Thakir Mohammed Mohsin

Disorders of the Lacrimal Drainage System

Applied anatomy

The lacrimal drainage system consists of the following:

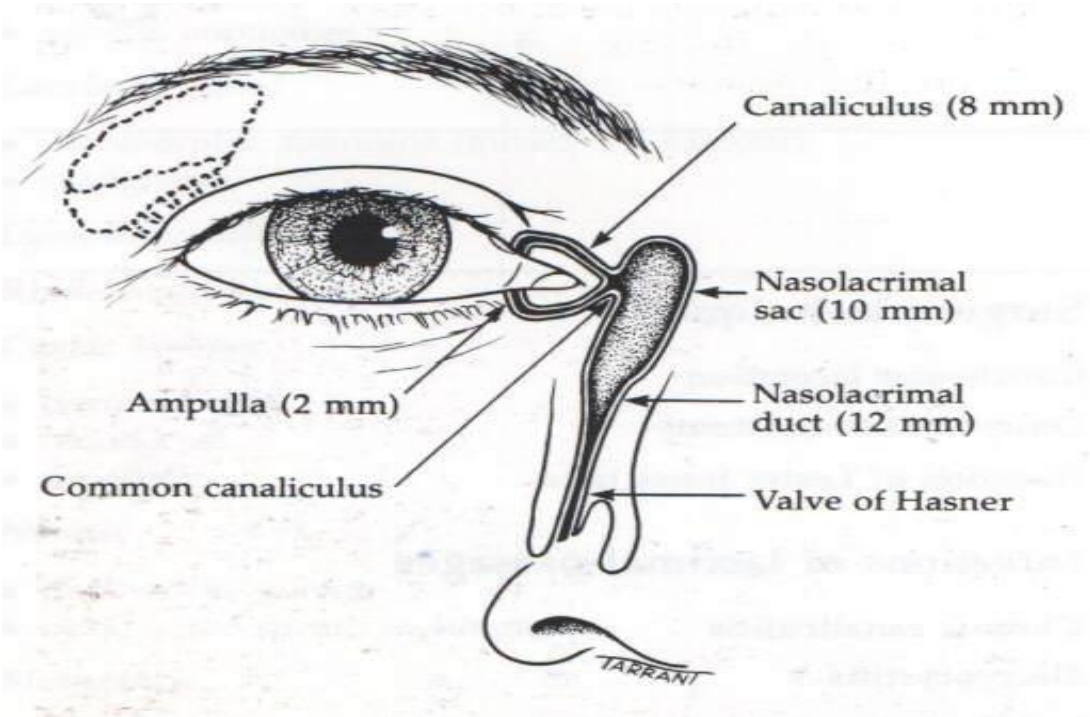
1-The puncta are located near the medial end of each eyelid. Normally they face in a slightly posterior direction and can be inspected by everting the medial aspect of the lids.

2-The ampullae (vertical canaliculi) are about 2 mm long and form the most proximal part of the lacrimal drainage system..

3-The horizontal canaliculi are about 8 mm long. In about 90% of individuals the upper and lower canaliculi form the common canaliculus which opens into the lateral wall of the lacrimal sac. In the remainder, each canaliculus opens separately..

4-The lacrimal sac *is* about 10 mm long and lies in the lacrimal fossa between the anterior and posterior lacrimal crests. The lacrimal bone and the frontal process of the maxilla separate the lacrimal sac from the middle meatus of the nasal cavity.

5-The nasolacrimal duct *is* about 12 mm long and is the continuation of the lacrimal sac. it passes downwards and angles slightly medial and posterior to open into the inferior nasal meatus, below the inferior turbinate.



physiology

Tears flow along the upper and lower marginal strips and enter the upper and lower canaliculi by capillarity and also possibly by suction. About 70% of tears drain through the lower canaliculus and the remainder drain through the upper canaliculus .

