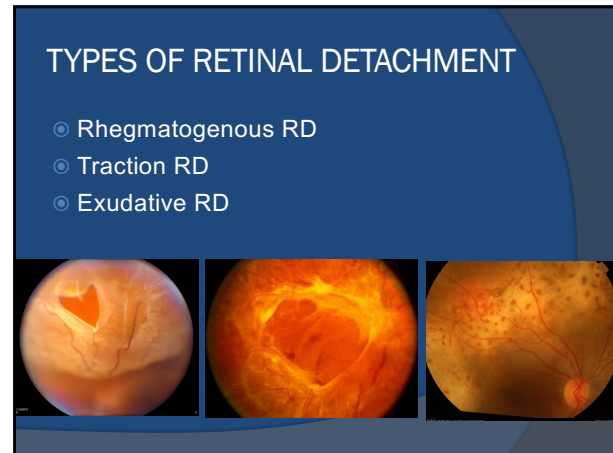
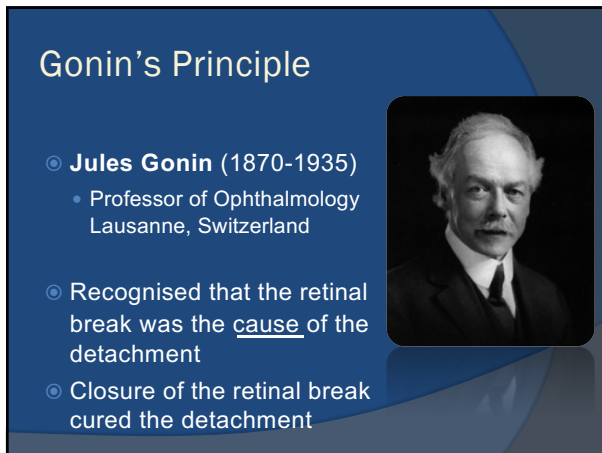




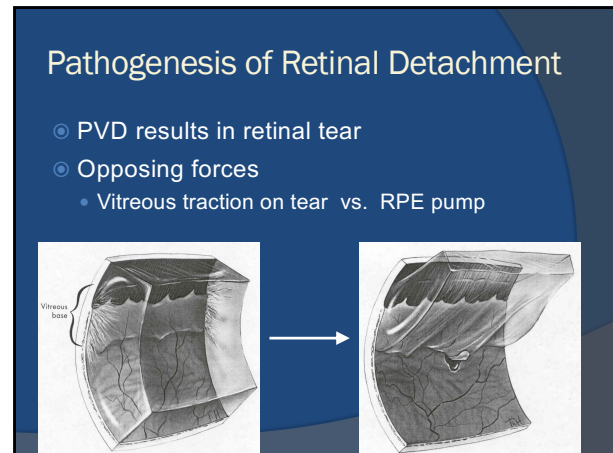
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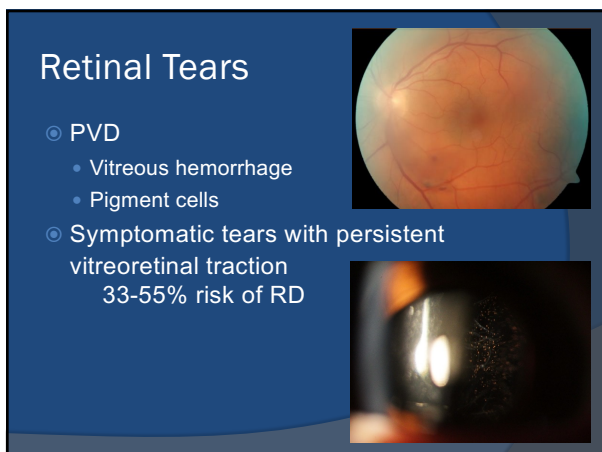
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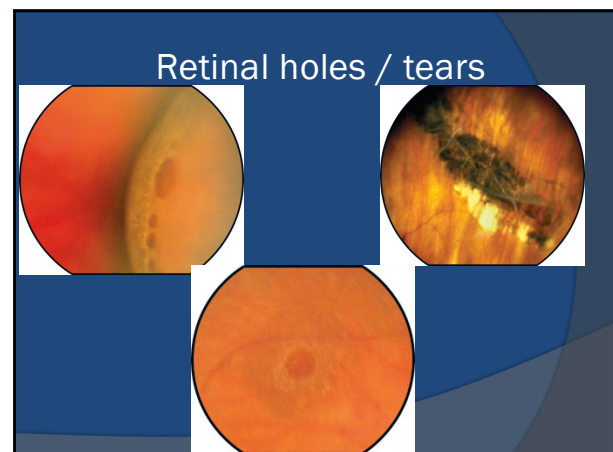
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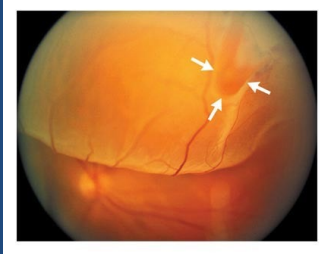
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6

Pathogenesis of Retinal Detachment

- ◉ If vitreous traction overwhelms RPE pump
- ◉ Liquid vitreous migrates through tear into subretinal space



