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Conjunctivodacryocystorhinostomy

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Conjunctivodacryocystorhinostomy (CDCR) with tube placement is a procedure that Lester Jones, MD pioneered in 1962 as a treatment for irreparable lacrimal canalicular obstruction. Since then, the procedure has undergone various modifications. In 1982, Murube-del-Castillo[1] described a method of total lacrimal bypass that obviated the need for osteal perforation and provided dependable drainage. In 1990, Arden et al.[2] detailed the use of a bipedicle nasal mucosal flap with temporary stenting. In 1991, Gonnering described a CDCR with a partial caruncullectomy using a transnasal, endoscopic, CO_2 or potassium titanyl phosphate (KTP) laser-assisted approach with good success in appropriately selected cases.[3,4] Contraindications to this technique included suspicious lacrimal sac malignancy and severe bony deformity of the lacrimal fossa, which would prevent accurate transillumination through the lacrimal bone.

Other modifications to the procedure include: blind canalicular marsupialization in cases of punctal atresia or obliteration[5]; wrapping the tube with mucous membrane,[6] saphenous vein,[7] or buccal mucosal grafts[8,9]; and elimination of a visible cutaneous scar by doing a conjunctival incision for primary CDCR.[10] Modifications of lacrimal bypass tubes included addition of a secondary flange, such as in the Gladstone-Putterman tube, which decreases the extrusion rate,[11] and modifications that allow tube fixation by placement of a stabilizing suture.[12]

The main indication for CDCR surgery is symptomatic epiphora resulting from severe disruption of the canalicular system, including punctal or canalicular agenesis.[13,14] Other causes for obstruction that might require a total lacrimal bypass procedure include herpetic infection, tumors, inflammatory conditions, sarcoidosis,[15] Stevens-Johnson syndrome, systemic chemotherapy, radiation therapy, and lacrimal pump dysfunction in facial nerve palsy.[14] Iatrogenic causes of punctal and canalicular obstruction include chronic use of 0.125%–0.25% echothiophate (phospholine iodide),[16] docetaxel,[17] and permanent punctal (proximal canalicular) occlusion used to manage keratoconjunctivitis sicca.[18,19] Trauma and idiopathic disease remain the most common

causes of lacrimal canalicular obstruction, as reported by Sekhar et al.,[20] and Zilelioglu and Gunduz,[21] with 34.8% and 68.5% (13.5% trauma), respectively. Common infectious causes of lacrimal drainage obstruction include: trachoma, *Aspergillus*, *Actinomyces*, *Diphtheria*, and *Streptococcus* organisms.[22] Stagnant lacrimal sac contents can act as culture media for microorganisms such as *Staphylococcus*, *Streptococcus*, gram-negative organisms,[23] and tuberculosis.[24]

Procedure

CDCR is a dacryocystorhinostomy performed in conjunction with placement of a total lacrimal bypass tube such as a Jones, or Gladstone-Putterman, or Cooper tube. Most tubes are made of Pyrex glass (Weiss Scientific Glass Blowing Company, Portland, OR) (Figure 14.1).

After exposing the lacrimal fossa, attention is directed toward placement of the tube. A linear slit is made in the caruncle or subtotal removal of the caruncle is performed so the tube will be well situated in the nasal end of the interpalpebral fissure. A large-gauge needle, von Graefe knife, or 15 blade, is passed into the nose through the caruncular slit and ostomy in an anteromedial and inferior direction (Figure 14.2). The tip of the instrument should be located anterior to the top of the middle turbinate. The intranasal septum must be sufficiently away from the lateral wall of the nose for adequate space of the distal end of the tube. A fine Quickert-Dryden lacrimal intubation probe is placed through the needle lumen into the nose. As the needle is withdrawn from the nose, the distance from the caruncle to the nose should be measured, to determine the length of the tube that is needed. Alternatively, the probe can be passed through the opening made with