The three main causes of excessive watering are
(1) **lacrimation,**
(2) **obstructive epiphora**

(3) **lacrimal pump failure.**

1. **Lacrimation** is caused by reflex over-production of tears from stimulation of the trigeminal nerve by irritation of the cornea or conjunctiva. In these cases the excess watering is associated with symptoms of the underlying cause and treatment is usually medical.
2. **Obstructive epiphora** is caused by mechanical obstruction of tear drainage. It is characterized by excessive watering which is exacerbated by a cold and windy atmosphere, and is least in a warm dry room. Most cases can be relieved by surgery.
3. **Lacrimal pump failure** occurs secondary to lower lid laxity or weakness of the orbicularis muscle which plays a very important role in pumping the tear in to the nasolacrimal duct (e.g. facial nerve palsy). Treatment is more difficult than for obstructive epiphora.

Evaluation of epiphora
Clinical examination

The main parts of the clinical examination are
(1) **general external inspection,**
(2) **slitlamp examination** and
(3) **irrigation.**

GENERAL EXTERNAL INSPECTION

1. Examination of the eyelids for evidence of ectropion, trichiasis, eversion of the lower punctum and lower lid laxity.
2. Palpation below the medial canthal tendon for enlargement of the lacrimal sac which may result from acute dacryocystitis or a mucocele.
3. Compression of the lacrimal sac which may cause reflux of mucopurulent material. This is indicative of a mucocele with a patent canalicular system, but with an obstruction either at the lower end of the lacrimal sac or in the lacrimal duct. In acute dacryocystitis, pressure over the sac will cause pain. Occasionally, palpation of the sac will reveal a stone or a tumour.

SLITLAMP EXAMINATION

1. Examination of the puncta for malposition, stenosis or obstruction caused by a foreign body or eyelash.
2- Examination of the marginal tear strip is important because many patients with epiphora do not have an obvious overflow of tears onto the face but merely show a high marginal tear strip.
3. The dynamics of eyelid closure should be evaluated. Normally, the eyelid margins approximate

and the puncta are apposed when the eyelids are closed. In patients with lower lid laxity, one eyelid may override the other or the puncta may evert.

4. Fluorescein disappearance test is performed by instilling fluorescein drops into both conjunctival sacs. Normally, very little or no dye remains after 2 minutes. A prolonged retention of dye is indicative of inadequate lacrimal drainage.

IRRIGATION

A drop of topical anaesthetic is instilled into the conjunctival sac and a straight lacrimal cannula on a 3-ml saline-filled syringe is inserted into the lower canaliculus. As the cannula is inserted deeper, an attempt is made to touch the medial wall of the lacrimal sac and the lacrimal bone. The cannula can come either to a **hard stop** or to a **soft stop.**

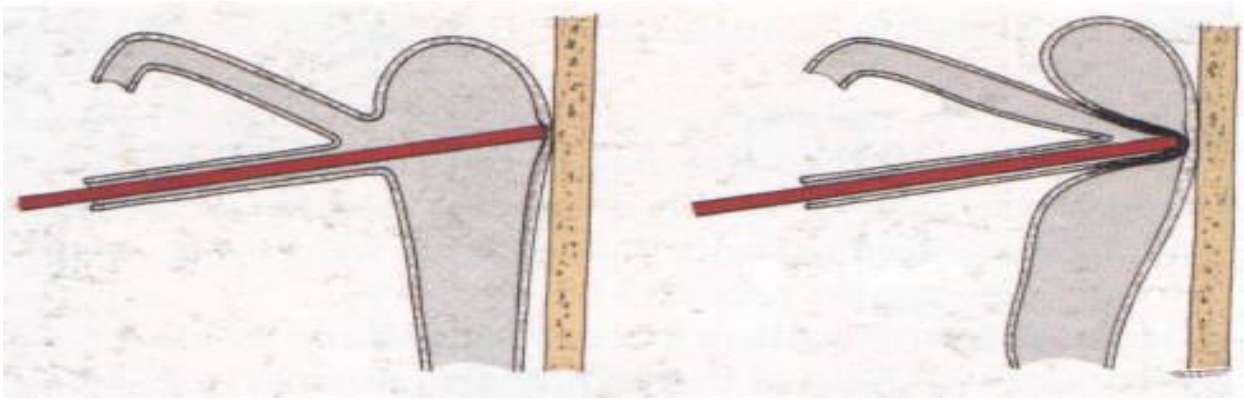
Hard stop

A hard stop occurs if the cannula touches the medial wall of the lacrimal sac and the lacrimal bone. This usually indicates that the lacrimal sac has been entered and excludes complete obstruction of the canalicular system.