7

Retinal Detachment

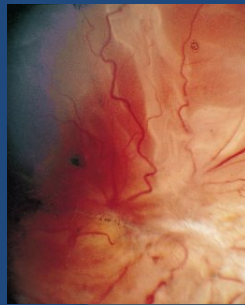
- ◉ Macula status
- ◉ Acute vs Chronic
- ◉ Status of posterior hyaloid
- ◉ Location of tear
- ◉ Type of tear
- ◉ PVR



8

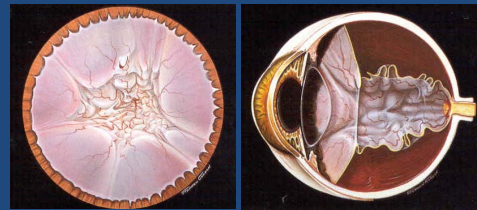
Proliferative Vitreoretinopathy (PVR)

- ◉ Retinal traction / detachment due to proliferative cells that contract on retinal surface and vitreous
- ◉ Folds
- ◉ Stiff retina
- ◉ Retinal shortening



9

Total RD with Massive PVR



10

Repair of Retinal Detachment

- ◉ Pneumatic Retinopexy
- ◉ Scleral buckle
- ◉ Vitrectomy ± scleral buckle

Least
invasiveMost
invasive

11

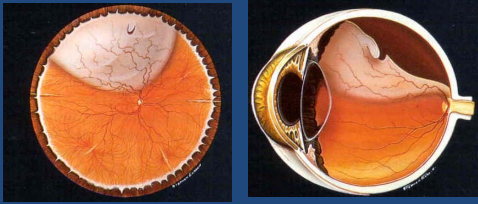
Pneumatic Retinopexy

Indications

RD with superior breaks
Breaks between 9-3 o'clock
Tear(s) within 2 clock hrs
No PVR
No significant media opacity (corneal scar, cataract, VH, etc) limiting 360° peripheral exam

12

RD with Superior Retinal Break



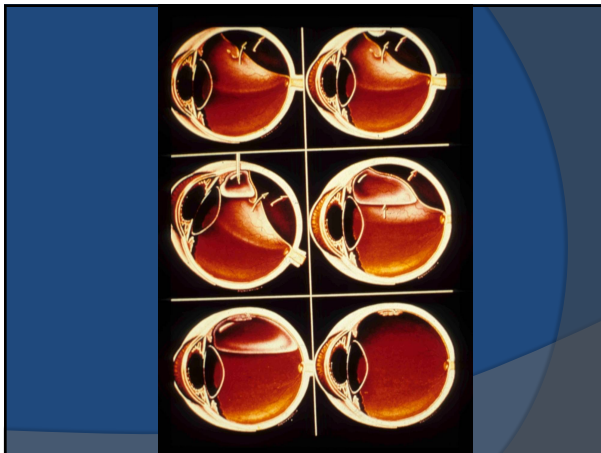
13

Pneumatic Retinopexy

● Mechanism of RD Repair

- Surface tension of gas bubble closes tear
- RPE pumps out subretinal fluid

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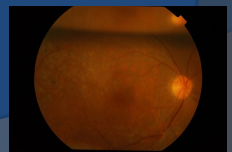


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Pneumatic Retinopexy

● Advantages

- Least invasive procedure
- Performed in outpatient setting
- Good success rate with proper patient selection
 - Phakic: 70%
 - Pseudophakic 60%



16

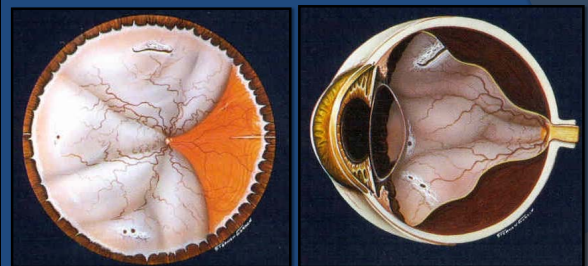
Pneumatic Retinopexy

● Disadvantages

- Requires proper patient positioning
- Gas bubble may result in shifting of subretinal fluid and formation of new retinal breaks

