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Introduction

Dacryocystectomy or DCT refers to a complete surgical extirpation of the lacrimal sac. It was first described by Thomas Woolhouse in 1724 and was the standard of care in its crude form, before the advent of dacryocystorhinostomy for management of dacryocystitis and lacrimal fistulae [1]. Rudolph Berlin later popularized it in the nineteenth century [1]. Dacryocystectomy in its journey since then has unfortunately seen many ups and downs and suffered major humiliation in the 1920s wherein it was described by few authors as “an act of surgical despair”; “a useless and barbaric mutilation”; and “a malpractice.” [1] We have come far from those days and DCT is now considered an important part of the lacrimal surgeon’s armamentarium. The usual approach in most of the cases is through a transcutaneous incision, except in certain exceptional circumstances where endoscopic approach may be needed [2].

Goals

There are two clear goals of the dacryocystectomy procedure. The first is to have a clear plane of sac excision and avoid injury to periorbita and

surrounding bones. The second is to have a complete excision of the sac along with the nasolacrimal duct without leaving any remnants behind. Since both these purposes are well-served by an external route, it is the preferred approach.

Indications

- (a) Dacryocystectomy is one of the recognized surgical modalities for the management of malignant lacrimal sac tumors [3–5]. This may have implications on live salvage, increased survival, or improving quality of life in such patients. Indications apart from this can be considered as relative indications and can be a subject of debate.
- (b) Recurrent dacryocystitis in patients with severe dry eyes [6, 7].
- (c) Dacryocystitis in patients with coexisting bleeding diathesis [6, 7].
- (d) Dacryocystitis in patients with predisposing conditions that cause nasal scarring like cicatricial pemphigoid, systemic lupus erythematosus, and Crohn’s disease [6–8].
- (e) Rare cases of extensive Wegener’s granulomatosis which requires nasal bones for future reconstructions [8].
- (f) Frail elderly patients with chronic dacryocystitis with cardiac or neurological comorbidities [6, 7, 9, 10].
- (g) Elderly patients with dacryocystitis with ocular comorbid conditions that require

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urgent attention like microbial keratitis, advanced cataract, or lens-induced glaucoma, where epiphora is not a serious complaint [11]. The implication here is facilitation of visual rehabilitation.

- (h) Recurrent dacryocystitis in elderly patient on beta-blockers where epiphora is not a serious complaint [10]. Serious systemic toxicity of beta-blockers is aggravated after DCR since there is direct absorption of drug from the nasal mucosa into systemic circulation, bypassing the hepatic metabolism.
- (i) Multiple times failed DCR in patients with dry eyes or recurrent dacryocystitis [6, 12]
- (j) Recurrent inflammation from the remnant of sac in a previously incomplete dacryocystectomy, especially if associated with comorbidities.
- (k) Recurrent chronic dacryocystitis with fibrotic sacs following severe trauma [13].
- (l) Severe atrophic rhinitis [13].
- (m) Lacrimal sac mucopyoceles with nasal malformations [13], congenital partial arrhinia, or nasal hypoplasia.

Advantages

Where indicated, dacryocystectomy has advantages in terms of aiding complete extirpation of tumors, technically easier, less learning curve, quickly performed under local anesthesia, less invasive and does not violate nasal mucosa, minimal bleeding, no hospitalization, early recovery, and overall lesser morbidity [3–11].

Preoperative Requisites

- (a) Confirmation of the diagnosis of dacryocystitis with nasolacrimal duct obstruction
- (b) Imaging modalities like CT-scan and MRI in cases where lacrimal sac tumors are suspected
- (c) Schirmer's test and others for establishing severe dry eyes if any

- (d) Good counseling about the objectives of surgery and persistence of epiphora postoperatively
- (e) Stable medical status
- (f) Bleeding and clotting times (PT/aPTT) and INR if on anticoagulants
- (g) Fitness for anesthesia (LA/MAC vs. GA)

