Summary

Two basic causes of tearing exist, epiphora associated with blockage of the lacrimal system, and excess lacrimation which is less frequent. Lacrimation (hypersecretion, reflex tearing, hyperlacrimation) is excessive tearing caused by reflex hypersecretion due to the irritation of the cornea or conjunctiva which are easy to be differentiated by clinical examination.

Differentiation between anatomical obstructions and functional disorders (dysfunctions) of the lacrimal system is required before beginning a treatment plan:

1- Anatomical obstructions are those in which some pathological changes and irregularity in the lacrimal drainage system are found, e.g., canalicular stenosis, canalicular blockade, lacrimal sac deformation, obstruction of the nasolacrimal duct, diverticulus, etc. The lacrimal system can be changed primarily in inflammation of the lining inside the lacrimal pathways, intrinsic, or the lacrimal pathways can be secondarily changed from the outside, extrinsic, i.e., lymphoid tumor lying around the lacrimal sac. Anatomical disorders are more common than functional ones.

2- Physiological dysfunction, functional epiphora is caused by disorders in which tearing does not result from anatomical changes of the lacrimal pathways themselves, but from a failure of functional lacrimal pump mechanism. It can be caused by the anatomic abnormality outside the

lacrimal pathways, such as eyelid malpositions, punctal eversion, or lacrimal pump insufficiency caused by poor orbicularis muscle tone or eyelid laxity as seen in the paretic eyelid caused by Bell's palsy.

The goals of the examination of tearing patients are as follows:

- Distinguish epiphora and lacrimation
- Define pathological process responsible for tearing
- Distinguish anatomical and functional disorders
- Evaluate block location and its extent, and define a surgical approach.

- ***Suprasaccal*** (presaccular): occurs proximal to the lacrimal sac, e.g., obstruction in the upper or lower canaliculi or common canaliculus, for example, following herpetic infection, trauma, post-irradiation, etc.
- ***Saccal*** (saccular) – occur in the lacrimal sac, e.g., diverticulus, trauma, tumor, etc.
- ***Subsaccal*** (nasolacrimal duct, postsaccular): occurs in the nasolacrimal duct; those obstructions are most common, e.g., a congenital nasolacrimal duct obstruction, primary acquired nasolacrimal duct obstruction (PANDO), nasolacrimal duct obstruction following functional endoscopic sinus surgery, etc. Dacryocystorhinostomy is indicated in the majority of these cases. DCR mainly is the best choice for treatment.
- In canalicular stenosis: intubation and canaliculoplasty are of high value
- In canalicular obstruction: canaliculodacryocystorhinostomy is the choice
- For eye lid malposition or laxity: lid surgry is indicated.

Gentle inferior massage over the area of the nasolacrimal sac and lacrimal crest for infants with chronic and persistent tearing and or mild to moderate mucopurulent discharge due to nasolacrimal obstruction. Nasolacrimal massage may help to treat the obstruction in the infant and reduce the risk of subsequent dacryocystitis. We can obtain a culture and sensitivity of the discharge if possible to define the antibiotic sensitivity. Systemic antibiotics are required if signs of subacute or acute dacryocystitis exists.

If conservative treatment does not relieve symptoms of tearing due to nasolacrimal obstruction, probing may be indicated between 6 and 13 months of age.

If probing fails, the insertion of a silicon tube is advised with next probing. Persistent tearing and/or dacryocystitis, despite multiple probings and intubation, is an indication for dacryocystorhinostomy at 2 years age or older.

There are mainly four well-established indications for a DCR: epiphora, (relapsing) dacryocystitis, dacryocele, and dacryolithiasis, which is rare. Whereas dacryocystitis is an easy indication (a simple inspection or palpation of the bulging sac may confirm it), chronic epiphora needs a differential diagnosis.

The search for modifications and alternatives to the external approach is motivated by the desire to improve the DCR success rate and to add other advantages, such as a better aesthetic result or better compliance by the patient. The conventional endoscopic DCR techniques generally involved limited opening of the sac, yielding frequent obstruction of the neo-ostium by granulation tissue, an outcome which explains the higher failure rates. To avoid or prevent obstruction of the neo-ostium, many modified techniques have been attempted. These include complete separation of the sac from the nasolacrimal duct to divert lacrimal flow to the neo-ostium use of steroids or mitomycin-C and use of mucosal flaps after wide resection of bone surrounding the sac.

A retrospective cohort study (Ben Simon et al;2005) comparing success rates of endonasal (86 cases) and external (90 cases)DCR surgeries found statistically significant success rates with endonasal DCR (84% versus 70%, P = 0.03) at a mean follow-up period of seven months. An earlier study (Cokkeser et al;2000) also found comparable success rates between external and endonasal DCR (90% versus 88%). In his study comparing external DCR and non-laser endonasal DCR, Dolman 2003 not only noted equitable success rates (90% versus 89%), but also found the nasal approach more rapid and more acceptable to patients who had an alternative technique used on the other side. However, a

retrospective comparative cohort study (Ibrahim;2001) found a higher success rate with external DCR when compared to endonasal DCR (82% versus 58%). It also found that the rate of symptom relief was similar in both groups. Verma et al. in their uncontrolled study comparing endonasal DCR using CO2 laser and external DCR, conclude the former to be faster and a better surgical option (Verma et al;2006). The randomized controlled traials by Maini et al. compared endonasal surgical dissection with potassium titanyl phosphate laser technique for creation of ostium (Maini et al;2007). The study authors found that the 12 month outcome was better with the surgical (74%) compared to laser (68%) technique. Henson et al. found diode laser to be safe and effective for endonasal dissection of ostium (Henson; 2007).