17

RD with Superior and Inferior Breaks



18

Scleral Buckle

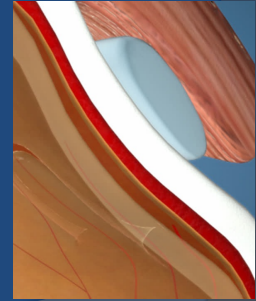
Indications

RD with inferior +/- superior breaks
Grade 0-II PVR

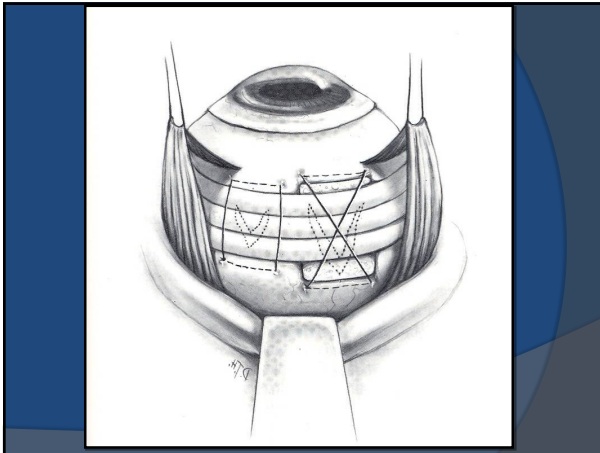
19

Scleral Buckle

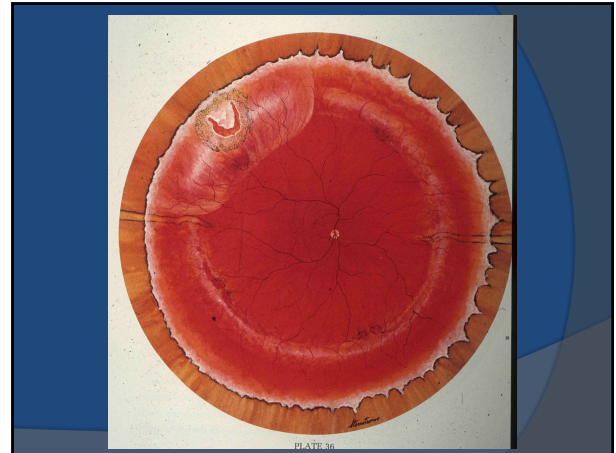
- Mechanism of RD Repair
 - Tear(s) is supported by indentation produced by explant
 - Explant results in indirect release of vitreous traction on tear(s)



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21



22

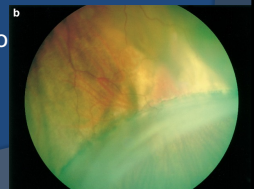
Scleral Buckle Advantages

- External procedure
 - No vitreous invasion
 - No PVR stimulus
- No intravitreal gas complications
 - Cataract progression
 - Concerns regarding air travel
 - Gas expansion and elevated IOP
- Faster visual rehabilitation
- Primary reattachment rate: 90-95%

23

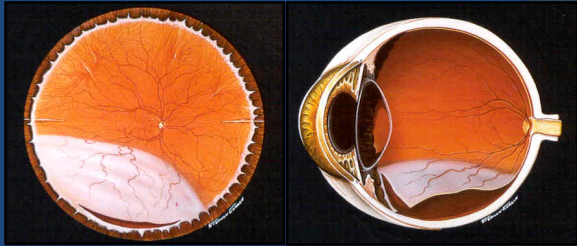
Retinal Dialysis

- Disease of young males
- Disinsertion of retina at the ora serrata
- Most commonly located in inferotemporal quadrant
- Vast majority secondary to blunt trauma (fist or ball)



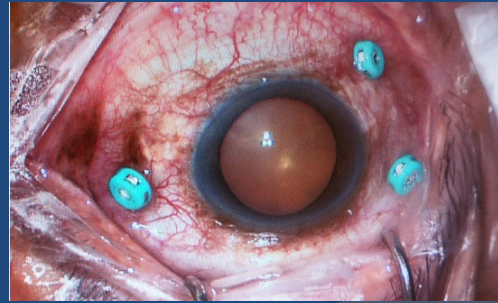
24

Retinal dialysis RD



25

Pars Plana Vitrectomy



26

Vitrectomy Advantages

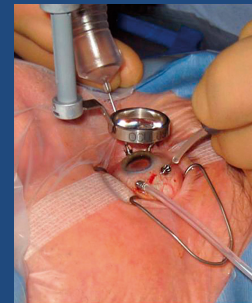
- Remove traction from inside the eye
- Transconjunctival sutureless small gauge surgery
- No refractive changes
- Can address surface pathology
- Remove media opacities
- Less time / faster recovery



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Vitrectomy Disadvantages

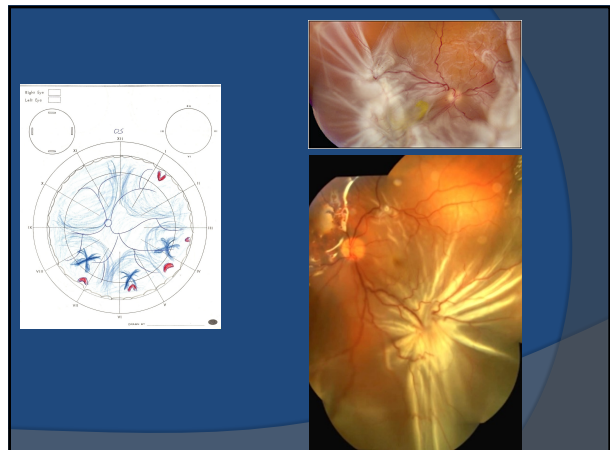
- More invasive procedure
- cataract progression
- Longer visual rehabilitation with use of intraocular gases (SF6, C3F8)