Surgical Technique

Anesthesia

The surgery can be done under general anesthesia or local anesthesia. The latter is the most commonly employed modality. Local anesthesia is given by both infiltration as well as topical application. For infiltration, 2 % lignocaine with 0.5 % Bupivacaine with adrenaline (1:200,000) is used, unless there is a medical contraindication for use of adrenaline. Infratrochlear nerve that supplies the lacrimal apparatus is blocked first. The non-dominant 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-medial canthus and 2 cc of the drug is injected (Fig. 34.1). The tissue along the anterior lacrimal crest is infiltrated subcutaneously and the needle enters deeper at about 3-mm medial-to-medial canthus, and without withdrawing the needle the drug is injected into deeper tissues up



Fig. 34.1 Local infiltration anesthesia



Fig. 34.2 Anterior ethmoidal nerve block

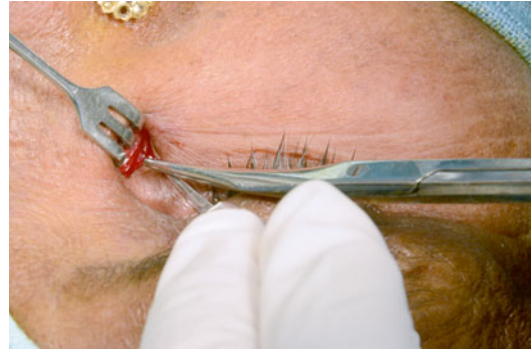


Fig. 34.4 Dissection to reach the periosteum



Fig. 34.3 Curvilinear incision

to periosteum both superiorly and inferiorly to block the nasociliary and anterior ethmoidal nerves (Fig. 34.2). Occasionally, an infraorbital nerve block may be required in cases of wide excision (malignancies). A drop of topical proparacaine is placed in conjunctival cul-de-sac for intraoperative comfort.

Incision

Though various incisions have been described, the author prefers the commonly used curvilinear incision of about 10–12 mm in length, 3–4 mm from the medial canthus along the anterior lacrimal crest and along relaxed skin tension lines (Fig. 34.3). However, extension of this skin incision above the medial canthus can lead to scars

and epicanthic folds. An alternate can be the use of a straight incision at the lateral surface of the nose, 8–10 mm from the medial canthus. In cases of malignant lacrimal sac tumors, the incisions may be much longer and at variable locations based on the size and adjacent spread of the lesion. For example, the Weber–Ferguson incision if lateral rhinotomy is additionally planned. The Ophthalmologist should follow a multidisciplinary approach as appropriate when managing lacrimal sac malignancies.

Sac Exposure

Blunt dissection is carried on to separate the subcutaneous tissues and orbicularis muscle and reach the periosteum (Fig. 34.4). A Freer's elevator is used to separate the periosteum from the bone and reflect it laterally (Fig. 34.5). As the periosteum is being reflected laterally, the anterior limb of medial canthal tendon is noted attached to it just anterior to the anterior wall of the lacrimal sac (Fig. 34.6). The lacrimal fascia, which is contiguous with the periosteum is adherent near the medial canthal tendon and hence reflection of tendon aids in lacrimal sac dissection (Fig. 34.6). The tendon is cut at the suture of Notha and the medial wall of the sac is bluntly separated from the bones of the lacrimal fossa.



Fig. 34.5 Lateral reflection of sac from lacrimal fossa



Fig. 34.7 Complete dissection of sac up to nasolacrimal duct

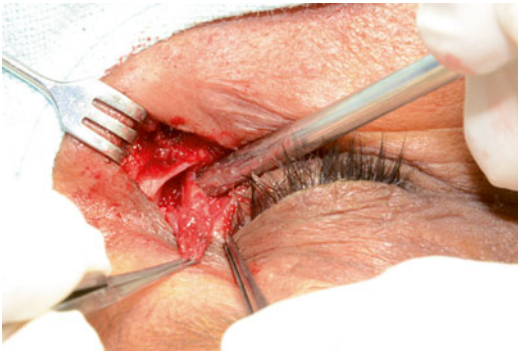


Fig. 34.6 Exposing the medial canthal attachments



Fig. 34.8 Lacrimal sac amputation

Sac Dissection

The lateral wall is separated with the help of Westcott scissors by separating it from the orbicularis oculi. The closed blades of the scissor are then directed downward between the lateral wall of the sac on one side and orbicularis and periorbital on the other. The common canaliculus needs to be severed from the sac during this step. To avoid perforation of sac as well as to detect inadvertent perforation intraoperatively, one can use fluorescein-stained viscoelastics or methylene blue [6, 8]. The sac needs to be filled with either of this material before the beginning of dissection. The superior wall and the posterior wall can be separated from the fascia with a Westcott scissor right up to the nasolacrimal duct (Fig. 34.7).

