Lacrimal Drainage Surgery
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Editor

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Foreword

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Dedicated to

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I first met Suresh D Isloor in Shimoga, Karnataka, India, where he had arranged a micro-ear surgery camp, almost 25 years ago. At that time, I met him in his capacity as an ENT surgeon. I was surprised to know that he was an ophthalmologist as well. He did corneal grafting with the same care and finesse as he did stapedectomy.

- The ophthalmologist plays a major role in the diagnosis and management of epiphora.
- The operation of DCR has been traditionally done by ophthalmologists using an external approach.
- It is only in the last couple of decades that Endoscopic Endonasal Dacryocystorhinostomy has become popular.

He has the unique advantage of “knowing both sides of the coin”. He is therefore best suited to address the issue which he has done in this book on Lacrimal Drainage Surgery. The chapters on Anatomy, Osteology and Physiology of Lacrimation are dealt with in a very precise manner. Diagnostic tests are dealt with in detail and the various aspects of surgery are clearly described with the help of excellent figures.

He also adds the benefits of his own experience in enhancing the academic value of the book. He has also dealt with recent concepts and advances including the use of laser in dacryocystorhinostomy. I feel that the book will be useful both to the novice and to the experienced surgeon, who deals with dacryocystorhinostomy as also for the postgraduate student in updating his knowledge on the subject.

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Tearing disorders are among the most common dilemmas that ophthalmologists encounter. Restoration of lacrimal system patency involves surgical techniques that are challenging to master and frequently have unpredictable results.

The close relation between eyes and nose demands an interdisciplinary approach. Ophthalmologists and rhinologists work together in the treatment of lacrimal drainage system to produce the best results. Interdisciplinary cooperation between ophthalmologists and rhinologists has advanced the present day treatment of lacrimal disorders.

There is no single method for the lacrimal drainage surgery. There are different approaches for the surgical management of nasolacrimal disorders. Lacrimal drainage surgery can be a problem to many eye surgeons. Three most important factors are:

1. Bleeding during intraoperative and postoperative period.
2. Considerable postoperative failure—closure of intranasal neo-ostium.

Rhinologists are trained to inspect the area of neo-ostium by nasal endoscopy and treat the pathology by removal of granulations, polyps, synechiae and punch out overhanging mucosa, agger nasi cells, anterior ethmoid sinus, anterior end of middle turbinate, and septoplasty for deviated nasal septum.

Ophthalmologists, who are not trained in nasal endoscopy and not conversant with nasal and paranasal sinuses surgical anatomy may benefit from the basic chapters on these subjects. Rhinologists may benefit from basic knowledge on physiopathology of lacrimal disorders.

Evaluation of “Wet Eye” may be a challenge in few cases, needs careful examination and newer diagnostics tests to arrive at correct diagnosis.

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INTRODUCTION

Nasolacrimal duct probing is a common procedure for children with persistent epiphora due to congenital nasolacrimal duct obstruction. Probing is a simple procedure and carries a very high success rate (90–95%). However, there are a few problems/difficulties with probing that may result in failure/nasal bleeding. Smart probes are designed to reduce those difficulties and reduce the incidence of intranasal bleeding.

A Bowman’s lacrimal probe is made of two stainless steel rods joined in the center to a holding member (Figure 12.1). The probes are available in various gauges. The diameter of the smallest gauge of the probe is 0.45 mm and that of the lacrimal punctum in an infant is 0.3 mm.1,2 Hence, a Nettleship’s punctual dilator is used to dilate the lacrimal punctum before the insertion of the probe. At the end of probing, the patency of the lacrimal duct is checked using a curved, blunt, lacrimal cannula. Many surgeons rely on free flow of fluid while syringing and retrieval of fluorescein dye from the inferior meatus/nasopharynx to confirm success of the probing. Some surgeons use metal to metal touch/nasal endoscope for the same. Visualizing the tip of the metal probe using an endoscope is difficult due to typical anatomy of the inferior meatus and the inferior turbinate (Figure 12.2). Experiencing the metal to metal touch is also difficult due to the posterior placement of the probe. Bold attempts to feel the probe are sometimes associated with the nasal mucosal injury and bleeding. Hence, a large number of ophthalmologists rely on fluorescein dye retrieval to confirm the patency.

