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Ophthalmic Technology Assessment

Balloon Dacryoplasty for Congenital Nasolacrimal Duct Obstruction

A Report by the American Academy of Ophthalmology

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Purpose: To identify the efficacy and adverse event rates of balloon dacryoplasty in cases of congenital nasolacrimal duct obstruction in children who fail to respond to an initial nasolacrimal duct probing.

Methods: A literature search was last performed in September 2017 in the PubMed database to identify all reports of balloon dacryoplasty. All searches up to and including the last search were limited to the English language, and they yielded 104 articles that were assessed for relevancy. Thirty-six articles were selected for full review, and 8 of these were selected for inclusion in this assessment and assigned a quality of evidence rating by the panel methodologist.

Results: Three of the 8 studies included in this assessment were rated level II, and 5 were rated level III. Success rates varied from 75% to 100%. Only 2 complications were identified, and these were cases of self-limited postoperative emesis. The 2 studies that compared balloon dacryoplasty with lacrimal stenting reported that outcomes were comparable between the 2 techniques.

Conclusions: Although level I evidence was not available, the studies that were uncovered in the literature review indicate that balloon dacryoplasty is a safe, effective procedure to address congenital nasolacrimal duct obstruction that persists after standard probings. The outcomes of this intervention are similar to those of lacrimal stenting, and the absence of an implanted stent theoretically reduces the risk of complications. *Ophthalmology 2018;■:1–5 © 2018 by the American Academy of Ophthalmology*

The American Academy of Ophthalmology prepares Ophthalmic Technology Assessments to evaluate new and existing procedures, drugs, and diagnostic and screening tests. The goal of an Ophthalmic Technology Assessment is to review systematically the available research for clinical efficacy and safety. After review by members of the Ophthalmic Technology Assessment Committee, other Academy committees, relevant subspecialty societies, and legal counsel, assessments are submitted to the Academy's Board of Trustees for consideration as official Academy statements. The purpose of this assessment by the Ophthalmic Technology Assessment Committee Oculoplastics and Orbit Panel is to review the published literature on the efficacy and safety of balloon dacryoplasty in cases of congenital nasolacrimal duct obstruction that fail to respond to an initial nasolacrimal duct probing.

Background

Congenital nasolacrimal duct obstructions result in mucoid discharge and infection in the lacrimal system.[1-3] Although the majority (90%)[4] of these blockages resolve with conservative care during the first few months of life, nasolacrimal duct probing is often required to alleviate persistent symptoms. This intervention is successful in the majority (78%–97%) of patients. Physicians have several surgical options to address recalcitrant congenital nasolacrimal duct obstructions, including a repeat nasolacrimal duct probing, stenting of the lacrimal system, balloon catheter dilation of the nasolacrimal duct (balloon dacryoplasty), and dacryocystorhinostomy.[5,6]

Repeat nasolacrimal probings carry reduced efficacy, and previous success rates have ranged from 25% to 64%.[5-7] Although the placement of lacrimal stents carries a high success rate (100% in some studies) in the management of congenital nasolacrimal duct obstructions that fail to resolve with a primary probing, there are certain disadvantages to using this modality.[8] Focal damage to the punctum and canaliculus, premature stent extrusion with symptom recurrence, and corneal damage have all been documented when this approach was used.[9] Furthermore, removal of the stents may require additional general anesthesia.[10]

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Over the past several decades, balloon dacryoplasty has emerged as a popular option to address recalcitrant nasolacrimal duct obstructions. This technique involves passing a lubricated, inflatable balloon along a guide wire into the nasolacrimal duct and through the level of obstruction.[11] The balloon is then inflated for 90 seconds to dilate the obstruction, deflated, and reinflated a second time or removed. Theoretically, this technique offers relief of epiphora with fewer complications and without the need to return to the operating room to remove inserted stents.

Question for Assessment

The focus of this assessment is to address the following question: Does balloon dacryoplasty for congenital nasolacrimal duct obstructions in children who have failed an initial probing relieve patients of symptomatic epiphora?

