LEARNING OBJECTIVES

Students should be able to:

a) Describe pathogenesis of Epiphora
b) Enumerate its clinical manifestations in children and adults
a) Enlist its investigations
   • SLIT LAMP EXAMINATION
   • CANALICULAR ENDOSCOPY
   • MICROCANALICULAR ENDOSCOPE

LACRIMAL DRAINAGE SYSTEM

Consists of following structures

• The puncta
• The canaliculi
• The lacrimal sac
• The nasolacrimal duct

WATERING EYE

A watery eye can be the product of

• Excess tear production (hyper-lacrimation)
• Disturbed ocular surface tear flow (lid malposition)
• Disturbed outflow (epiphora).
• Occasionally all three mechanisms can be involved.

EPIPHORA

Denotes watering due to obstruction of outflow of tears.

It may be caused by:

• Occlusion or malposition of the lacrimal puncta.
• Obstruction anywhere along the tear elimination route

• Obstruction of the naso-lacrimal duct may be congenital, in which case it is most usually due to delayed canalization of the valve of Hasner, or it may be acquired.

### NASO-LACRIMAL DUCT OBSTRUCTION

EVALUATION

- History
- Slit Lamp Examination
- Digital Pressure Over Lacrimal Sac
- Irrigation
- Probing
- Dye Drainage Test
- Schirmer Test
- Intra Nasal Examination
- X-rays and CT
- Dacryocystography
- Dacryoscintigraphy

HISTORY

- Excess tears
- Age
- Duration of symptoms
  - < 6 months potentially reversible
  - > 6 months definitive DCR
- Unilateral or bilateral
- Intermittent or constant
- Previous episodes of pain redness swelling in lacrimal sac area

**EPIPHORA IN CHILDREN**

- Symptomatic NLDO occurs in approximately 5-6% of infants. A sticky, watery eye with positive regurgitation on pressure over the lacrimal sac confirms the diagnosis.
- As there is a high spontaneous rate of remission (60-90%) in the first year of life, probing should be delayed until 10-12 months of age.
- Parents can be instructed to undertake lacrimal sac massage during the intervening period. Earlier probing is only justified if there is severe recurrent infection.
- Probing of the naso-lacrimal duct is the first line of treatment.
- However probe failure increases with age and is known to double every 6 months.
- In cases of persistent epiphora, a second probing two to four months later is advocated. In failed cases it may be necessary to perform a dacryocystorhinostomy (DCR).
- Alternatively bicanalicular silicone incubation can be carried out with a claimed success rate of 88-95%.

**EPIPHORA IN ADULTS**

- In adults the commonest cause of epiphora is primary acquired nasolacrimal duct obstruction (NLDO) which is associated with inflammation of the nasolacrimal duct.
- Epiphora in the presence of a patent lacrimal system to syringing and in the absence of excess tear production or lid malposition is defined as functional NLDO.
- Causes of disturbed ocular surface tear flow such as lid malposition (euryblepharon, punctal ectropion, punctal phimosis) or ocular surface irritation (dry eye, blepharitis) should be excluded first. Tumours are rare causes.
- Identification of the site of the obstruction causing epiphora is most important.

### INVESTIGATIONS

- Identification of the site of blockage requires one or more of the following tests:

**SLIT LAMP EXAMINATION**
Anterior segment examination including IOP
Position, Swelling, redness of punctum.
Patency of punctal opening
Fluorescein flow into the punctum.
Eye lid movement with each blink.
Any irritative lesion of eye

REGURGITATION TEST
Pressure over the sac
Simple, quick, confirmatory test for sac and naso-lacrimal duct infection and possible obstruction.

DYE TESTS
- Two or three drops of sodium fluorescein are instilled into the lateral fornix.
- Dye may drain completely (dye disappearance) and be collected by a swab at the inferior meatus (Jones I), when the drainage system is patent. No more tests are necessary at this stage.
- The ocular surface is examined simultaneously. Conjunctival and corneal staining should be noted to rule out ocular surface disease.

Dye tests
- The secondary dye test (Jones II) is performed by irrigating the inferior canaliculus with saline.
- If the irrigated fluid is not stained with fluorescein, the dye has not passed into the canalicus. This finding confirms the presence of a functional block.

