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Introduction

Dacryocystorhinostomy or DCR is among the common Oculoplastic surgeries performed for managing epiphora due to nasolacrimal duct obstruction [1, 2]. It is a bypass procedure that creates an anastomosis between the lacrimal sac and the nasal mucosa via a bony ostium. It may be performed through an external skin incision or intranasally with or without endoscopic visualization. This chapter will discuss the indications, goals, and simple techniques for a successful outcome of DCR.

Goals

There are two clear goals of DCR procedure. One is to make a large bony ostium into the nose and that remains so. Second is to have a mucosal lined anastomosis. Since both these purposes are equally well served by an external route, it can be one of the approaches with predictable and high success rates.

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Indications

- (a) Persistent congenital lacrimal duct obstructions unresponsive to previous therapies
- (b) Congenital lacrimal duct obstructions associated with mucocele, dacryocystitis, and fistula
- (c) Primary acquired nasolacrimal duct obstructions (PANDO) [3]
- (d) Secondary acquired nasolacrimal duct obstructions (SALDO) [4]

Preoperative Requisites

- (a) Confirmation of the diagnosis and clinical findings
- (b) Hemoglobin levels
- (c) Bleeding and clotting times
- (d) Blood pressure measurement
- (e) Random blood sugars
- (f) Additional general anesthesia investigations when required

Steps of the Surgery

Anesthesia

The surgery can be done under general anesthesia or local anesthesia [5]. The latter is the most commonly employed modality. Local anesthesia is given by both infiltration and topical application. For infiltration, 2 % lignocaine with



Fig. 17.1 Preoperative nasal packing

0.5 % bupivacaine with or without adrenaline is used. Infratrochlear nerve that supplies the lacrimal apparatus is blocked first. The nondominant hand marks the supraorbital notch, and the needle is inserted into the lateral edge of the medial third of the eyebrow and advanced to just medial to the medial canthus and 2 cc of the drug is injected. The tissues along the anterior lacrimal crest are infiltrated subcutaneously, and the needle enters deeper at about 3 mm medial to the medial canthus, and without withdrawing the needle, the drug is injected into the deeper tissues up to the periosteum both superiorly and inferiorly. A drop of topical proparacaine is placed in the conjunctival cul-de-sac for intraoperative comfort. The nasal mucosa is sprayed with 10 % lignocaine 1–2 puffs followed by packing with 4 % lignocaine and 0.5 % xylometazoline. Alternatively topical lignocaine spray along with topical xylometazoline can be used without packing the nasal cavity. The forceps should guide the medicated cottonoid from the external naris superiorly and backwards so that it reaches the middle meatus, the site of ostium (Fig. 17.1).

Incision

Though various incisions have been described, the authors prefer the commonly used curvilinear incision of about 10–12 mm in length, 3–4 mm from the medial canthus along the anterior lacrimal crest (Fig. 17.2).



Fig. 17.2 A typical curvilinear incision



Fig. 17.3 Sac dissected laterally to expose the bony lacrimal fossa

Sac Dissection

Blunt dissection is carried on to reach the periosteum. A freer elevator is used to separate the periosteum from the bone and reflect it laterally along with the lacrimal sac to expose the lacrimal fossa. It is preferable to preserve the medial canthal tendon and dissect only when needed (Fig. 17.3).

Bony Ostium Creation

Once the lacrimal fossa is exposed, bone punching should be started at the junction of the lamina papyracea of the ethmoid and lacrimal bone. The Kerrison bone punch should be gently inserted between the bone and the nasal mucosa

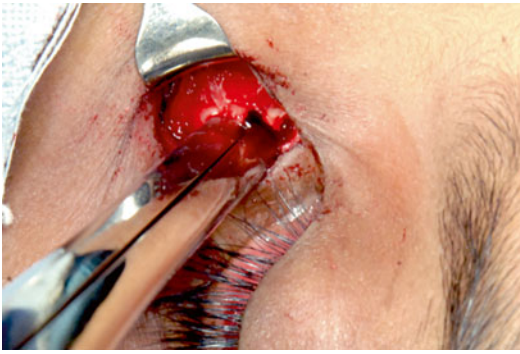


Fig. 17.4 Kerrison punch being used to create a bony ostium

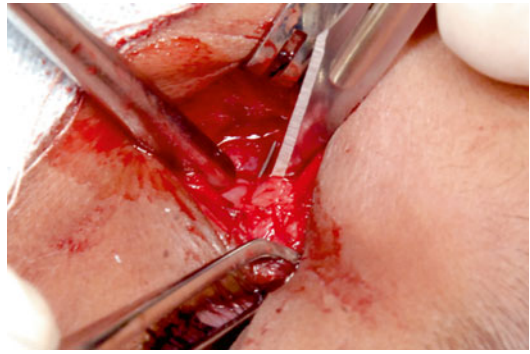


Fig. 17.6 Lacrimal sac incision being taken by a number 11 blade using the probe as a guide