28

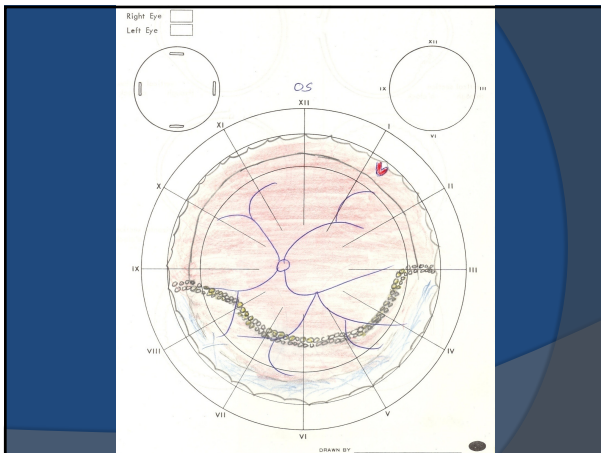
Vitrectomy ± Scleral Buckle

- Mechanism of RD Repair
 - Vitrectomy results in DIRECT release of vitreous traction on tear(s)
 - Indentation of scleral explant results in INDIRECT release of vitreous traction on tear(s)

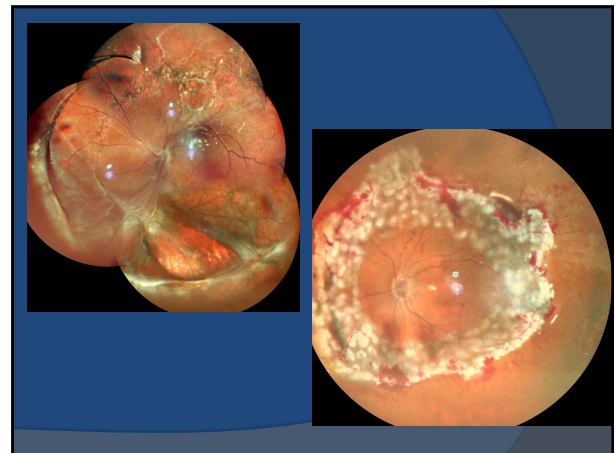


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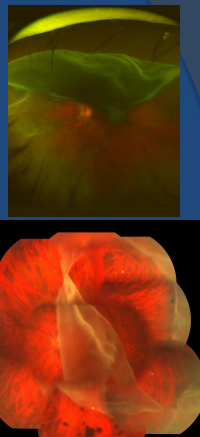
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32

Giant Retinal Tear

- Defined as peripheral break extending through ≥ 90 degrees of retinal circumference
- Vitreous is attached to the anterior flap thereby allowing independent mobility of the posterior edge of tear

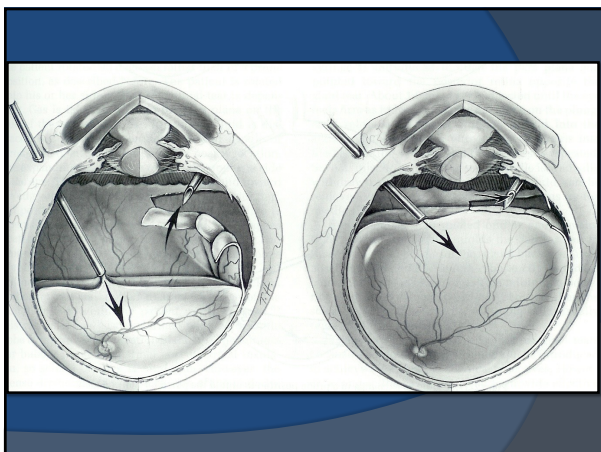


33

Giant Retinal Tear



34



35

Dr. RaShawn Venerable

Specialty Eye Institute

The Ins and outs of the Nasal Lacrimal Duct

1

Financial disclosure

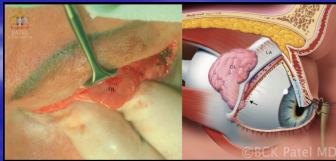
- No financial conflicts to disclose.

2

ANATOMY AND PHYSIOLOGY OF THE LACRIMAL SYSTEM SECRETORY APPARATUS:

■ LACRIMAL GLAND

- Levator aponeurosis (lateral horn of the levator) divides the gland into an orbital and palpebral lobe. Lacrimal ducts (8-12) empty into superior cul-de-sac 5mm above lateral tarsal border. Ducts from the orbital portion run through palpebral lobe—cannot remove palpebral lobe without damaging all the ducts! Therefore, biopsies should be performed on orbital portion.

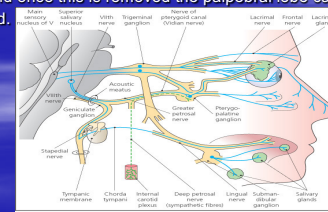


3

ANATOMY AND PHYSIOLOGY OF THE LACRIMAL SYSTEM SECRETORY APPARATUS:

■ LACRIMAL GLAND

- Afferent pathway: TRIGEMINAL (V) NERVE. Efferent pathway: FACIAL (VII) NERVE. The nerve travels through the orbital lacrimal gland and once this is removed the palpebral lobe cannot be activated.



4

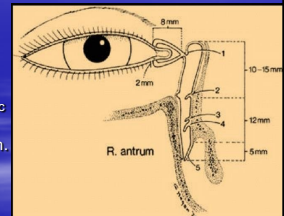
■ ACCESSORY LACRIMAL GLANDS OF KRAUSE AND WOLFRING: Located in the superior cul-de-sac.

- Basic secretors: no efferent nerve supply.
- TEAR FILM
 - Inner layer: mucin from the conjunctival goblet cells.
 - Middle aqueous layer: main and accessory lacrimal glands.
 - Outer oily layer: Meibomian glands.

