7.12.4. Lacrimal System: Acquired Lacrimal Drainage Obstruction (I)

Examination

History

- 2 groups
  - 1 hypersecretion of tears (lacrimation)
  - 2 impairment of drainage (epiphora)
- questions
  - constant versus intermittent tearing
  - periods of remission versus no remission
  - unilateral versus bilateral condition
  - subjective ocular surface discomfort
  - history of allergies
  - use of topical medications such as glaucoma drops
  - history of probing during childhood
  - prior ocular surface infections such as conjunctivitis or herpes simplex
  - prior sinus disease or surgery, midfacial trauma, or nasal fracture
  - previous episodes of lacrimal sac inflammation
  - clear tears versus tears with discharge or blood
  - blood in the tear meniscus may indicate malignancy

Pseudoepiphora evaluation

- pseudoepiphora: reflex hypersecretion of tears (lacrimation) caused by ocular surface irritation
- Tear meniscus
  - size of lacrimal lake
  - presence of precipitated proteins and stringy mucus
- **Tear breakup time**
  - fluorescein is placed in conjunctival cul-de-sac
  - patient is asked to open his/her eyes and refrain from blinking
  - examine tear film using a broad beam of slit lamp
  - normal: ≥ 10 seconds
  - <10 seconds may indicate poor function of mucin or meibomian layer despite a sufficient amount of tears
- Evaluation of corneal and conjunctival epithelium
  - topical rose bengal and lissamine green: stain devitalized conjunctival/corneal epithelium
  - topical fluorescein: stains lost conjunctival/corneal epithelium; indicates more severe tear film malfunction
- **Basal tear secretion**
  - topical anesthetic
  - inferior cul-de-sac is dried
  - Schirmer strip is bent at the notch and placed with the short end resting on the conjunctiva and the fold crease on the eyelid margin: at the lateral one-third of the lower eyelid
  - strip is left in place for 5 minutes
  - amount of wetting is recorded
  - normal: ≈10–15 mm
  - rapid saturation of strip signifies hypersecretion: excess secretion may occur in response to irritation from the measuring strips themselves; serial testing should be performed to confirm this assumption
  - Schirmer I and Schirmer II tests
    - **Schirmer I test**: like basal tear secretion test, but no topical anesthetic is used; to evaluate both basic and reflex tearing
    - **Schirmer II test**: to distinguish between fatigue block (when reflex secretion is suppressed because of chronic irritation) and a lack of function of the reflex secretors; no anesthetic; tear strip in place: cotton-tipped applicator is placed in the nostril and moved back and forth for 2 minutes
    - reserved for special diagnostic circumstances
- Corneal irritation
  - trichiasis
  - entropion
  - allergy
  - chronic infection
  - contact lens–related disease such as giant papillary conjunctivitis

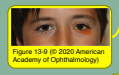
Lacrimal outflow examination

- eyelid
  - malposition
    - tears might not reach the puncta
    - slit-lamp examination during blink cycle
  - weak/incomplete blink
    - poor lacrimal pump function
    - etiology: facial nerve dysfunction
- conjunctiva/caruncle
  - enlarged caruncle: mechanical blockage of punctum
  - conjunctivochalasis: mechanical blockage of punctum
- punctum: stenosis, occlusion, aplasia
- lacrimal sac: reflux of mucoid or mucopurulent material with pressure on a distended lacrimal sac; confirms complete NLDO; no further diagnostic tests are needed if a lacrimal sac tumor is not suspected
- nose
  - intranasal tumor
  - turbinate impaction
  - chronic allergic rhinitis

Diagnostic tests

dye disappearance test (DDT)

- technique
  - instill fluorescein into the conjunctival fornices of each eye
    - drop of sterile 2% fluorescein solution
    - moistened fluorescein strip
  - observe tear film with cobalt blue filter of slit lamp x 5 min
    - persistence of significant dye: indicate an obstruction
    - asymmetric clearance of dye: indicate an obstruction
- If DDT result is normal, severe lacrimal drainage dysfunction is highly unlikely
  - intermittent causes of tearing, such as allergy, dacryolith, or intranasal obstruction, cannot be ruled out
- Schirmer tests are also read at 5 minutes
- to assess presence or absence of adequate lacrimal outflow
  - especially in children
  - especially in unilateral cases
  - lacrimal irrigation is impossible without deep sedation!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Jones I test

- primary dye test
- instill fluorescein into conjunctival fornices
- recover it in inferior nasal meatus by passing a cotton-tipped applicator into nose
  - at 2 and 5 minutes

Jones II test

- following an unsuccessful Jones I test
- flush residual fluorescein from conjunctival sac with clear saline
- irrigate lacrimal system with clear saline using a cannula inserted into the canalicular system
  - clear solution suggests that tears never entered lacrimal outflow system
  - fluorescein-stained irrigant indicates partial obstruction

lacrimal drainage system irrigation

- most frequently performed immediately after DDT
- determines level of lacrimal drainage system occlusion
- tachnique
  - instill topical anesthesia
  - lower eyelid punctum is dilated and any punctal stenosis is noted
  - irrigating cannula is placed in canalicular system
    - maintain lateral traction of the lower eyelid
    - canalicular stenosis or occlusion should be recorded and confirmed by subsequent diagnostic probing
  - once irrigating cannula has been advanced into horizontal canaliculus, clear saline is injected
- interpretation
  - difficulty advancing irrigating cannula and inability to irrigate fluid: total canalicular obstruction
  - saline can be irrigated but it refluxes through upper canalicular system with no palpable distension of lacrimal sac: complete blockage of the common canaliculus
    - probing determines whether common canalicular stenosis is total or whether it can be dilated

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  - mucoid material or fluorescein refluxes through the opposite punctum and lacrimal sac distension is palpable: complete NLDO
  - no canalicular reflux or fluid passing down the NLD but lacrimal sac become distended, causing patient discomfort: complete NLDO
    - functional valve of Rosenmüller, preventing reflux through the canalicular system
  - simultaneous saline reflux through the opposite canaliculus and saline irrigation through the NLD: partial NLDO
  - saline irrigation passes freely into the nose with no reflux through the canalicular system: patent nasolacrimal drainage system
    - a functional obstruction may still be present
    - dacryolith may also impair tear flow without blocking irrigation

Figure 13-10

diagnostic probing

- topical anesthesia
- small probe (size 00): to detect any canalicular obstruction
  - probe is clamped at punctum before withdrawal, thereby measuring distance to obstruction
  - larger probe may be useful to determine extent of a partial obstruction
  - probe should not be forced through any area of resistance
- upper system (puncta, canaliculi, and lacrimal sac)
- diagnostic probing of the NLD has no place in adults
  - there are other means of diagnosing NLDO
  - probing in adults has limited therapeutic value
    - unlike infants: NLDO in infants results from occlusion by a thin membrane
    - NLDO in adults results from extensive fibrosis of duct itself

intranasal examination

- nasal speculum and light source
- diagnostic nasal endoscopy

contrast dacryocystography

- dye injection into lacrimal system followed by computerized digital subtraction imaging
- anatomical information

dacryoscintigraphy

- radionucleotide eyedrops to follow tear flow
- physiologic information

CT and MRI

- indications
  - craniofacial injury 1
  - congenital craniofacial deformities 2
  - suspected neoplasia 3
- fractures: CT is superior for the evaluation of suspected bony abnormalities
- malignancy: MRI is superior for the evaluation of suspected soft-tissue disease
- CT or MRI may be helpful in evaluating concomitant sinus or nasal disease

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