The endonasal DCR is a one-stage procedure that permits correction of associated pathology, such as septal deviation or chronic paranasal sinusitis , that may be a causative factor in lacrimal obstruction.

Various endoscopic techniques have been used to remove lacrimal bone and the thick bone of the maxilla forming the anterior lacrimal crest. Removal of the thick bone along the anterior edge of the lacrimal sac is important to achieve unobstructed lacrimal drainage. Use of the laser for this purpose necessitates sophisticated instrumentation and training and

adds extra cost and its related potential complications and hazards. Bone removal with the laser is tedious and has been associated with a higher rate of recurrence. Concomitant use of a drill or rongeur is advocated to obtain a larger rhinostoma and prevent reclosure.

Sometimes, epiphora starts again during the follow- up. This may be secondary to collection of mucus in the remnant sac obstructing the drainage of the common canaliculus, which is known as ‘‘lacrimal sump syndrome’’. Soft external massage empties the sac.

Complications of DCR are; Stenosis , Granulation tissue , Synechia , Stent migration , Sump syndrome , Cutaneous fistula , Hemorrhage.

Fistula and heamorhage are rar complications with laser use.

Early postoperative complications of external DCR include hemorrhage within the first 24 hours that normally subsides spontaneously. Delayed epistaxis may occur 2 to 8 days after surgery, possibly as a result of the dissolution of a blood clot at the surgical site. Several investigators consider postoperative infection to be a causative factor in delayed epistaxis and therefore advocate oral or intravenous antibiotic treatment for their patients. The most important late complication is surgical failure from scar formation around the osteotomy site. ***(Guy J et al; 2010).***

Postoperative, The piece of Merocel is removed between days 5 and 7 after surgery.. The silicone probes are removed after 2–3 weeks. Keeping

the probes in place longer may produce granulation tissue formation at the surroundings of the common canaliculus. there is absolutely no need to keep silicone catheters for a longer period of time.in children The silicone tube when placed should be kept in position for 12 weeks.

The majority of patients with patent but non-functional lacrimal drainage systems can be helped by DCR surgery, with greater success rates in those with significant reflux on preoperative syringing. For patients with residual epiphora, functional success can reach 100% with subsequent Lester Jones Tube LJT insertion.***(Neena and Andrew ; 2010)***

On the other hand laser use and altarntive prucedurces have less postoperative stay and follow up Patients are usually remarkably well following a laser DCR performed under either a local or general anesthesia. There is minimal discomfort or bruising of the eye, unlike the external approach. Most patients are able to go home within 2 h of surgery and can resume their work within a day or two.

There are two studies comparing quality of life outcomes between external DCR and endonasal DCR. ***Bakri 1999*** found no significant difference in the quality of life outcome scores between the two procedures. ***Mathew 2004*** found that patient satisfaction with endoscopic endonasal DCR was comparable to that with external DCR.

Table (6,7) compares surgical duration and success rates between external dacryocystorhinostomy and endoscopic approache

Tab (6)Comparison of surgical duration

Study	External DCR	Endoscopic DCR
Hartikainen 1998	78 min.	23 min.
Dolman P.J. 2003	34.3 min.	18.5 min.

Tab(7) success rates

Study	External DCR	Endoscopic DCR
Hartikainen et al 1998	91%	63%
Cokkessr 2000	89.5%	88.2%
Ibrahim HA 2001	82%	58%
Mirza et al 2002	94%	64%
Dolman P.J et al 2003	90.2%	98.1%

External DCR, however, still remains the most established reference treatment modality for NLD obstruction, with endonasal endoscopic DCR closely following it in success. Compared with those of the external approach, the advantages of endonasal DCR are minimal morbidity; less intraoperative bleeding; shorter operative time, preservation of pump function of the orbicularis oculi muscle, presaccal fibers, and medial canthal tendon and a better cosmesis, which is important for some patients, especially in female patient. Endoscopic DCR has been known to have some disadvantages, such as small opening size, high recurrence rate, and

high equipment cost; it can also be difficult to learn. Even with these disadvantages, the absence of an external scar, short recovery period, minimal morbidity (only to the intranasal rhinostoma opening), and low complication rate have made endoscopic DCR popular. Because of the minimal morbidity, bilateral cases can be operated in the same sitting with excellent patient compliance. The endoscopic approach also allows diagnosis and management of the predisposing or concomitant nasal and paranasal sinus disorders.

Since the early 1990s, there has been a controversy concerning the endoscopic DCR and whether or not it would take over the position of external DCR as the standard treatment for nasolacrimal duct obstruction.

Now we may ask, Can external DCR be an end of an era?

A final "yes" answer to this question may take a long time with wider scale studies, longer follow up and more refinement of the techniques and instruments of endoscopic DCR.