Part I

Evaluation of Nasolacrimal Duct Obstruction
Anterior and posterior lacrimal crests

Lacrimal-maxillary suture
Nasolacrimal Duct Obstructions

- Involutional stenosis
- Chronic sinus disease
- Dacryocystitis
- Naso-orbital trauma
- Granulomatous disease
Causes of Tearing
Congenital Tearing

- Constant tearing with no mucopurulence suggests upper system blockage, punctal or canalicular dysgenesis
- Constant tearing with mucopurulence suggests complete NLDO
- Intermittant tearing with mucopurulence suggests nasal turbinate / mucosal abnormalities associated with URI
- Pressure on sac is the most important diagnostic maneuver
Dacryocystocele

- Amniotic fluid trapped in lacrimal sac with NLDO
- May respond to massage +/- topical abx
- Often requires probing of the system
- Beware of encephalocele
- Beware of bilateral process impinging on lateral nasal walls with partial breathing obstruction
Congenital NLDO

- Usually caused by membranous block at valve of Hasner
- 90% resolve in first year of life
- Probing usually is curative
- Controversy on when to probe
- Refractory cases need silicone intubation
- DCR if no success by mid childhood
Acquired Tearing

- Ocular surface irritation with hypersecretion
  - Dry eye with reflex hypersecretion
  - Poor tear quality
- Outflow obstruction
  - Punctal or canalicular obstruction
  - NLD obstruction
  - Eyelid or punctal malposition
  - Pump failure, laxity
- Primary idiopathic hypersecretion
Canalicular Obstruction

- “soft stop” on probing
- Trauma, toxic medications (5-FU, docetaxel, ioxuridine, PI, eserine), viral infection, OCP, Stevens-Johnson
- Conjunctivodacryocystorhinostomy with Jones tube may be required in symptomatic cases
Canaliculitis

- Most common organism: *Actinomyces israelii* (g+ rod)
- Erythematous, dilated, “pouting” punctum
- Grating sensation with probing
- Canaliculotomy is performed to remove concretions
- Appropriate antibiotics (Penicillin drops)
Acute Dacryocystitis

- Usually associated with complete NLDO causing stasis
- Can lead to conjunctivitis, mucocele formation, orbital cellulitis
- Oral Antibiotics
- Warm compresses
- Avoid P&I
- I&D may be necessary
- Almost always necessitates a DCR
Dacryolythys

- Lipid with or without calcium, shed epithelial cells, debris
- May be painful
- Visible with dacryocystography
- Should be removed with DCR
Lacrimal Sac Neoplasms

- A rare entity
- May have palpable mass
- May have partial or complete NLDO
- Bloody tears or reflux are worrisome signs
- 45% benign, 55% malignant
- Squamous cell papillomas and carcinomas are most common
5 minute dye disappearance test
Canaliculus Irrigation Test

- Topical anesthetic
- Blunt cannula is passed into the punctum and canaliculus
- Assess quality of passage through canaliculus
- Irrigate into lacrimal sac
<table>
<thead>
<tr>
<th>Pharynx</th>
<th>Reflux</th>
<th>Nasolacrimal System</th>
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</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td>Normal</td>
</tr>
<tr>
<td>Yes</td>
<td>Upper</td>
<td>Partial Obstruction of NLD</td>
</tr>
<tr>
<td>No</td>
<td>Upper</td>
<td>If mucoid d/c obstr. distal to sac</td>
</tr>
<tr>
<td>No</td>
<td>Lower</td>
<td>If clear fluid obstr. distal to c.c. or i.c.</td>
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</tbody>
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Dacryocystography

- Irrigation of lacrimal system with contrast material
- Serial radiography
- Useful for demonstrating stenosis, intrinsic or extrinsic mass, fistula, diverticulum
PART II

Techniques of endoscopic dacrycystorhinostomy
Advantages of Endoscopic and LaserEndoDCR vs. External DCR

- Absence of external incision
- Minimal edema and ecchymosis
- Acceptable success rate
- Ability to perform surgery on acute dacryocystitis
Disadvantages of Non Laser Assisted Endoscopic DCR (compared to external approach)

- Requires knowledge of nasal anatomy
- Requires skill in endoscopy and sinus surgical instrumentation
- Moderately steep learning curve
- Hemostasis is (even more!) critical
Advantages of Endo-DCR versus Laser DCR

- Easy creation of larger bone window
- Decreased equipment cost
- Ability for better lacrimal sac inspection
- Increased success rate (to date)
Patient Selection