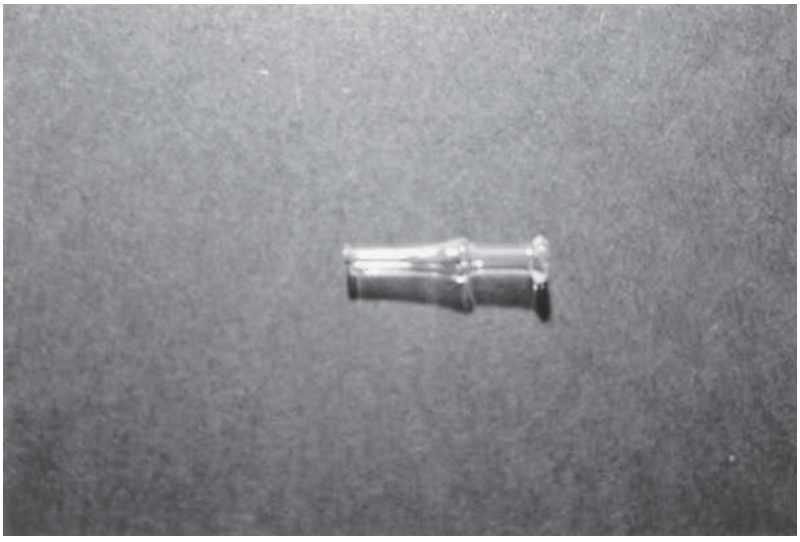

FIGURE 14.1. Gladstone-Putterman tube.

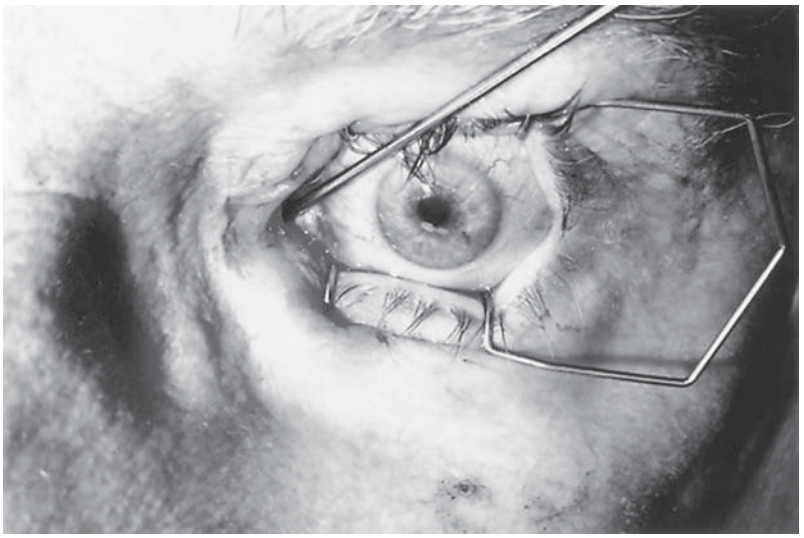

FIGURE 14.2. Creation of a linear slit through caruncle.

the knife or blade. The probe is used as a guide for passing the glass tube directly into the nose (Figure 14.3). A suture is placed around the neck of the collar or through a fixation hole in the collar to anchor the tube to adjacent tissues. Another method for placing the tube is to use a glaucoma trephine over a solid guide.

The authors prefer a 3.5- to 4.0-mm collar size on a straight tube. Tubes come in many collar sizes and can be angulated. When the tube becomes well seated, it is not unusual to need a smaller collar size and different length tube. If it is necessary to change tubes, a gold dilator can be placed to keep the passage open (Figures 14.4 and 14.5).

