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Evaluation of the Tearing Patient

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Patients with insufficient lacrimal drainage may present to the ophthalmologist with a complaint of tearing. This tearing may be unilateral or bilateral, intermittent or constant, isolated or associated with other ocular symptoms. Tearing may cause blurred vision, problems with contact lens wear, or annoyance with tears flowing down the cheek. Patients may also complain of a buildup of mucopurulent material in the medial canthus, leading to mattering of the eyes.

To correctly identify and treat the cause of tearing, it is helpful to first differentiate between hyperlacrimation (tear overproduction) and epiphora (decreased tear outflow).

Hyperlacrimation may be attributable to a variety of causes and must be ruled out before addressing any potential outflow problems. Causes of hyperlacrimation, listed in Table 6.1, include the general categories of supranuclear and infranuclear etiologies, reflex lacrimation, and direct lacrimal gland stimulation.[1–3]

Epiphora may be caused by problems at any point along the lacrimal outflow apparatus: punctum, canaliculus, lacrimal sac, lacrimal pump, nasolacrimal duct, and the valve of Hasner at the nasal opening of the nasolacrimal duct. Specific problems involving these areas are listed in Table 6.2.

History

When evaluating any patient presenting with a complaint of tearing, one should begin with a simple history and a clear understanding of the presenting complaint (Figure 6.1). Does the patient complain of "watery eyes" or of tears actually flowing down the cheek? One should inquire about the severity, duration, and frequency of the tearing, as well as any association with certain activities or conditions. The patient's ocular history, such as previous eye surgery, trauma, or topical medications used may provide clues to arriving at a diagnosis. Any associated symptoms that may assist in the diagnosis should also be elucidated. For instance, many older people with macular degeneration

TABLE 6.1. Causes of hyperlacrimation.

Supranuclear etiologies
Emotional distress
Central nervous system disorders
Infranuclear etiologies
Aberrant regeneration
Cerebellopontine angle tumors
Reflex lacrimation
Keratoconjunctivitis
Tear film abnormality
Direct lacrimal gland stimulation
Inflammation
Tumor

complain of "watery eyes," referring to the visual distortion they experience.

A patient who complains of chronic or intermittent irritation or who describes a burning or gritty feeling would likely have a tear film abnormality, such as meibomian gland dysfunction or keratoconjunctivitis sicca. A complaint of severe itching or a seasonal nature of the symptoms would suggest an allergic component. Presence of crusting or mucus may suggest meibomian gland dysfunction, allergy, or blepharitis. Purulence should cause one to consider nasolacrimal obstruction

TABLE 6.2. Causes of epiphora.

Punctal abnormalities
Stenosis
Ectropion
Lacrimal pump dysfunction
Orbicularis oculi weakness
Eyelid laxity
Eyelid retraction
Canalicular stenosis
Trauma
Canaliculitis
Topical medications
Chemotherapeutic agents
Herpetic disease
Lacrimal sac pathology
Dacryocystitis
Dacryoliths (Figure 6.4)
Neoplastic
Nasolacrimal duct obstruction
Involution
Traumatic
Neoplastic
Nasal disease
Allergy
Sinusitis
Neoplastic