Description of Evidence

A literature search was originally performed in September 2017 and last conducted in April 2018 in the PubMed database. Articles were limited to original research in which an English language abstract was available, and only those articles that assessed the use of balloon dacryoplasty in children who had failed an initial probing were included. Articles that reported outcomes in 10 or fewer patients or that did not specifically address patients who failed an initial probing were specifically excluded. The search strategy used the search terms *lacrimal, nasolacrimal, tearing, balloon, dilatation, dacryoplasty, LacriCATH,* and *nasolacrimal duct obstruction*.

A total of 104 articles were identified for review to ensure that they met the inclusion criteria, and 36 were selected for full review. Eight articles were selected for data abstraction, and the panel methodologist (V.K.A.) assigned a level of evidence rating based on the Oxford Centre for Evidence-Based Medicine.[12] A level I rating was assigned to well-designed and well-conducted randomized clinical trials; a level II rating was assigned to well-designed case-control and cohort studies and lower-quality randomized studies; and a level III rating was assigned to case series, case reports, and lower-quality cohort and case-control studies. Three studies met level II criteria, and 5 studies met level III criteria. There were no level I studies.

Published Results

A summary of the 8 studies included in this assessment is presented in Table 1.

Level II Study Outcomes

The Pediatric Eye Disease Investigator Group compared the impact of balloon dacryoplasty (n=84) with silicone stenting (n=88) in children who had failed nasolacrimal probing.[13] Success was defined as the absence of tearing, absence of mucous discharge, and absence of an increased tear meniscus 6 months after a lacrimal intervention. The rates of success were generally comparable between the balloon procedure (77%) and the stent placement (84%). Complications were rare and self-limited in the balloon dacryoplasty group; 1 child experienced emesis with possible aspiration. The nature of the aspirated fluid was not specifically described.

Likewise, Goldstein et al[14] compared monocanalicular stenting (n = 35) with dacryoplasty (n = 42) in obstructed lacrimal systems that were refractory to probing. Patients were followed for at least 3 months after surgery. A dye disappearance test was used to evaluate results, and a historical review of symptoms was conducted to assess success after surgery. Stent placement was successful in 91% of patients, whereas dacryoplasty was successful in 86%. The outcomes for the 2 procedures were not significantly different statistically.

Casady et al[8] evaluated a sequential algorithm to treat congenital nasolacrimal duct obstructions. Initially, patients were treated using simple nasolacrimal duct probing. Patients who failed probing underwent balloon dacryoplasty, and the relatively small fraction of patients who did not respond to balloon dacryoplasty then underwent stenting. The authors noted resolution in 32 of 39 patients (82.1%) who required balloon dilation.

Level III Study Outcomes

Becker et al[15] followed 34 patients who had previously undergone nasolacrimal duct probing for a mean of 6 months after balloon dacryoplasty. The authors defined patency as the absence of tearing or discharge after 6 weeks, a normal tear meniscus, and a normal fluorescein dye disappearance test. This study demonstrated that dacryoplasty was successful in 32 of 34 patients (94.1%).[15]

Cho et al[16] used a standardized tearing scoring system whereby epiphora was graded on a range from 0 (no epiphora) to 5 (constant tearing). At a mean follow-up of 16 months, 13 of 13 patients (100%) who failed an initial probing improved from grade 5 to grade 0 after balloon dacryoplasty.

Lueder[17] used a similar methodology to assess the outcome of balloon dacryoplasty in 52 eyes of 32 patients who were refractory to a first probing. Outcomes were graded as "excellent" if symptoms and drainage resolved completely, "good" if symptoms became mild or the dye disappearance test was mildly delayed, "fair" if the responses were moderate, and "poor" if symptoms failed to improve. This study identified only 1 complication; a patient aspirated blood and recovered without any long-term problems or without developing pneumonia. Twenty-eight percent of outcomes were excellent, 47% were good, 22% were fair, and 3% were poor.

Tao et al[18] assessed dacryoplasty as a secondary procedure, and at a 4-week follow-up, 29 of 39 patients (74.4%) who did not respond to an initial probing experienced complete resolution of their symptoms. Tien and Young[19] found a similar success rate in 39 eyes of 26 patients; at a mean follow-up of 23 months, the authors reported that 32 of 39 eyes (82%) experienced resolution of epiphora.

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