Sac Amputation

Once the sac is dissected all around and separated from its soft tissue attachments, the sac is amputated at its junction with the nasolacrimal duct (Fig. 34.8). In cases of lacrimal sac tumors, the amputation is carried at a point as far as possible toward the distal nasolacrimal duct. Occasionally, bony nasolacrimal duct along with a lateral rhinotomy or medial orbital wall excision is combined with dacryocystectomy depending on the extent of malignancy.

Cautery

After the sac removal, the common internal canaliculus, nasolacrimal duct stump, and any remnant

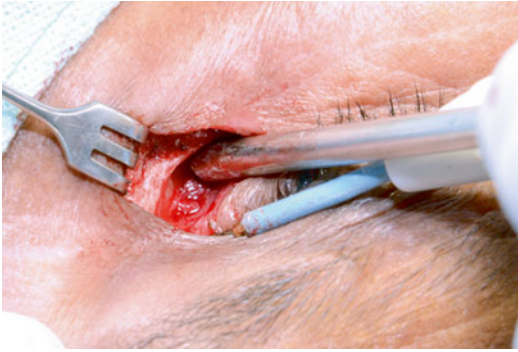


Fig. 34.9 Cautery to secure hemostasis

sac lining should be cauterized to prevent recurrences (Fig. 34.9). The canaliculi are cauterized separately using Ellman Surgitron needle (Ellman Int Inc, New York, USA) in a coagulation mode or with the help of a probe within the canaliculus. The punctum and the canaliculi show an immediate whitish discoloration following a successful cautery.

Wound Closure

Once hemostasis is achieved, the orbicularis is sutured back with 6-0 vicryl followed by skin closure with 6-0 prolene or vicryl or silk based on surgeon's preference.

Extended Dacryocystectomy

Extended dacryocystectomy refers to complete extirpation of lacrimal sac along with any of the surrounding structures like nasolacrimal duct, overlying lacrimal fossa bone, frontal process of maxilla, ethmoids, lateral nasal wall, anterior part of medial orbital wall, and surrounding soft tissues (Figs. 34.10, 34.11, 34.12, 34.13, and 34.14). Extended dacryocystectomy is indicated in lacrimal sac tumors and the extent of tumor infiltration into surrounding structures determines the extent of the surgery [3–5].

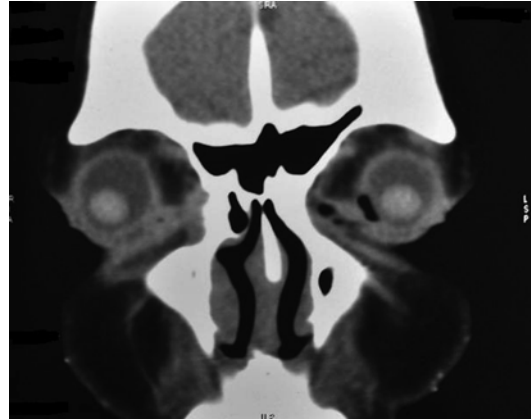


Fig. 34.10 Coronal CT of a lacrimal sac malignancy with lacrimal crest involvement