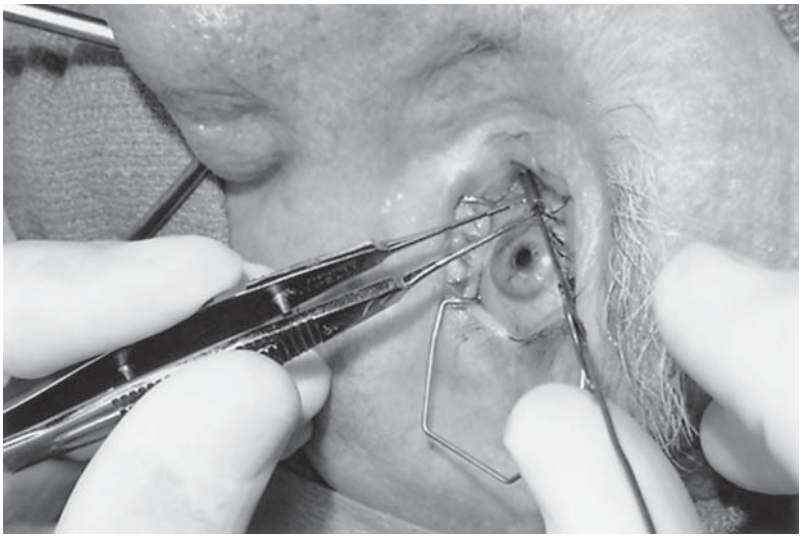

FIGURE 14.3. Passage of total bypass tube over lacrimal probe.

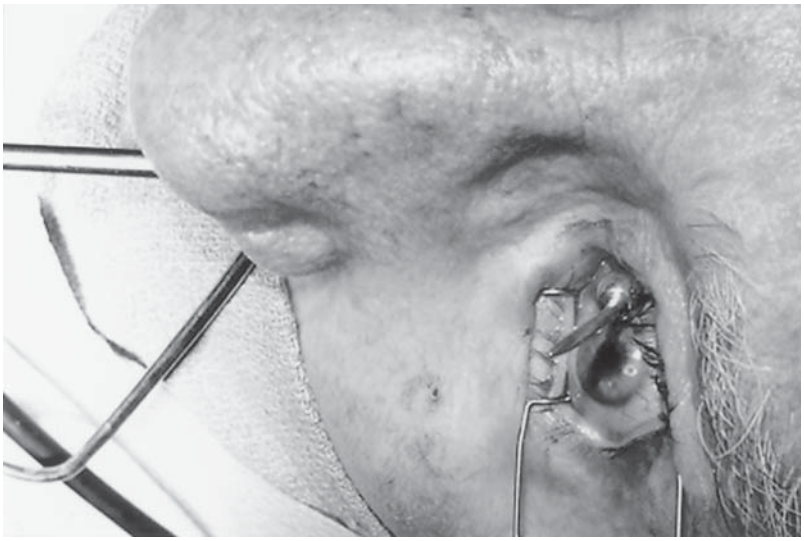

FIGURE 14.4. Gold dilator.

Postoperatively, the patient should be treated with topical antibiotics or antibiotic/steroid eye drops. The patient should be encouraged to irrigate water or saline through the tube daily on a long-term basis to prevent protein buildup[25] and mucous plugging. Having the patient temporarily occlude the contralateral nostril can help the flow through the tube. It is important to inform the patient to close the eyelids when sneezing to avoid reflux or displacement of the tube.

Patients who lose their tubes are at risk of fistula track closure.[8] Steinsapir et al.[26] believe that the tube should remain permanently in

FIGURE 14.5. Endoscopic view of total bypass tube in the left nasal vault.

place, based on their study of 75 patients over a 16-year period. Jones[27] believed that once the fistula tract was epithelialized, the tube could be removed. Lim et al.[28] reported on five eyes in which the tube had been lost; one was a complete success, two were moderate successes, and one was a failure.