SYRINGING AND PROBING
- The lower puncti are gently dilated under topical anesthesia.
- One or two mls of local anesthesia are injected using a lacrimal cannula.
- If there is regurgitation, the largest lacrimal probe which can be inserted without damaging the annulus is used.
- If it enters the sac without any resistance, the site of blockage is most probably NLD.
- The exposed end is measured to identify accurately the site of the blockage. In the case of stenosis the smaller probe can be passed through and into the sac. Syringing of the NLD then follows. The same examination is repeated for the upper puncti.

PROBING
Diagnostic probing in adults is done to determine the site of an obstruction in the canalicular system.

MACRO DACRYOCYSTOGRAPHY (MDCG) AND SCINTIGRAPHY
- These further investigations may be used to confirm the diagnosis. MDCG is particularly useful to reveal details of lacrimal sac anatomy and the site of nasolacrimal duct obstruction. MDCG with a delayed erect film 5 minutes after injection of contrast medium can detect functional NLDO by showing delayed clearance of the lacrimal sac.
- Scintigraphy is mainly used to confirm a diagnosis of functional blockage when there is delayed or no out-flow of radioactive media in the presence of a normal DCG.
- Recently, modifications of the original DCG technique have been developed as macrodacryocystography (MDCG), subtraction MDCG, and digital subtraction MDCG
- The original technique clearly shows only the lacrimal sac. The modifications include intubation of the canaliculi, macrography (enlargement of image size), and subtraction (to allow better visualization).
- Standard x-ray subtraction can involve problems with tube positioning, adequate filling with contrast, and delay in development and subtraction. Digital subtraction, which uses angiographic equipment with fluoroscopy, eliminates these.

CANALICULAR ENDOSCOPY
- More recent investigative tools are available such as the microcanalicular endoscope, which can demonstrate the site and type of blockage.

TREATMENT
- Nasolacrimal duct blockage
- External DCR is still the most popular choice for NLDO and dacryocystitis and has a success rate of 80-95%. If there is canalicular damage or a narrow upper nasal cavity it may be necessary to insert a silicone tube.
- Endonasal DCR is acknowledged to have a lower success rate.
- Balloon dilatation dacryoplasty has also been shown to be effective in partial nasolacrimal duct obstruction with a claimed success rate of 60%.

CANALICULAR OBSTRUCTION
- More complex surgical procedures are necessary if intubation is not successful. The micro-surgical repair of canaliculi has been proposed with a canaliculo-DCR being reserved for distal canalicular blockage.
- During a standard DCR the inner opening of the common canalicus is identified and probed towards the blocked canaliculi. On reaching the site of the blockage
a pseudo punctum is fashioned. A silicone tube is then inserted through the same route.

- **Canalicular stenosis**
  Silicone tube insertion during DCR is necessary.

- In cases of failure of the above procedures, a by-pass operation is the only remaining option. Conjunctivo-DCR with a Lester-Jones tube can be performed as a closed technique in the presence of a previous osteotomy

**FUNCTIONAL BLOCKAGE**

- Functional blockage due to preductal or ductal narrowing, identified by delayed MOCG or scintigraphy, can be treated by DCR and a silicone stent. Many cases of functional blockage have also been successfully treated using lid shortening and punctal snip procedures.
- Functional blockage due to pump failure (facial nerve palsy) might require by-pass lacrimal surgery. Treatment remains controversial.

**SUMMARY**

- Ocular surface irritation and lid mal-positions should be addressed initially. After identification of the site of blockage an appropriate plan of action should be adopted.
- Probing of the canaliculi in experienced hands is an effective diagnostic tool.
- Partial canalicular blockage can be treated by either DCR and silicone tube insertion or by closed technique canaliculoplasty involving bicanalicular insertion of a stent into the naso-lacrimal duct.
- Extensive canalicular blockage requires more complex surgery. Canaliculo-DCR for distal obstruction and DCR with retrograde intubation for proximal obstruction.
- Lacrimal by-pass surgery with a Lester-Jones tube is the last resort when other techniques have failed to achieve recanalization of the drainage system.

THANK YOU