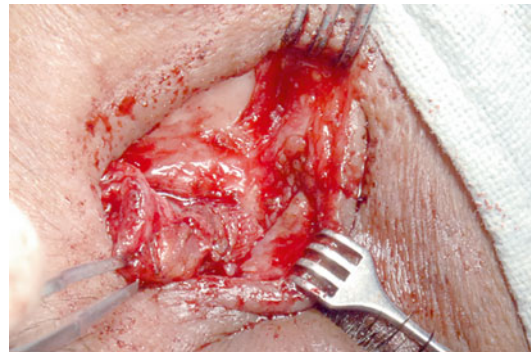


Fig. 34.11 Extended dacryocystectomy showing wide soft tissue margins

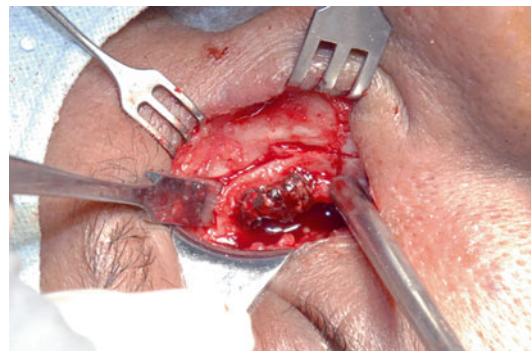


Fig. 34.12 Margins for the bony osteotomy around the tumor infiltration

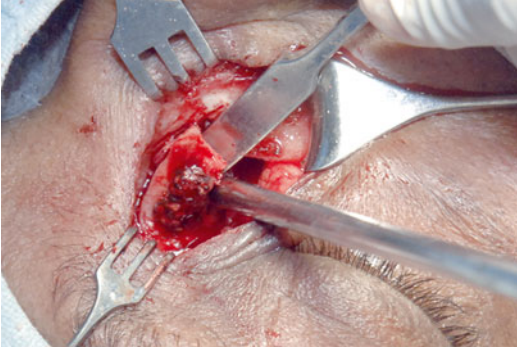


Fig. 34.13 Osteotomy completed

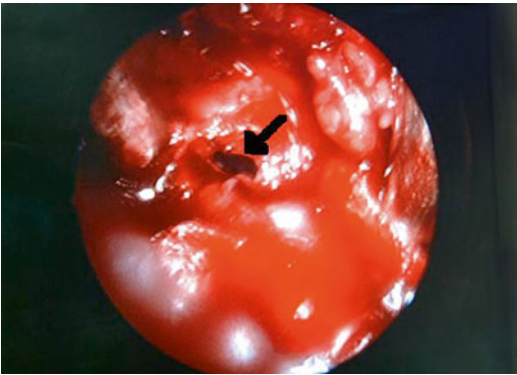


Fig. 34.14 Endoscopic view of the removed nasolacrimal duct till the opening in inferior meatus (*black arrow*)

Endoscopic Dacryocystectomy

Shams and Selva [2] described a bilateral endoscopic dacryocystectomy as an alternative in an elderly patient suffering from chronic dacryocystitis without symptomatic epiphora, where an external incision was undesirable in view of past history of wound infections secondary to picking. This indication can be extended in any case where the mental state of the patient may be a restrictive factor in maintenance of a healthy external wound. The technique is initially just like a routine endoscopic DCR, where after raising the mucosal flaps the osteotomy is performed to expose the lacrimal sac completely. The sac can then be removed completely in one go or piecemeal by incising the sac and removing anterior and posterior walls separately. The common canalicular opening and the remnant nasolacrimal ducts can be cauterized just like in an

external dacryocystectomy. Although endoscopic approach entails bone removal, we believe that a few exceptional circumstances may warrant its need.

Tips for Hemostasis

Although profuse bleeding is rarely expected in a dacryocystectomy, the profile of the patient (bleeding diathesis, anticoagulant therapy) and etiology (tumors) can sometimes influence the need for a preoperative assessment and intraoperative management of hemorrhage. The following can be useful tips in such patients:

- (a) Good preoperative assessment to rule out bleeding diathesis or anticoagulant use
- (b) Preoperative blood pressure assessment
- (c) Raising the head end of the table when needed
- (d) Avoid known blood vessels
- (e) Good illumination and a well-powered suction
- (f) Judicious use of cautery
- (g) Keep materials like gel foam or bone wax in the armamentarium

Postoperative Measures and Follow-Up

Once wound is closed, reassure the patient that the surgery went fine. The wound can be patched. The patient is started on topical antibiotics and oral analgesics.

On the first day after surgery, the patch, if any, is gently removed and wounds are dressed with povidone iodine 5% or other similar drugs based on surgeon's preference along with topical antibiotics and oral analgesics. Extended dacryocystectomy may warrant prophylactic oral antibiotics. Patients who underwent endoscopic dacryocystectomy may need additional nasal decongestants based on surgeon's preference. One week postoperatively, the sutures are removed and medications discontinued. Further follow-ups are tailored according to the indication for which a dacryocystectomy was performed.