In a small series of patients, Leone[8] described similar findings to Campbell et al.,[6] in which 17 patients had a full-thickness buccal-mucosal graft to line the CDCR tract, to prevent closure in the event that the tube came out. Two patients lost their tube from rubbing their eye, one was lost in the nasal cavity, and two elected to have their tubes removed after 6 months. All of these patients remained asymptomatic with primary dye tests demonstrating patency of their reconstructed lacrimal apparatus. Twenty-four percent of grafted patients remained asymptomatic after removal of the Jones tube, between 6 months and 3 years after surgery. Lower success rates (2 of 11 patients) were reported by Can et al.[9]

After CDCR, the conjunctival flora of the eye (in some patients) became similar to nasal flora secondary to retrograde flow of lacrimal and nasal secretions. This may be important in terms of infection risk, especially in patients who are candidates for intraocular surgery. In a study by Can et al.,[9] the number of cases (20 eyes) in which bacteria was isolated from the operated eye and nose (50%) but not from the nonoperated eye included: *Staphylococcus aureus*,[4] *Corynebacterium* sp.,[2] a-hemolytic streptococci,[1] gram-negative bacilli,[1] and pneumococcus.[1]

Overall complication rates postoperatively have ranged from 51%[21] to 63.6%,[9] of which the primary complication was extrusion of the lacrimal bypass tube. Can et al.[9] reported that complications rates were less (21.4%) when CDCR procedures were performed in conjunction with buccal grafts, because there was less irritation resulting in conjunctival overgrowth and granuloma formation, which accounted for 31.8% of complications resulting from standard CDCR. The rate of complication seen in a series of 121 patients who had CDCR performed in the study by Rosen et al.[29] was similar (49%).

Reports of significant and symptomatic medial conjunctival inflammation that developed after CDCR despite aggressive medical treatment were described by Abel and Meyer.[30] Inflammation persisted despite the removal of the Jones tube, and the second patient had what resembled an injected pterygium that formed and was later excised. Histopathologic examination revealed conjunctival tissue with fibrosis, without subepithelial elastotic degenerative changes.[30]

Persistent episcleritis and atypical facial pain, scleral erosion and ulceration, and lower eyelid inflammatory masses have been described by Bartley and Gustafson[31] as complications seen in a limited series of patients who underwent bilateral CDCRs. Other complications include conjunctival overgrowth, internal extrusion, and bypass tube malposition. Some complications such as obstruction, anterior migration, infection, discomfort, including irritation and pain, and diplopia on extreme lateral gaze caused by scarring of the medial bulbar conjunctiva can be prevented or corrected by correct placement of the fistulous tract.[28]

In another report, extrusion was seen in 57.9%, 40 of 69 eyes, of which 57.5% of the extrusions were seen in the first 3 months after the operation.[20] Can et al.[9] found that extrusion and migration accounted for 50% of cases. This complication occurred in most cases within the first 6 months postoperatively. Additional postoperative complications mentioned by Kulwin et al.[32] (1990) included pyogenic granuloma of the caruncle, corneal abrasion, granulation tissue in the nose, wound infection, nasal septal hematoma, and mucous obstruction. They advocated middle turbinectomy and septoplasty to enlarge the middle meatal air space, so that the tube can project 3 mm beyond the lateral nasal wall mucosa, and away from the septum.

Functional outcome is, of course, the key to determining the level of satisfaction with using the Jones tube in the CDCR procedure. A completely successful outcome was defined as a comfortable, epiphora-free eye despite frequent complications. The success rate using this definition ranges from 92.6% (Rosen et al.[29]) to 98% (Sekhar et al.[20]), and 94% (Lim et al.[28]) with complete or significant improvement of epiphora in 49 cases, of which 32 patients (70%) were satisfied with the result; 35% reported tube maintenance to be troublesome. This is somewhat higher than what was reported by Rosen and colleagues[29] who reported an 11.6% dissatisfaction rate of successfully treated patients. Overall, success rates have ranged from 83% from the original Jones tube procedure, up to 90%[21] and 94%–95% with regard to complete relief of epiphora and lacrimal obstruction; the success rate is somewhat higher for endoscopic CDCR in well-chosen patient populations.

The highest rate of dissatisfaction was in patients over 70 years of age (22%), and under 19 years of age. Complaints included tearing in the recumbent position, fogging of eyeglasses, and air blowing in the eye upon sneezing or blowing the nose. Successfully patent mucous membrane-lined fistulous tracts after Jones tube expulsion have been reported.[25,33]

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