Figure 12.1: Bowman's stainless steel lacrimal probes (Katena instruments) size 0000 to size 8 with respective diameters in mm

Figure 12.2: Sketch demonstrating complex anatomy of the inferior meatus making it difficult to visualize the probe tip (red arrow) using a nasal endoscope (marked yellow)
The most common cause of nasal bleeding during the probing is damage to the nasal mucosa due to overzealous probing. An ophthalmologist who continues to advance the probe despite of reaching the inferior meatus will hit the nasal mucosa and abrade the nasal mucosa. It is well known that the inferior meatus is reached after advancing 30 mm length of the probe (Figure 12.3). Then, the surgeon should refrain from further advancing the probe and rather look for the probe tip in the inferior meatus or perform the fluorescein dye test.

The smart lacrimal probe (Figure 12.4) measures 90 mm in length. At 60 mm, a holding member is attached (which is 20 mm in length). The external diameter of the probe is 0.65 mm and the internal diameter is 0.45 mm. The smart probe has one side that resembles a Bowman’s type lacrimal probe. The difference is it is cannulated. The proximal end of the cannula opens sideways (Figure 12.4). The distal end is connected to a silicon tube that is connected to a 20 gauge cannula which can be attached to a syringe containing fluorescein solution.

When probing is performed (see the video), the probe is initially advanced horizontally until it encounters a hard stop (station 1, Figure 12.3). This is reached when first 10 mm of probe is advanced. At that point the surgeon modifies the direction of the probe by rotating it 90° to make it vertical. Another 10 mm is then advanced to reach the junction of the membranous part and the bony part of the nasolacrimal canal (station 2, Figure 12.3). A delicate manipulation is needed at this point to gently enter the “bony” nasolacrimal canal, which is around 1 mm in diameter (in vivo, thickness of the mucosal lining included). Another 10 mm of the probe is then advanced to reach the lower end of the bony nasolacrimal canal. Often a mild resistance is felt while the last 10 mm of the 30 mm is advanced. This resistance comes from the imperforate valve of Hasner (station 3, Figure 12.3). The loss of resistance on further advancement heralds the entry of the probe tip in the inferior meatus.

The assistant/the ophthalmic surgeon would inject the fluorescein containing saline at this stage, which can be directly visualized in the nose using a nasal endoscope or retrieved from the nose on cotton gauze inserted in the inferior meatus/nasopharynx.

Absence of dye retrieval indicates false passage. Then, the probe needs to be withdrawn and reinserted, preferably from the upper punctum.

Failure to advance the probe before 30 mm mark is reached indicates stenosis of the nasolacrimal duct/common...
canaliculus/a bony obstruction, depending on when the resistance is encountered.

Use of smart probe (Figure 12.5) with a fair idea of lacrimal system’s anatomy and tactile feedback allow the surgeon to employ correct manures and manipulation to advance the probe rather than use the force which often results in a false passage. Standard size of the probe (0.65 mm) can help to diagnose the stenosis of the nasolacrimal canal. A smaller size smart probe (0.45 mm diameter) is also available and can be employed in such situation. However, the parents should be informed about possibility of persistence of epiphora and need of a balloon dacryocystoplasty at a later stage.

Cannulation in the smart probe allows the ophthalmic surgeon to inject the dye simultaneously without having to insert a separate cannula, which may result in additional trauma, extravasation of the fluid in pericanalicular soft tissue and regurgitation from the opposite punctum.

We believe use of smart probes is helpful and reduces the incidence of nasal bleed associated with probing.

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REFERENCES