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Invited Review

Evaluation and Treatment of Congenital Nasolacrimal Duct Obstruction

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Abstract

Congenital nasolacrimal duct obstruction is a common problem in neonates that can result in epiphora, superimposed infection, or amblyopia. The aim of this review was to examine causes and current management of this problem in the pediatric population. Before 1 year of age, a conservative approach with the help of the parents is preferred. Afterwards, an interventional approach is recommended to overcome obstruction of the nasolacrimal duct.

Keywords: Balloon dacryoplasty, congenital nasolacrimal duct obstruction, probing, silicone intubation in children.

Introduction

Congenital nasolacrimal duct obstruction (CNLDO) is a common problem in the pediatric population with an incidence of 6% to 20% in newborns, and it is bilateral in approximately one-third of cases (1-5). The problem is usually at the Hasner valve, where the nasolacrimal duct would open into the inferior meatus of the nasal cavity (6). As demonstrated in the study of Weiss et al. the obstruction may be due to a persistent membrane at the distal end of the duct, a bony obstruction, or a narrowing of the inferior meatus (7).

The most common symptoms are epiphora, mattering of lashes with an overflow of tears, chronic or recurrent conjunctivitis caused by bacterial overgrowth in the sac, and maceration of the skin around the eye. Associated preseptal or orbital cellulitis may complicate the problem and require hospitalization and systemic antibiotic treatment. High tear meniscus, distension of the lacrimal sac and expression of mucopurulent material on compression are the signs of CNLDO. A fluorescein dye disappearance test, conducted by administering an anesthetic agent and then applying a fluorescein drop or moistened fluorescein paper strip to the inferior fornix can confirm the diagnosis. In a patent system, dye should disappear from the conjunctival cul-de-sac after 5 minutes upon examination of the eyes with a cobalt blue filter (8). MacEwen and Young (9) reported that this test had 90% sensitivity and 100% specificity for CNLDO in their preliminary study, and Bowyer et al. (10) postulated that reading the test at 5 minutes demonstrated 76% sensitivity and 76% specificity.

Epiphora caused by excess tear production due to irritation, trichiasis, distichiasis, abnormal eyelid position, a foreign body, or corneal abrasion should be considered in the differential diagnosis of CNLDO. Infantile glaucoma is another condition that should be kept in mind as a cause of epiphora, photophobia with blepharospasm, and corneal edema.

Dacryocystocele, also called amniocele, and mucocele, presents as a blue, non-inflamed mass inferior to the medial canthal area, seen 1 in 3900 live births and 0.1% of infants with CNLDO (3, 6, 11). It is caused by dual obstruction of the nasolacrimal system at the junction of the common canaliculus-lacrimal sac and at the opening of the nasolacrimal

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duct to the nose (8, 12). Because infants are obligate nasal inhalers, intranasal extension of the dacryocystocele can result in respiratory distress (13, 14).

Management

Remission of epiphora with non-surgical treatment was reported in 66% of infants aged 6 to 10 months who were followed up for 6 months (15) and 96% by 1 year of age (3). Urgent surgical treatment is unnecessary in the first year; education of the parents on conservative treatment is the mainstay of therapy. Lacrimal sac massage, first described by Crigler (16) in 1923, which entails gently compressing the lacrimal sac until the fingertip reaches the inferior medial orbital rim, performed 3 to 5 times, twice daily after cleansing the lashes with cooled boiled water, has been recommended to parents. The administration of antibiotic drops before massage is necessary in cases of purulent discharge. Massaging in a downward fashion increases the hydrostatic pressure inside the nasolacrimal canal and ruptures the membranous Hasner valve and also helps to drain discharge inside that, had it remained, could result in infection (6). Parents should be warned about signs of dacryocystitis and orbital cellulitis. Systemic antibiotic therapy is necessary in cases of acute dacryocystitis and preseptal or orbital cellulitis. Dacryocystoceles require decompression with massage and urgent probing with or without excision of an intranasal extension of dacryocystocele.