Fig. 17.5 A large bony ostium exposing the nasal mucosa

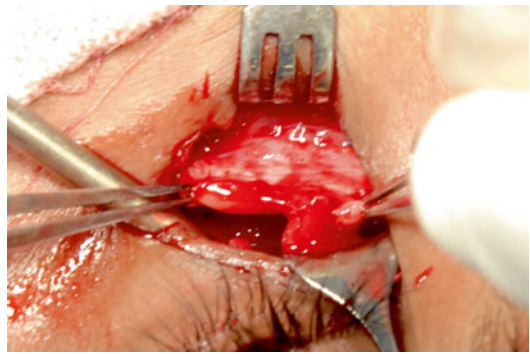


Fig. 17.7 Raising a large nasal mucosal flap

and the ostium sequentially enlarged (Figs. 17.4 and 17.5). The extent of the ostium which the authors follow is:

- (a) Anteriorly till the punch cannot be inserted between the bone and the nasal mucosa
- (b) Posteriorly till removal of the aerated ethmoid
- (c) Superiorly till 5 mm above the common canaliculus
- (d) Inferiorly till the nasolacrimal duct is de-roofed

Flap Formation

The first step is to create sac flaps. To do this a Bowman's probe is passed through the lower punctum and bent in such a way to tent the sac as posterior as possible to create a large

anterior and small posterior flap. Alternatively, fluorescein-stained viscoelastic can be injected from the upper punctum to dilate the sac and help in creating flaps. Using the probe as guide, an "H"-shaped incision is made with the help of a number 11 or 15 blade right across the sac from the fundus to the nasolacrimal duct. Flaps are raised and the posterior one is cut (Fig. 17.6).

The second step is to fashion the nasal mucosal flaps. With the help of a number 11 blade, incisions are made in the nasal mucosa along the bony ostium except anteriorly to have a hinged flap. The large anterior flap is raised and the posterior small residual flap is cut (Fig. 17.7). Alternatively both the flaps can be sutured, but no significant difference in the success has been noted in doing this either way [6, 7].



Fig. 17.8 Taut flap anastomosis



Fig. 17.9 Sutured surgical wound

Flap Anastomosis

It is important to appose the nasal mucosal and sac flaps edge to edge. Excess nasal mucosa can be excised in a controlled manner so as to avoid sagging of the flaps that may compromise the tear drainage later (Fig. 17.8). In case of overriding, the nasal mucosal overriding is preferable or alternatively one can tent the flaps and suture to the overlying orbicularis.

Wound Closure

Once flaps are secured, the orbicularis is sutured back with 6-0 Vicryl followed by the skin with 6-0 silk (Fig. 17.9).

Tips for Hemostasis

- (a) Good preoperative assessment to rule out bleeding diathesis
- (b) Preoperative blood pressure assessment
- (c) Use of adrenaline or oxymetazoline patties along with local anesthetics provided there are no medical contraindications
- (d) Good nasal decongestion before beginning
- (e) Raising the head end of the table
- (f) Avoid known blood vessels
- (g) Well-powered suction

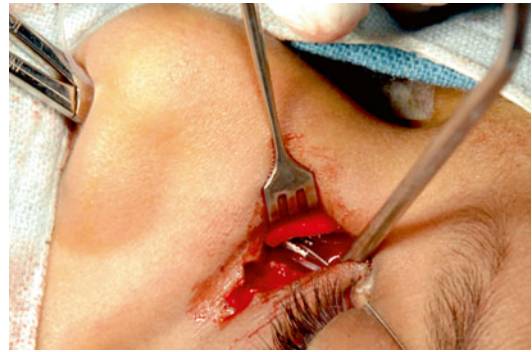


Fig. 17.10 Intubation: upper canaliculi intubated. The bodkins are being retrieved by a transnasal artery forceps

- (h) Judicious use of cautery
- (i) Keep materials like gel foam or bone wax in the armamentarium

Adjunctive Measures (Use of Mitomycin C and Intubation)

Mitomycin C in a concentration of 0.02 % is used if there are intra-sac synechiae and soft tissue scarring like in failed DCRs and in the presence of a complicated surgery. Intubation is also advisable for similar indications, but in addition, it is also used in the presence of canalicular problems and inadequate flaps [8] (Figs. 17.10, 17.11, and 17.12).