5

LACRIMAL EXCRETORY APPARATUS

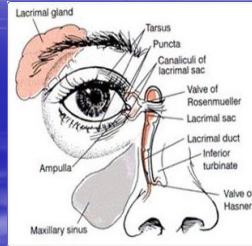
- PUNCTA should be inverted against the globe.
- CANALICULI: Ampullae 2mm - vertical. Horizontal course - 8-10 mm. 90%: upper and lower join forming common canaliculus.
 - Rosenmuller's valve at lacrimal sac entrance prevents reflux from the sac into the canaliculi.
- LACRIMAL SAC: 10mm in length. Lies between anterior and posterior crus of medial canthal tendon within the lacrimal sac fossa



6

LACRIMAL EXCRETORY APPARATUS

- **NASOLACRIMAL DUCT:** 12mm long. Drains into the inferior meatus. Ostium covered by mucosal fold:
- **VALVE OF HASNER,** Child: 20mm from external nares. Adult: 30mm from external nares.

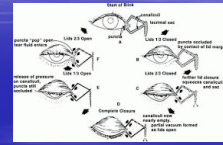


7

LACRIMAL PUMP

■ PRETARSAL AND PRESEPTAL ORBICULARIS ARE KEY PLAYERS.

- **EYELIDS CLOSE** Superficial and deep heads of pretarsal orbicularis contract. Compress the ampulla. Shorten the horizontal canaliculus. Punctum moves medially. Superficial and deep heads of preseptal orbicularis contract. Pull lacrimal fascia laterally. Lacrimal sac expands: creating negative pressure. Fluid drawn from canaliculi into the sac.
- **EYELIDS OPEN** Muscles relax. Sac collapses; tears are forced into the nose. Punctum moves laterally and tears enter canaliculi.



8



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10

LACRIMAL EVALUATION

- **Cause of tearing**
 - Hyper secretion of tears
 - Impaired drainage
 - **HISTORY** Constant vs. intermittent Unilateral vs. bilateral Any ocular discomfort
 - Previous lacrimal, sinus, or facial surgery or trauma
 - Are tears clear or contains blood or discharge
 - Any topical medications
 - **EXAM** includes -ocular surface -tear film -eyelid position -punctal opening and position -lacrimal sac

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EXCRETORY TESTS

- **DYE DISAPPEARANCE TEST**
 - Excellent test for children! Fluorescein instilled in both cul-de-sacs. Tear film observed with or without cobalt blue light. Asymmetry over a five-minute period: relative obstruction on the side retaining the dye. Etiology not determined, could be due to lid malposition, a poor tear pump, punctal stenosis, canalicular obstruction, or nasolacrimal duct obstruction.

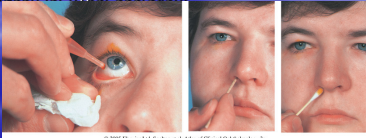


12

EXCRETORY TESTS

PRIMARY DYE TEST

- JONES 1-(33% false negatives) Fluorescein is instilled in conjunctival cul-de-sac. Recover from inferior meatus with cotton-tipped probe. Have patient blow nose. If no dye recovered, there is an anatomic or functional block.
- No dye=Negative test
- If dye recovered in a patient with epiphora look for ocular reason for hyper secretion.

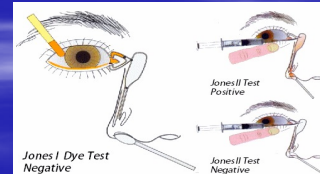


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EXCRETORY TESTS

SECONDARY DYE TEST - JONES 2

- After JONES 1 test wash out dye from the fornices. Irrigate lacrimal sac with saline;
- 1. Positive Dye recovered from nose indicates incomplete or functional block in nasolacrimal duct. (Positive Jones 2)
- 2. No Dye recovered from nose, but unstained fluid recovered indicates defect in canaliculi or pump. (Jones 2 Negative)

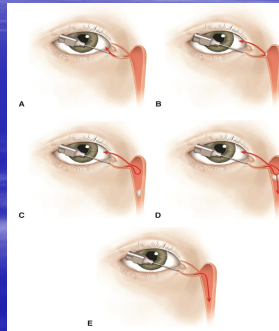


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EXCRETORY TESTS

LACRIMAL IRRIGATION

- most commonly used test to evaluate system irrigation thru system doesn't r/o functional block

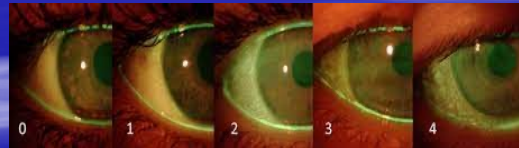


15

SECRETORY TESTS

TEAR FILM EXAMINATION

- Tear meniscus: the size of the lake, presence of precipitated proteins and stringy mucus may indicate abnormal tear film.

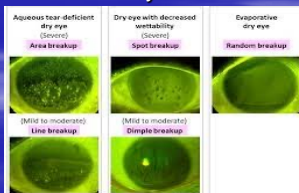


16

SECRETORY TESTS

TEAR FILM EXAMINATION

- Tear break up time: After a fluorescein strip is moistened by tears the patient is asked not to blink. Tear break-up of less than 10 seconds indicates poor function of the mucin layer.



