoplastic causes are rare. The definitive management of such an obstruction is done by creating a new tear duct by making a hole in the bone (lacrimal bone and part of the frontal process of the maxilla) between the tear sac and the middle meatus of the nose. This operation is called “dacryocystorhinostomy” which can be performed externally or endoscopically, depending on the availability of equipment and expertise.

External Dacryocystorhinostomy
This procedure is done from outside, thus termed “external” dacryocystorhinostomy. A small incision of about 15-20mm is usually placed medial to the medial canthus (the corner of the eye). An ostium is then made on bones underlying the lacrimal sac by a bone rongeur. The lacrimal sac is incised and then connected to the nasal mucosa by stitches, creating a new tear drainage pathway. Silicone tubes (stents) are sometimes placed in the newly created tear drainage pathway for a few months to prevent scarring of the tear duct, which might otherwise result in failure of the surgery. Success rate of this procedure is high. Most studies report success rates of approximately 90% or higher despite variations in technique and exclusion criteria.

Endoscopic Dacryocystorhinostomy
Nowadays, with the use of nasal endoscopes, surgeons can perform the procedure from inside. A 3.5mm rigid endoscope is inserted into the nasal cavity to the middle meatus (Fig 5). The nasal mucous


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CONCLUSION

The management of tearing in adults depends on the cause of the symptom. It is important to discuss with patients about possible diagnostic tests that may be necessary to evaluate the condition and their possible results. Patients are to be well informed of the treatment protocols and options.

References