Combined Endoscopic, Laser Assisted Dacryocystorhinostomy (ECLAD)

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From the time that Toti (in 1904) first described the operation of creating a direct fistula between the lacrimal sac mucosa and the mucosa of the middle meatus of the nose, in order to relieve a blockage of the nasolacrimal duct that occurs in chronic dacryocystitis, various innovations have been tried in order to improve the efficiency of the procedure and to cut down on the morbidity associated with the operation. This external approach in dacryocystorhinostomy (DCR) surgery underwent several modifications such as suturing of the anterior and posterior mucosal flaps and intubation with tubes and stents made from various materials.

Another major innovation in this surgery was the introduction of the endonasal approach to DCR. This was first done in 1911. This later was modified by the use of the YAG laser to effect fracture of the bone and to cut the nasal and sac mucosa.

The main advantages of the endonasal procedure over the external approach are
- better cosmesis due to absence of an external scar and the medial palpebral ligament remaining intact,
- less bleeding,
- intact lacrimal pump mechanism due to the orbicularis muscle not being tampered with, and
- associated nasal anomalies can be corrected in the same sitting.

However the endonasal procedure has its own problems:
- Most studies show that the success rate is inferior to that of the external procedure.
- Endonasal approach is in the domain of an ENT surgeon rather than the ophthalmologist who is more aware of related problems.

In 1993, a revolutionary innovation was made in the field of DCR surgery by the introduction of the use of a YAG laser which when passed through the lacrimal canaliculi, could cut the medial wall of the lacrimal sac, the bony wall of the lacrimal fossa as well as the nasal mucosa, creating a large enough fistula to overcome the blockage of tears due to nasolacrimal duct obstruction. A diode laser was later substituted for the YAG laser.

Instrumentation

ECLAD is a mode of doing Dacryocystorhinostomy through a combined approach viz. transcanalicular with nasal endoscopic monitoring.

The laser used is a diode with a wavelength of 980 nm with 10 Watts of power. This machine is an improvement on previous machines which had only 4 Watts of power and hence were not capable of going through dense bone.

980 nm wavelength has high absorption in water, oxyhaemoglobin and haemoglobin. It has concurrent vaporization of both hard and soft tissue with optical coagulation.

The preoperative check list for a transcanalicular Laser DCR is the same as for any conventional DCR.
In addition to routine tests, bleeding and clotting times are checked. Lacrimal sac tumors and chronic infections like tuberculosis of the sac have to be ruled out. A detailed examination of the middle meatus of the nose, where the fistula is to open, is done. Polyps, deviated septa, tumors and other disorders are addressed before the surgery is done.

The procedure is fairly simple and short, the operation itself taking only about ten minutes.

**Operative Steps**

- A syringing is done before surgery to confirm the diagnosis of Nasolacrimal duct block.
- A preoperative packing of the nose with xylocaine 2%( with adrenaline,) for shrinkage of the nasal mucosa and better visualization of the structures in the nose is done about 30 minutes before the surgery which is removed just prior to the procedure.
- Xylocaine 2% is infiltrated above and below the medial canthus upto periosteum level and a lacrimal probe is passed through the canaliculus into the sac to test the patency.
- A nasal endoscope with either 0 degree or 30 degree angulation, which is connected to a TV monitor through a video camera, is used to visualize the middle meatus, above the inferior turbinate.
- The laser probe can be passed into the sac in two ways.
  A) Either it is passed alone in the case of the more rigid fibreoptic probe or
  B) Through a 23 gauge metal cannula in case of the thinner, more flexible probe.
- The direction of the canula or the probe is first horizontally, till one encounters a hard stop and then downwards, medially and slightly anteriorly after withdrawing the tip from the bone.
- If the bony wall of the lacrimal fossa is thin, as is usually the case in female patients and in those of either sex belonging to older age groups, the pilot
indicator lamp can be visualized through the endoscope in the nose and laser applications can be made under direct vision.

- In patients with thicker bones the pilot light may not be seen through the nose and the first laser application would be done blindly and subsequent shots applied after adjusting for proper position in relation to the first burn.

- Laser burns are seen by the appearance of smoke in the nose, and visualization of the pilot lamp and the probe in the nose.

- One should aim for an ostium of about 10 mm vertically and at least 5 mm horizontally, taking care to see that it is in a position which is not likely to be obstructed by other structures in the nose like the septum or the turbinates.

- The Nasal endoscopic monitoring also ensures that there is no inadvertent injury to the nasal septum or other adjacent structures.

- In cases where space seems inadequate, infracture of the turbinate may generate more space and contribute to the continuing patency of the ostium.

- Irrigation with saline can be done if visualization is hampered by the appearance of smoke. Syringing with Mitomycin-C 2% solution is done and the appearance of the fluid in the nose can be seen through the nasal endoscope.

- If there is any evidence of haemorrhage into the nose, a pack can be placed and removed a few hours later.

A few studies have indicated that intubation of the ostium with silastic or other material is an useful adjunct to the procedure.

An alternative would be to use Mitomycin-C drops and steroid drops topically in the immediate postoperative period.

ECLAD thus comes across as a time saving, efficient procedure in which practically all morbidity associated with conventional external DCR is eliminated and is a more predictable and efficacious procedure than Endonasal DCR.

References