After 1 year of age, probing of the nasolacrimal system is the main approach. Early (6-9 months) vs late (6 months of observation, after 1 year of age) probing was studied prospectively by the Pediatric Eye Disease Investigator Group (PEDIG) (17). Similar success rates were reported; however, 66% of cases in the late group resolved without intervention. Early probing decreases the risk of fibrosis and the duration of chronic discharge; avoids the risk of complications, such as dacryocystitis, fistula formation, and orbital cellulitis; and can be performed under local anesthesia in an office setting (4, 6, 18). Katowitz et al. (18) reported a success rate of 97% for probing in patients younger than 13 months of age, 54.5% for patients older than 13 months, and 33% for patients older than 24 months, and they recommended conservative therapy until 1 year of age (18). Repeat probing can be performed in patients who still have epiphora despite successful initial probing and patent nasolacrimal lavage (4). In the PEDIG study, the success rate in a second intervention was 56% for repeat probing, 77% for balloon catheter dilatation, and 84% for intubation (19, 20).

In the event of canalicular stenosis, hypertrophy of the Rosenmüller valve, a history of dacryocystitis, or an inability to pass the probe into the inferior meatus, lacrimal intubation or balloon dacryoplasty, with or without fracture of an inferior turbinate, is the treatment of choice (4, 6). The success rates of monocanalicular and bicanalicular intubation are similar (21). However, performing monocanalicular intubation and removal of the tube is easier and less harmful (6, 12). A simple square knot at the end of bicanalicular stents helps with easy removal from the upper lacrimal system, which is the preferred approach in our clinic. Silicone intubation dilates stenosis in the lacrimal system and prevents the formation of granulation tissue along the lacrimal system following probing (12). Potential complications of tube implantation include corneal abrasion due to tube contact, early extrusion of the tube, slitting of the punctum or the canaliculus, sinusitis, epistaxis, and pyogenic granuloma formation. The optimal timing of tube removal is 2 to 6 months after insertion (6, 12, 22, 23). Tube removal at 6 weeks is usually effective in children younger than 2 years old. However, 3 months is the recommended time for older children (22).

Another alternative approach for failed probing is balloon dilatation of the distal nasolacrimal duct. In this technique, inflation of a balloon at the end of a probe can be effective in diffusely dilating the lacrimal system and opening adhesions or constrictions due to chronic infection (4) with a reported success rate of 76% to 83% (24).

Nasal endoscopy during all of the procedures discussed above helps with visualization of exit of the instruments from their true location and with the anatomical relationship of the nasal structures, as well as avoiding false passages, which have been reported to occur as often as in 15% of cases (25). Dacryocystorhinostomy (DCR) is indicated in patients with persistent epiphora despite probing, silicone intubation, or balloon dacryoplasty; with craniofacial abnormalities; and with bony or traumatic obstructions (4, 26). The success rate for DCR in children is between 85% and 95% (12). Ill-defined anatomy, such as a poorly developed lacrimal crest, shallow lacrimal fossa, or anteriorly placed ethmoidal cells, are among the difficulties of pediatric DCR (4, 27).

It has been demonstrated that risk of amblyopia increases with CNLDO. The incidence of anisometric amblyopia associated with CNLDO is 10% to 12% (28-30). It is important to be alert for amblyopia by performing cycloplegic refraction and examining children periodically until 4 years of age.

Conclusion

The initial treatment of a child with CNLDO who is younger than 1 year of age is primarily lacrimal massage of the sac, with or without antibiotics. In a case of persistence of symptoms and obstruction, probing is performed at around 1 year of age. An inferior turbinate can be fractured if the inferior meatus is narrow due to the close apposition of an inferior turbinate to the lateral nasal wall. If the obstruction remains unresolved and if the initial probing was easily performed, a second probing may be attempted. If epiphora still persists

after interventions, intubation of the nasolacrimal system or balloon dacryoplasty can be performed. Dacryocystorhinostomy is indicated only in intractable conditions, such as anatomical and/or traumatic abnormalities. Amblyopia is a risk factor in children with CNLDO; therefore, they need be examined until 3 to 4 years of age.

Disclosures

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Conflict of Interest: None declared.

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