Soft stop

A soft stop is a spongy feeling as the cannula presses the common canaliculus and the lateral wall against the medial wall of the sac. This indicates that the cannula has been prevented from entering the lacrimal sac by an obstruction in **the canalicular system.**

i



Acquired nasolacrimal duct obstruction

Acquired causes of nasolacrimal duct obstruction include
(1) **involutional stenosis in the elderly,**
(2) **naso-orbital trauma,**
(3) **chronic sinus disease**
(4) **dacryocystitis.**
Complete obstruction is treated by dacryocystorhinostomy (DCR). Incomplete obstruction may sometimes respond to intubation of the entire lacrimal system with silicone tubes or stents. This should only be performed if the tubes or stents can be passed easily, otherwise a DCR should be done.

Congenital nasolacrimal duct obstruction

DELAYED CANALIZATION
The nasolacrimal duct is the last portion of the lacrimal drainage system to canalize. At birth the lower end of the nasolacrimal duct is frequently non-canalized (usually near the valve of Hasner), but this is of no clinical significance because it becomes patent spontaneously during the first few weeks of life.

Clinical features

Presentation is within a few weeks of birth, with epiphora
Examination shows that gentle pressure over the lacrimal sac causes reflux of purulent material from the puncta. Other congenital causes of a watering eye include punctal atresia and fistulae between the sac and skin.

It is important to consider congenital glaucoma in all infants with a watering eye.

Treatment

1. **Massage** of the nasolacrimal duct increases the hydrostatic pressure and thereby ruptures the membranous obstruction. In performing this manoeuvre, the index finger is placed over the common canaliculus to block the exit of material through the puncta and then stroked downwards firmly to increase the hydrostatic pressure within the lacrimal sac. Ten strikes should be applied four times a day.

2. **Probing** overcomes the obstructive membrane at Hasner's valve. it should not be performed until the age of 12 months because spontaneous canalization occurs in about 95% of cases. Probing performed within the first 2 years of life has a very high success rate, but thereafter the success rate decreases. Probing should be carried out under a general anaesthetic. After the probing, saline should be irrigated through the nasolacrimal duct into the nose. Postoperative antibiotic drops are used four times a day for 1 week. If, after 6 weeks, there is no improvement, the probing should be repeated.

About 90% of children are cured by the first probing and a further 6% by the second. Failures are

usually the result of altered nasolacrimal duct anatomy, which can usually be recognized at the time of the initial probing by difficulty in passing the probe and subsequent inability to irrigate saline through the nasolacrimal duct into the nose. If symptoms persist despite two technically satisfactory probings, it may be necessary to perform a DCR between the ages of 3 and 4 years.

CONGENITAL DACRYOCELE

A congenital dacryocele (amniontocele) is a collection of amniotic fluid or mucus in the lacrimal sac caused by an imperforate Hasner's valve.

Presentation *is* perinatal with a bluish cystic swelling at or below the medial canthal area, accompanied by epiphora .

Examination shows a tense lacrimal sac which is initially filled with mucus but may become secondarily infected. A dacryocele should be differentiated from an encephalocele which is characterized by a pulsatile swelling above the medial canthal tendon.

Treatment *is* initially with massage. If this fails after 2 weeks then probing and irrigation are required.

Dacryocystitis

Infection of the lacrimal sac is usually secondary to a blockage of the nasolacrimal duct. It may be ***acute*** or ***chronic.***

Acute dacryocystitis

Presentation *is* with a sudden onset of a painful tense swelling at the medial canthus, associated with epiphora.

Treatment *is* initially with systemic broad-spectrum antibiotics and warm compresses. Irrigation and probing should not be carried out. If the sac is distended and filled with pus a stab incision through the skin may be necessary. Although a fistula may develop following this procedure, it is relatively rare. After the acute infection has been controlled, a DCR is usually necessary to relieve any permanent obstruction.
Presentation *is* with epiphora which may be associated with a chronic or recurrent unilateral conjunctivitis. The lacrimal sac develops into a mucocele and is filled with mucopurulent material which can be expressed by applying pressure over the sac.

Treatment *is* by DCR.

Expression of mucopurulent material by pressure over the lacrimal sac in a patient with a mucocele resulting from chronic dacryocystitis