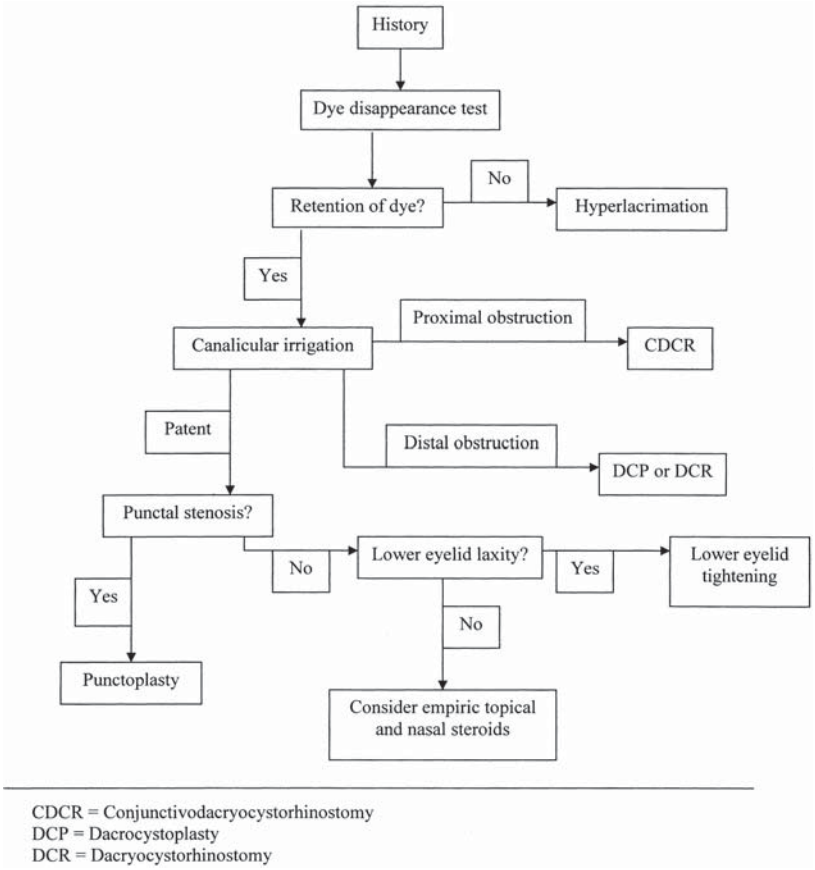

FIGURE 6.1. General approach to evaluation of a patient with excess tearing.

with dacryocystitis or conjunctivitis, whereas tearing in the presence of pain may suggest a dacryolith as the etiology.

Unilateral tearing would more likely be caused by a local irritant or lacrimal obstruction, although these conditions can occur in a bilateral manner. Bilateral tearing would be more consistent with allergy or a tear film abnormality. Punctal malposition or a dysfunctional lacrimal pump could present either unilaterally or bilaterally, depending on the etiology.

Ocular trauma can lead to tear film abnormalities, eyelid malposition, or lacrimal outflow obstruction. Chronic use of topical medications, such as pilocarpine, phospholine iodide, and idoxuridine, can result in punctal or canalicular stenosis.

Clinical Examination

The evaluation should begin by examining the eyelids and periocular structures. Any irregularity, swelling, or evidence of trauma should be noted. Close attention should be given to the medial canthal region for

focal swelling or erythema overlying the nasolacrimal sac, which would suggest dacryocystitis. In addition, any facial adenopathy should be noted, which may herald an undiagnosed head and neck malignancy.

One should assess for lid position and proper apposition against the globe. Inferior scleral show, lid retraction, entropion, or ectropion should be noted. Lid tone can be assessed with the distraction test, whereby the lower lid is pulled away from the globe. A normal distance for this test is less than 8 mm. Resiliency can be assessed with the snapback test, in which the lower lid is pulled downward and let go, allowing the lid to snap back against the globe in the normal eye (Figure 6.2). Abnormalities on any of these tests would suggest lacrimal pump dysfunction as an etiology. Orbicularis strength should be evaluated as well, because it also contributes to lacrimal pump function. One should ask the patient to gently close the lids and observe for lagophthalmos, which may lead to keratopathy-induced tearing.