- Preoperative intranasal endoscopy
  - Deviated nasal septum – compromise access
  - Distance between lateral nasal wall/septum
- Avoid patients on aspirin, heparin, coumadin
  - This is where L-EndoDCR shines!
Endoscopic DCR

- Nasolacrimal duct
- Middle turbinate
- Inferior turbinate
- Uncinate process
- Bulla ethmoidalis
Normal Surgical Intranasal Anatomy

- Middle turbinate
- Inferior turbinate
- Mucosa & bone overlying lacrimal fossa
Endoscopic DCR

- Middle turbinate
- Inferior turbinate
- Uncinate process
- Bulla ethmoidalis
Endoscopic DCR

- Uncinate process
- Blakesley forceps
Endoscopic DCR

- Mucosa & bone overlying the lacrimal sac
- Edge of lacrimal fossa bone
Endoscopic DCR

- Nasal mucosa
- Guarded monopolar cautery tip
Endoscopic DCR

- Edge of bone
- Bone overlying lacrimal sac
Endoscopic DCR

- Bone overlying lacrimal sac
- Kerrison rongeur
Endoscopic DCR

- Bowman probe
Endoscopic DCR

- Lacrimal sac mucosa
- Sickle knife
Endoscopic DCR

- Lacrimal sac flap
- Silasting tubimg
Transcanalicular Diode Laser
DCR
Several attempts to use various lasers have been reported over the last 15 years:

- 1993 Reifler: Potassium titanyl phosphate
- 1994 Piaton: Neodymium:YAG
- 1996 Dutton: Holmium:YAG
- 2001 Caversaccio: Erbium:YAG
- 2002 Piaton: Diode
The Good News- Diode Laser DCR

- Fast
- Efficient
- Minimal trauma
- Great hemostasis
  - Perfect choice for patients on warfarin, ASA, oral anticoagulants
- Shorter learning curve
The Bad News

- Decrease success rate compared to other techniques
  - 86% at one month
  - 77% at 6 months
  - 74% at 12 months (compared with ~90% for non-laser Endo DCR)
- This is without any antimetabolite treatment
Transcanalicular endoscopic laser dacrycystorhinostomy

- Packing of nose: gauze soaked in 4% cocaine (or 4% lidocaine with oxymetazoline) placed primarily under middle turbinate for 5 minutes and removed
Transcanalicular endoscopic laser dacrycystorhinostomy

- Injection of 50:50 mixture of 2% lidocaine and 0.5% marcaine with epinephrine to middle turbinate, uncinate process, lateral nasal wall. Repack nose with 4% cocaine for 5 minutes.
Transcanalicular endoscopic laser dacrycystorhinostomy

- Under endoscopic visualization, infracture of middle turbinate performed if necessary
Transcanalicular endoscopic laser dacrycystorhinostomy

- Superior and inferior puncta dilated and diode laser fiber passed through lower puncta, through canalicular system to hard stop
Transcanalicular endoscopic laser dacrycystorhinostomy

- Endoscope placed with light source then lowered to visualize aiming beam of laser. Osteotomy created using continuous wave @ 10 W then lowered to 5-8 W.
Transcanalicular endoscopic laser dacrycystorhinostomy

- Debridement of tissue or mechanical removal of excess tissue/uncinate process can also be performed if necessary with Takahashi forceps type instrument.
Transcanalicular endoscopic laser dacrycystorhinostomy

- Passage of Crawford silicone tubes through superior and inferior canaliculi
Transcanalicular endoscopic laser dacrycystorhinostomy

- Retrieval of Crawford tubes under endoscopic visualization with Crawford hook
Transcanalicular endoscopic laser dacrycystorhinostomy

- Crawford tubes tied in single square knot and then sutured to nasal mucosa of lateral nasal wall with 6-0 vicryl
On the Horizon

- Canalicular endoscopy
- Current literature suggest decreased success compared to Endo-DCR
  - Different techniques to improve success are under investigation
- Increasing number of patients on anticoagulation
  - Mounting literature exposing risk of stopping anticoagulation
  - Need for better techniques to care for patients that cannot discontinue anticoagulation
Antimetabolite/anti-inflammatory treatment

- Agents include
  - Mitomycin C
  - 5 Fluorouracil
  - Triamcinolone or other corticosteroid

- Method of administration
  - Intraoperative topical application
  - Intraoperative injection
  - Postoperative application (fluticasone nasal spray)
Adjuvant Techniques

- Silicone stents or other spacers
- Postoperative debridement
References

Evan H. Black, MD
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