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SECRETORY TESTS

TEAR FILM EXAMINATION

- Corneal evaluation with rose bengal, fluorescein or Lissamine green staining.



Lissamine green dye has a staining profile similar to that of rose bengal and may cause less ocular irritation.

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SECRETORY TESTS

SCHIRMER TESTS

BASIC SECRETION

- SCHIRMER TEST Reflex secretion is eliminated by anesthetizing the conjunctiva and blotting the inferior cul de sac dry. 10 mm or more is considered normal. Good test for ptosis and blepharoplasty patients.

- SCHIRMER 1 Measures both basic and reflex secretion. No topical anesthesia is used. Normal: 10-30mm.

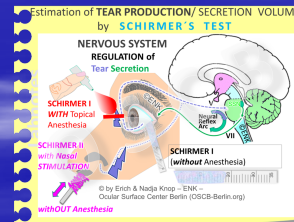


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SECRETORY TESTS

SCHIRMER TESTS

- SCHIRMER 2 Use when Schirmer 1 and basic secretion are low to confirm activity of the reflex secretors. Anesthetize conjunctiva and irritate middle turbinate.



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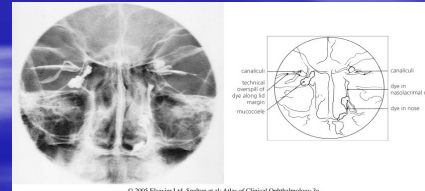
EXCRETORY TESTS

- SCINTIGRAPHY Use gamma ray emitting radionuclides such as technetium-99 to evaluate the physiological flow of tears.
- DACRYOCYSTOGRAPHY Radiopaque dye is irrigated into both lacrimal drainage systems. Plain x-ray technique can be augmented with subtraction studies. Helpful to delineate site of obstruction, confirm suspicion of tumor or stones.
- NASAL ENDOSCOPY direct visualization of lacrimal outflow area

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EXCRETORY TESTS

- CT SCAN-with or without contrast in lacrimal system Indicated in craniofacial injuries, congenital deformities or when lacrimal sac neoplasia is suspected.



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CONGENITAL AND DEVELOPMENTAL ANOMALIES OF THE LACRIMAL SYSTEM

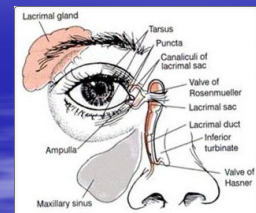
- EMBRYOLOGY Embryonic analog of the lacrimal drainage system begins as a cord in the medial canthus and grows laterally and down. Cavitation of the canaliculi and ducts occurs to form the lumen. The NASOLACRIMAL DUCT is the last to canalize. Canalization is not always complete at birth and obstruction at the distal end (Valve of Hasner) is present.

23

CONGENITAL AND DEVELOPMENTAL ANOMALIES OF THE LACRIMAL SYSTEM

NASOLACRIMAL DUCT OBSTRUCTION

- Membranous block at the valve of Hasner is present in 50% of newborns but is clinically evident in only 2-6% of infants at 3-4 weeks of age, with 1/3 being bilateral.
- Symptoms are tearing with mucopurulent discharge.

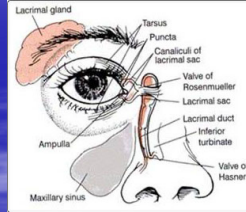


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CONGENITAL AND DEVELOPMENTAL ANOMALIES OF THE LACRIMAL SYSTEM

■ NASOLACRIMAL DUCT OBSTRUCTION

- Most obstructions resolve spontaneously within 4 to 6 weeks.
- 90% of obstructions have resolved by 1 year



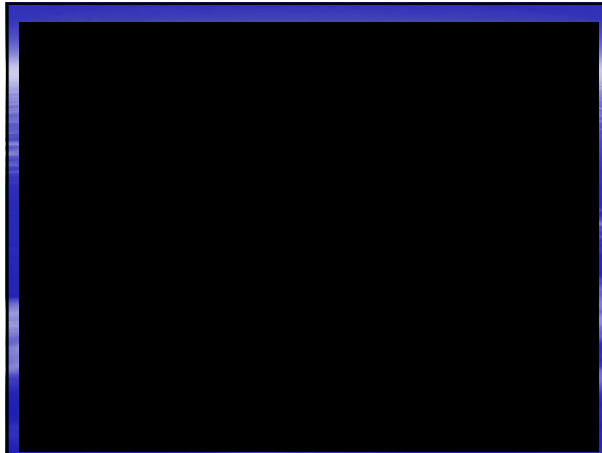
25

CONGENITAL AND DEVELOPMENTAL ANOMALIES OF THE LACRIMAL SYSTEM

■ CONSERVATIVE MANAGEMENT:

- Topical antibiotics Massage Nasal decongestants, antibiotic ointments
- PROBING: 6-12
- Technique: Probe superior canaliculus, may also infracture the inferior turbinate and irrigate with fluorescein.
 - > 12 months- probe and irrigate and Ballon Dacryoplasty.
 - >= 24 months- Consider DCR.