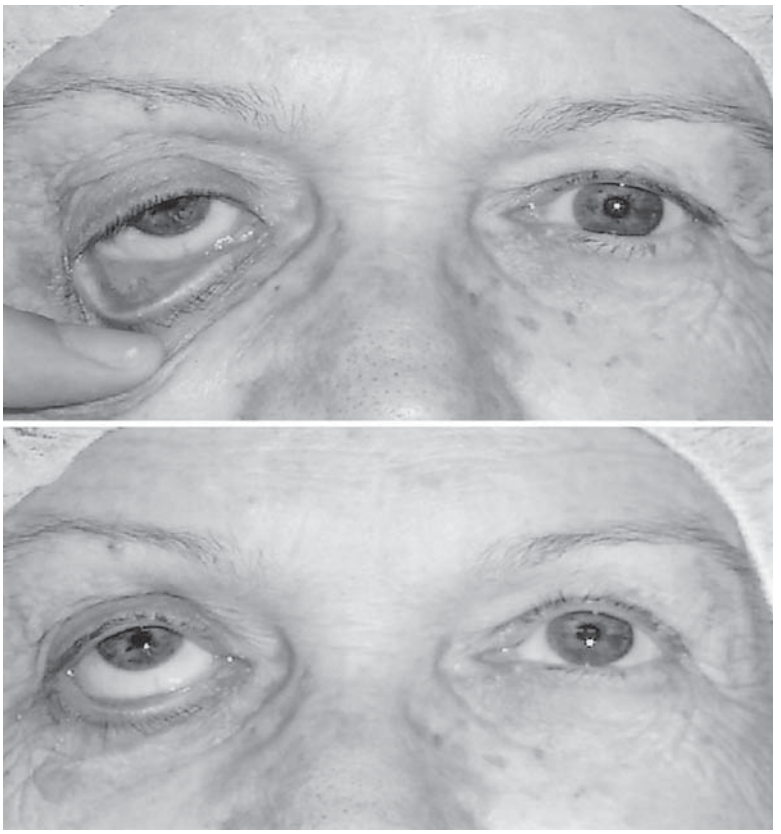

FIGURE 6.2. Snapback test. After inferior traction is applied to the lower lid **(A)**, it does not properly snap back against the globe when released **(B)** in this patient with lid laxity.

At the slit lamp, one should evaluate the puncta for patency and proper apposition against the globe. The lids should be further evaluated for meibomian gland inspissations and stigmata of blepharitis, and the quality and adequacy of the tear film should be noted. One should examine for trichiasis and associated keratopathy. Other corneal irregularities, defects, or keratitis, as well as conjunctival injection or a papillary reaction should be noted.

Schirmer I testing to measure total tear production can be performed by placing a filter paper strip around the lower lid margin and checking the length of wetting of the strip after 5 minutes. Alternatively, a reading at 1 minute can be multiplied by 3 as estimation. Normal wetting is greater than 10–15 mm. Schirmer II testing, which involves stimulation of the nasal mucosa after placing similar strips on the lids, can be used to further evaluate the reflex arc for tear production. Basal secretory rate can then be tested by reapplying the strips after applying an anesthetic to suppress reflex tearing. Normal basal rate is greater than 10–15 mm.

Fluorescein should be instilled in each cul-de-sac, and the cornea and conjunctiva again examined for punctate staining, which may suggest a dry eye syndrome or other surface disease. One should also measure the tear breakup time by observing the time to disruption of the tear film after the patient blinks. If this time is less than 10 seconds, the patient may have a relative deficiency of the mucin layer of the tear film.

The dye disappearance test is a very simple and useful tool. With the fluorescein already present, one can assess for a decrease or asymmetry in tear drainage by observing the amount of fluorescein remaining in each eye after about 5 minutes. A decrease in fluorescein clearance is nonspecific and is likely secondary to an anatomic or functional drainage abnormality (Figure 6.3). Although high false-positive rates exist with dye retention in the tear film, clearance of the dye makes nasolacrimal dysfunction very unlikely.

The Jones I or primary dye test involves an attempt to recover fluorescein from the nasal opening of the nasolacrimal duct just beneath the inferior turbinate. Lack of dye retrieval at 5 minutes, a negative test, heralds a nonspecific drainage abnormality and the Jones II or second-

FIGURE 6.3. Dye disappearance test. Fluorescein clears more slowly in the right eye of this patient.

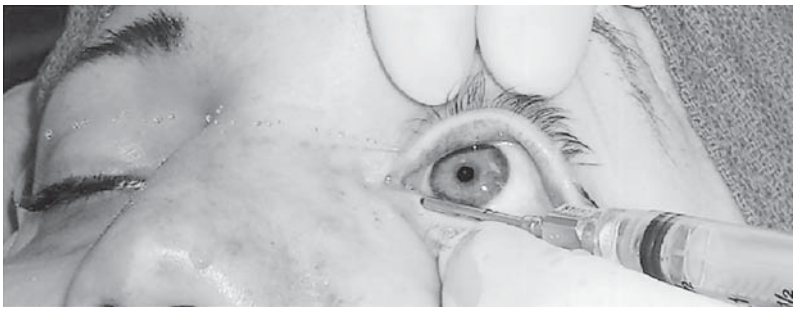

FIGURE 6.4. Canalicular irrigation. Saline is seen to reflux through the upper punctum when injected into the lower canaliculus in this patient with nasolacrimal duct obstruction.

ary dye test should be performed. This is done by injecting saline through the canalicular system at increased physiologic pressures after removal of any fluorescein remaining in the cul-de-sac. If no irrigant is retrieved from the nasal end, the patient has a nasolacrimal obstruction. Recovery of irrigant without fluorescein suggests that the patient has a functional obstruction proximal to the nasolacrimal sac, whereas the recovery of fluorescein suggests an obstruction distal to the sac allowing dye to pool there. Jones testing provides a significant number of false-positive and false-negative results and therefore is not routinely used.