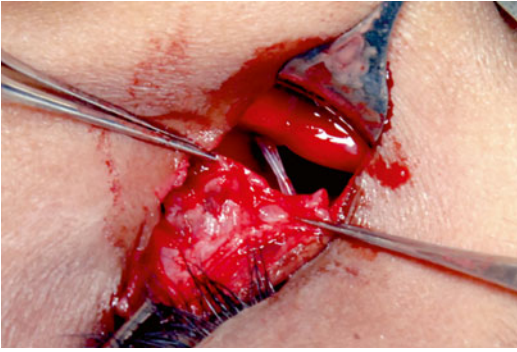


Fig. 17.11 Intubation: tubes in place before flap anastomosis

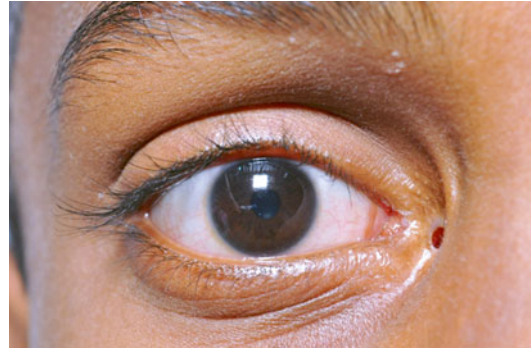


Fig. 17.13 Early wound dehiscence following an external DCR

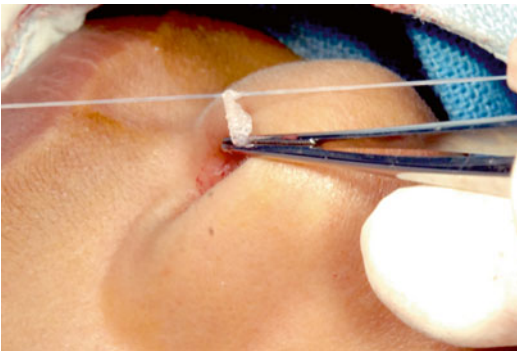


Fig. 17.12 Intubation: tubes being secured in the nose

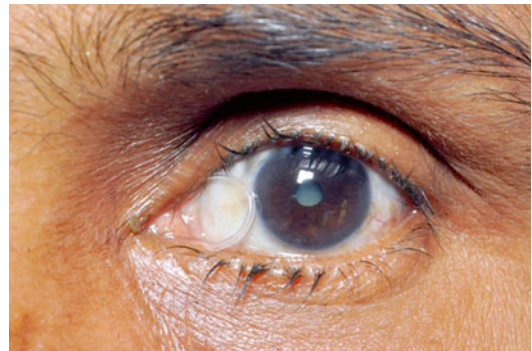


Fig. 17.14 An example of stent prolapse

Immediate Postoperative Steps

Once wound is closed, reassure the patient that the surgery went fine. Nasal packing is optional. When needed, it is important to note that the purpose of this pack is for hemostasis only, so deeper packing like preoperative one should be avoided for it risks damaging the flaps. The patient is placed on oral antibiotics and analgesics.

Follow-Up

After the surgery, the patient is seen on the first postoperative day. The nasal pack if any is gently removed and hemostasis assessed. The wounds are cleaned with 5 % Betadine, and the patient is

advised oral antibiotics and analgesics, topical antibiotics and steroids, and nasal decongestants. One week postoperative, the sutures are removed, oral medications discontinued, topical steroids tapered, and nasal medications continued for two more weeks. The patient is reviewed at 6 weeks for stent removal, if any.

Complications

Complications following external DCR surgery can be divided as early (1–4 weeks), intermediate (1–3 months), and late (>3 months) [1–3].

Early complications include wound dehiscence (Fig. 17.13), wound infection, tube displacement (Fig. 17.14), excessive rhinostomy crusting (Fig. 17.15), and intranasal synechiae.

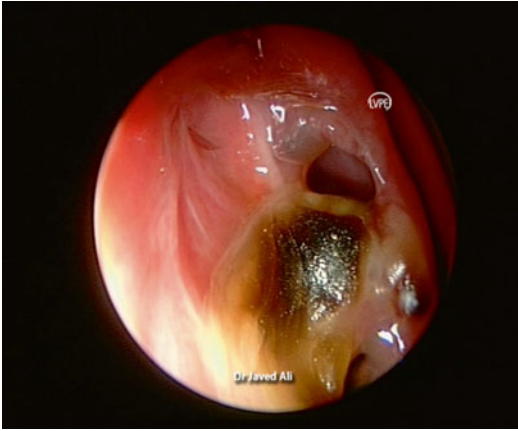


Fig. 17.15 Endoscopic view of rhinostomy scarring

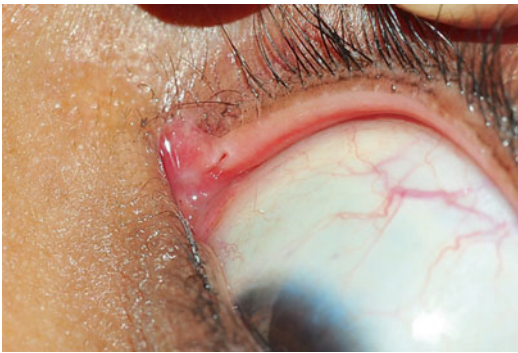


Fig. 17.16 Punctal cheese-wiring

Intermediate complications include granulomas at the rhinostomy site, tube displacements, intranasal synechiae, punctal cheese-wiring (Fig. 17.16), prominent facial scar, and nonfunctional DCR.

Late complications include rhinostomy fibrosis, webbed facial scar, medial canthal distortion, and failed DCR.

Outcomes

A successful DCR is one where there is both anatomical and functional patency. The passage should be patent on irrigation, and the patient should be free of symptoms. The reported success rates of external DCR in literature varies between 85 and 99 % [1–3, 9–11]. These rates

were presumed to be much higher as compared to endonasal or transcanicular, but increasingly literature shows comparable results between both the external and endoscopic approaches [12–15].

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