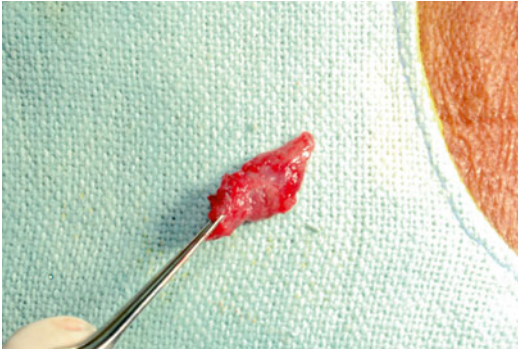


Fig. 34.15 Lacrimal sac for histopathological examination

Histopathology

All samples of lacrimal sac should be examined grossly (Fig. 34.15) to look for any unusual features like any mass, unusual discoloration, diverticulas, and partly missing walls, before sending for a histopathological analysis. In case of lacrimal sac tumors, the margins of the extended dacryocystectomy are studied separately to comment on tumor infiltration and this has significant bearing on further treatment. Lacrimal sacs removed for nontumor indications are also important since a lot of information on chronic inflammatory changes and specific granulomatous disorders that may have been undetected preoperatively can be studied and the information utilized for further management [4, 6]. Recently, there has also been a lot of interest to look into lacrimal drainage-associated lymphoid tissues and its derangements in chronic dacryocystitis [14].

Complications

Complications following a dacryocystectomy are rare. Inadvertent injury to the angular vein may cause profuse bleeding. This can easily be avoided if incisions are not on the site or in close vicinity of angular vein. Other complications include wound dehiscence, wound infection, increased tear meniscus and epiphora, recurrent dacryocystitis secondary to remnant sac, and a prominent facial scar.

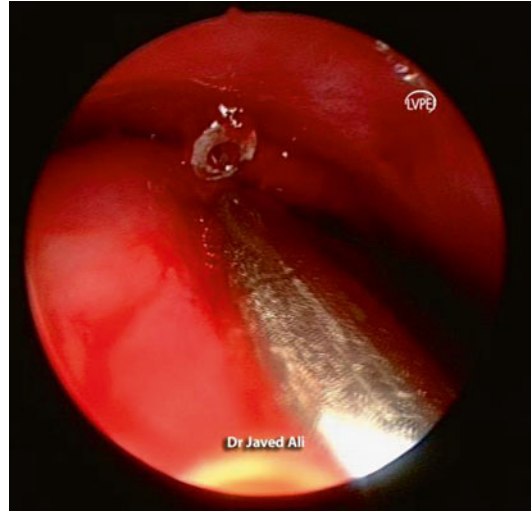


Fig. 34.16 Endoscopic CDCR

Although very rare, two cases of retrobulbar hematomas causing visual loss and one case of orbital cellulitis following a dacryocystectomy have been reported [1, 11]. The possible cause could be violation of periorbita and orbital septum during the surgery, which may result in orbital hemorrhage and hematoma and consequent optic nerve compression and visual loss. In the eventuality of a vision-threatening hematoma, standard protocols for managing a retrobulbar hemorrhage should be followed.

Lacrimal Rehabilitation

Numerous options have been described in the literature for managing epiphora following a dacryocystectomy. The most commonly practiced option is a conjunctivo-dacryocystorhinostomy (CDCR) using either the Jones tubes or Gladstone–Putterman tubes (Fig. 34.16) [15]. A canaliculo-dacryocystorhinostomy has been described in cases where the entire canaliculi are normal with absence of sac following a dacryocystectomy [16]. Occasional cases where a remnant sac is suspected, a regular dacryocystorhinostomy has been described [16]. Botulinum toxin injection into the lacrimal gland to manage epiphora following a dacryocystectomy is still not a well-established or widely practiced procedure.

Conclusion

In conclusion, although dacryocystectomy is a sparingly used lacrimal surgery, it has its own specific and relative indications. Extended dacryocystectomy is a very useful and life-saving surgery in lacrimal sac tumors. It also appears to make sense to perform a dacryocystectomy in recurrent dacryocystitis in patients with dry eye or certain systemic comorbidities. The surgery is technically easier with a quick learning curve and should be taught to ophthalmology residents and Oculoplastics fellows.

References

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