One should use a nasal speculum to examine the nares for any mucosal swelling, tumors, or other anatomic abnormality in the vicinity of the inferior turbinate. Patients with allergy or sinusitis may develop mucosal thickening severe enough to occlude the nasolacrimal duct opening beneath the inferior turbinate. These patients may respond well to nasal steroids and antiallergy eye drops. Patients with a history of trauma or previous nasal surgery may have a deviated septum, which could narrow the opening as well.

Irrigation is the gold standard of nasolacrimal testing and can yield information to help determine if there is outflow obstruction. After an anesthetic drop is instilled, a punctal dilator is used to create a larger opening for a #23 lacrimal cannula or disposable anterior chamber cannula. Using a 3-cc syringe, saline is injected through this cannula, which is advanced through each canaliculus (Figure 6.4). A 3-cc syringe is preferred because a 10-cc syringe provides too much resistance to appreciate partial obstruction, whereas a 1-cc syringe provides too little resistance. If saline cannot be passed or refluxes through the same punctum entered, the patient has an obstruction of the canaliculus tested. This result is usually associated with moderate discomfort. If saline refluxes through the opposite punctum, the patient has an obstruction distal to the common canaliculus or nasolacrimal sac (Figure 6.5). If saline passes without difficulty into the patient's nose and throat, the nasolacrimal system is anatomically patent. A patient can have a partial obstruction that allows some saline to pass into the

throat with a degree of resistance noted during the procedure. If irrigation demonstrates adequate outflow in the presence of a positive dye disappearance test or delay of irrigant reaching the nose, a functional abnormality may be present. This situation may be the result of a dilated nasolacrimal sac and/or lacrimal pump failure.

One can additionally use the lacrimal cannula, or alternatively a lacrimal probe, to advance nasally within the canaliculus toward the nasolacrimal sac and lacrimal fossa. If reflux occurred but the cannula can be advanced freely to encounter a hard stop against the bony wall of the lacrimal fossa, then a more distal obstruction should be suspected. However, if the cannula cannot reach bone and seems to get caught up on soft tissue to encounter only a soft stop, then obstruction within the canaliculus tested or common canaliculus would be present. In the latter case, the medial canthus can be seen to drag nasally as the cannula pushes against the soft tissue complex as opposed to passing through it.

General Approach

Evaluation of the tearing patient begins with a history to elucidate the nature of the patient's complaint and obtain additional clues to the etiology. One should determine if the patient has true epiphora, using the dye disappearance test and observing the tear meniscus. Any causes of hyperlacrimation, such as keratitis or tear film abnormality, should be ruled out or treated. The outflow system should then be evaluated with irrigation. If obstruction is encountered, dacryocystoplasty, dacryocystorhinostomy, or conjunctivodacryocystorhinostomy should be considered as indicated for the site and degree of obstruction. If anatomically patent, one should consider treatment of rhinitis, repair of punctal stenosis, or horizontal lid tightening as indicated. Additionally, imaging studies may be used when the diagnosis is uncertain or when tumefaction is suspected.

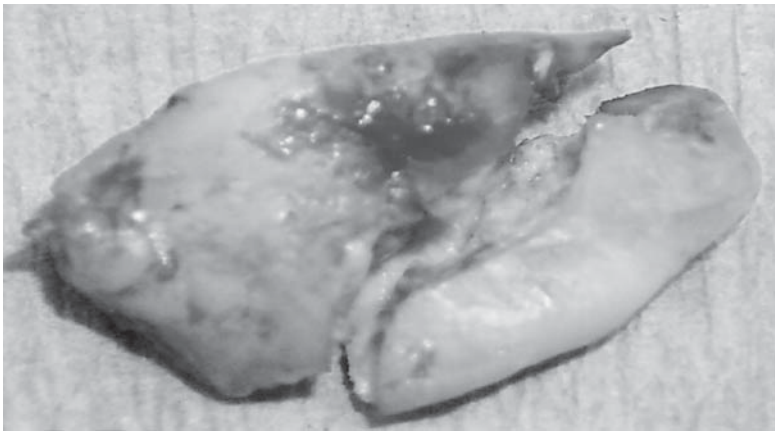

FIGURE 6.5. Dacryoliths removed from a patient with tearing and pain.

As the evaluation is performed, it should be remembered that patients may have multiple causes of their tearing. The tearing patient with blepharitis may also have a partial nasolacrimal duct obstruction. One needs to determine whether the patient's tearing is primarily the result of ocular surface disease or outflow obstruction. Only after performing the complete examination can one decide on the best course for management. If the etiology is unclear, conservative treatment is usually recommended before surgical intervention.

References

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