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CONGENITAL AND DEVELOPMENTAL ANOMALIES OF THE LACRIMAL SYSTEM

■ BALLOON DACRYOPLASTY



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CONGENITAL AND DEVELOPMENTAL ANOMALIES OF THE LACRIMAL SYSTEM

■ DACRYOCYSTOCELE

- Combination of nasolacrimal duct obstruction and amniotic fluid or mucus trapped in the sac.
- Sterile at first: treat with antibiotics and massage. If infection develops or doesn't resolve, probing is needed. May extend into the nose and if bilateral can cause airway obstruction



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CONGENITAL AND DEVELOPMENTAL ANOMALIES OF THE LACRIMAL SYSTEM

■ ANOMALIES OF PUNCTA AND CANALICULI

- Punctal agenesis and dysgenesis Look for lacrimal papillae-system intact under membrane If no system present will need CDCR when older

30

CONGENITAL AND DEVELOPMENTAL ANOMALIES OF THE LACRIMAL SYSTEM

■ ANOMALIES OF PUNCTA AND CANALICULI

- Congenital lacrimal-cutaneous fistula Usually asymptomatic but 1/3 may be associated with nasolacrimal duct obstruction



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ACQUIRED LACRIMAL DRAINAGE DISORDERS

■ PUNCTAL CONDITIONS

- Punctal Stenosis Dilation. Ampullotomy - snip procedure. Silicone intubation / stent placement.
- Punctal malposition



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ACQUIRED LACRIMAL DRAINAGE DISORDERS

■ CANALICULAR DISORDERS

– CANALICULAR OBSTRUCTION

- Etiology: Trauma, punctal plug, systemic medications (5 FU, Docetaxel, Idoxuridine), topical medications (IDU, phospholine iodide, eserine), viral infections (vaccinia, herpes simplex) and immune disorders (pemphigoid, Stevens-Johnson).

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ACQUIRED LACRIMAL DRAINAGE DISORDERS

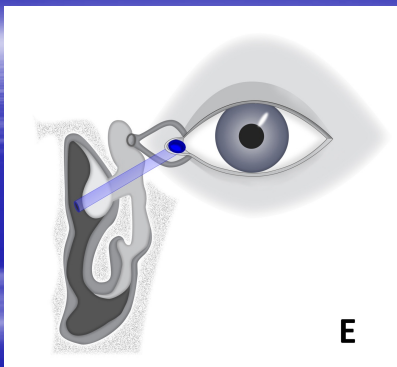
■ CANALICULAR DISORDERS

– CANALICULAR OBSTRUCTION

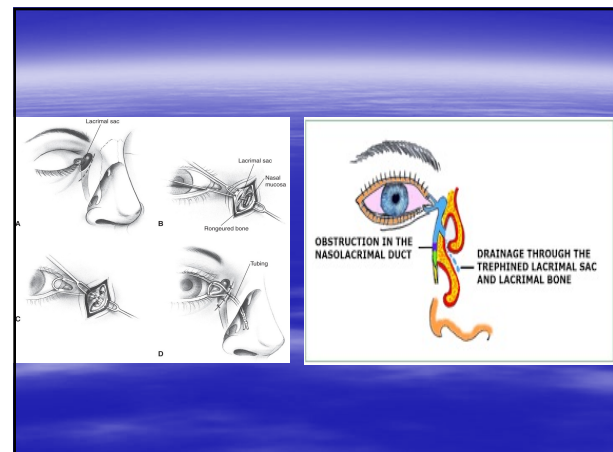
■ Treatment

- Partial Silicone intubation. DCR with intubation may be necessary.
- Complete-try DCR with tubes
Conjunctivodacryocystorhinostomy(CDCR): done in cases of extensive canalicular obstruction. CDCR: Jones' pyrex glass tubes

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ACQUIRED LACRIMAL DRAINAGE DISORDERS

- CANALICULAR DISORDERS
 - CANALICULAR OBSTRUCTION



37

ACQUIRED LACRIMAL DRAINAGE DISORDERS

- CANALICULAR DISORDERS
 - CANALICULAR OBSTRUCTION

- CANALICULITIS

- Can be caused by various bacterial, viral, chlamydial or mycotic organisms; however, most common cause is *ACTINOMYCES ISRAELII* (Streptothrix). Filamentous Gram-positive rod. Follicular conjunctivitis. Erythematous, dilated, pouting punctum. May be result of retained intracanalicular plug!!! (smart plugs; herrick plugs)



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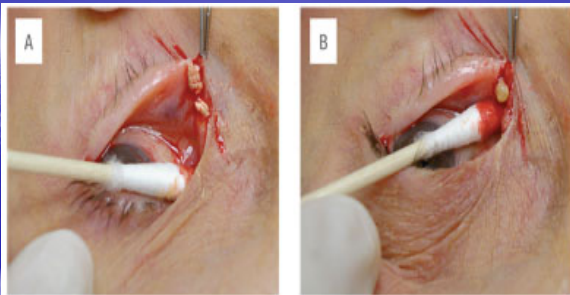
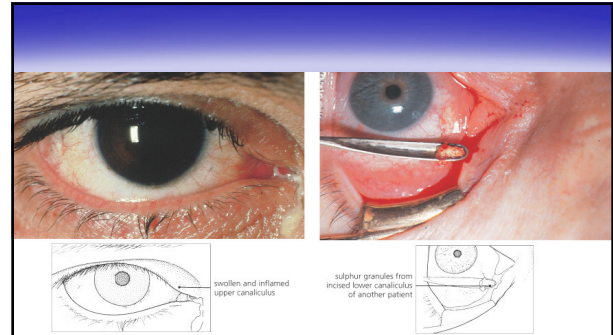


Figure 4A. A 90-year-old female with multiple stones encountered on canaliculotomy of the left lower lid. 4B. The SMARTPlug is removed below the lacrimal stones as the causative factor.

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ACQUIRED LACRIMAL DRAINAGE DISORDERS

- CANALICULAR DISORDERS
 - CANALICULAR OBSTRUCTION

- CANALICULITIS

- TREATMENT: Canaliculitis Gentle probing and irrigation. Milk out concretions and curette; gram stain, Irrigate with penicillin. Oral antibiotics - tetracycline, PCN, Sulfonamide. Apply 1% iodine solution to involved area. Canaliculotomy with curettage

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ACQUIRED LACRIMAL DRAINAGE DISORDERS

- CANALICULAR DISORDERS
 - CANALICULAR OBSTRUCTION

- TRAUMATIC INJURY-lateral traction on the lid - medial canthal area the weakest area

- TREATMENT-repair laceration with silicone intubation

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ACQUIRED LACRIMAL DRAINAGE DISORDERS

■ CANALICULAR DISORDERS

- DACTYOCYSTITIS Acutely presents with swelling and erythema with distension of the lacrimal sac below the medial canthal tendon, Can spread into the orbit and cause orbital cellulitis.



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ACQUIRED LACRIMAL DRAINAGE DISORDERS

■ CANALICULAR DISORDERS

- TREATMENT- Acute Dacryocystitis Avoid irrigation and probing. Warm compresses. Topical antibiotics are of limited value Oral antibiotics: bactrim, keflex, augmentin Parenteral antibiotics for severe infection. Incise and drain if pyoceles-mucocele is localized and pointing. DCR when quiet. May resolve with system open

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ACQUIRED LACRIMAL DRAINAGE DISORDERS

■ CANALICULAR DISORDERS

- DACTYOLITHS Caused by infection with Actinomyces or Candida or long term epinephrine use. Remove dacryolith at time of DCR.

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ACQUIRED OBSTRUCTION OF NASOLACRIMAL DUCT

– INVOLUTIONAL STENOSIS

- Most common in women.
 - Naso-orbital trauma.
 - Dacryocystitis.
 - Radioactive Iodine for thyroid cancer Chronic sinus disease.
 - Lacrimal plugs
 - Neoplasm

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ACQUIRED OBSTRUCTION OF NASOLACRIMAL DUCT

– TREATMENT

- SILICONE INTUBATION: Works in some cases of partial obstruction
- DACTYOCYSTORHINOSTOMY: creates an anastomosis between lacrimal sac and nasal cavity through a bony ostium.
 - SURGICAL TECHNIQUE
 - External, Internal(endoscopic), or Transnasal laser approaches TRANSNASAL LASER DCR-less long-term success
 - BALLOON DACTYOPLASTY-good for partial obstruction -Mitomycin C may have usefulness in preventing fibrosis

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ACQUIRED OBSTRUCTION OF NASOLACRIMAL DUCT

– LACRIMAL SAC TUMORS

- Lacrimal sac tumors are rare and most commonly present in the fifth decade.
 - CLINICAL COURSE: Epiphora, chronic dacryocystitis, lacrimal sac mass (above medial canthal tendon), epistaxis, bleeding from the puncta, ulceration. Malignant lesions spread to regional lymph nodes and metastasize.
 - DACTYOCYSTOGRAM: filling defect with delayed draining of contrast. CT SCAN: mass in lacrimal sac area.

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ACQUIRED OBSTRUCTION OF NASOLACRIMAL DUCT

– LACRIMAL SAC TUMORS

- Benign epithelial tumors:
 - SQUAMOUS CELL PAPILLOMAS
 - TRANSITIONAL CELL
- Malignant epithelial tumors:
 - SQUAMOUS CELL CARCINOMA
 - TRANSITIONAL CELL CARCINOMA
 - ADENOCARCINOMA
- Non-epithelial tumors:
 - FIBROUS HISTIOCYTOMA
 - LYMPHOMA MELANOMA

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ACQUIRED OBSTRUCTION OF NASOLACRIMAL DUCT

– LACRIMAL SAC TUMORS

- TREATMENT: SURGICAL EXCISION Wide excision of sac, canaliculi and nasolacrimal duct. If malignant, excision includes a lateral rhinotomy. Radiation: lymphoid lesions and extensive epithelial malignancies..



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Key Statistics

- 46% Lacrimal Obstruction
- 22% multifactorial
- 22% reflex tearing
- 10% eyelid malposition
- About 50/50
 - male/female
 - Unilateral/Bilateral
 - Over the age of 60

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The Key

- Dry eyes is the most common cause of tearing.
- Do not Assume that the etiology is a single factor.
- Keep your thoughts open to many other things

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Thank you

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Reference

1. Product insert and Websites

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