



Review article

The outcomes of endoscopic dacryocystorhinostomy in children: A systematic review



Federico Maria Gioacchini ^{a,*}, Matteo Alicandri-Ciufelli ^b, Shaniko Kaleci ^c, Massimo Re ^a

^a Otolaryngology Department, Marche Polytechnic University, Ancona, Italy

^b Otolaryngology Department, University Hospital of Modena, Modena, Italy

^c Department of Diagnostic Medicine, Clinical and Public Health, University Hospital of Modena, Modena, Italy

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ABSTRACT

Objectives: To systematically review and discuss the published results about the application of endoscopic dacryocystorhinostomy in treating children with nasolacrimal duct obstruction.

Methods: In October 2014 an appropriate string was run on PubMed to retrieve all relevant articles. A cross-check was performed by two of the authors on abstracts and full-text articles found using the selected inclusion and exclusion criteria. A non-comparative meta-analysis concerning the procedures' rate of success and failure was performed.

Results: Fourteen studies were identified comprising a total of 346 subjects affected by nasolacrimal duct obstruction (unilateral or bilateral). Overall there were 393 surgical procedures, all performed with an exclusive endoscopic approach. The average length of follow-up was reported in twelve studies resulting 15.2 months and ranging from 3 to 27.1 months. On the basis of our statistical analysis the mean (95% CI) rate of failure was 0.14 (0.09–0.21). The mean (95% CI) rate of success resulted 0.87 (0.80–0.91).

Conclusions: Although in young patients the nasal anatomy is more complex and narrow than in adults our review showed as the endoscopic dacryocystorhinostomy allows similar results in terms of success compared to the external approach.

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1. Introduction

Nasolacrimal duct obstruction (NLDO) is the most common cause of persistent tearing and ocular discharge in children occurring in up to 20% of all normal newborns and causing symptoms in up to 6% of children during the first year of life [1].

Congenital NLDO usually results from a failure of canalisation of the distal end of the nasolacrimal duct with persistence of a membranous web at the level of the Hasner valve [2].

The acquired type of NLDO obstruction accounts for a relatively small number of cases of this condition in children, and its etiologies have not been investigated completely.

NLDO in children has a high rate of resolution without surgery. Medical treatments consist of compression or massage of the nasolacrimal sac and topical antibiotics when a discharge is present.

* Corresponding author. Tel.: +3771525135/+3490069191.
E-mail address: giox83@hotmail.com (F.M. Gioacchini).

However after 12 months of age, the likelihood of spontaneous resolution decreases and most patients are treated with probing or intubation of the nasolacrimal drainage system [3–7].

Refractory cases of sachal and post sachal obstructions have been historically managed by external DCR. This procedure was first described by Toti in 1904 [8] and represents a highly effective procedure for the correction of a common NLDO in children unresponsive to medical therapy, probing(s) and intubation [9–11].

With the advent of rigid nasal endoscopes and fiberoptic light carrier systems, surgical access through the nasal cavity had been greatly enhanced because of better illumination and magnification [12]. Overall, the endonasal approach presents many advantages over the external one [13–15]. Unlike external DCR, endoscopic DCR allows the drainage of an obstructed lacrimal sac and system without a facial incision and subsequent scar. Endoscopic DCR also causes less surgical trauma to medial canthal and orbital tissue and causes less bleeding than is observed in conventional surgery [16]. For these reasons during recent years, DCRs in adults have increasingly been performed endoscopically and studies have shown that the success rates of external and endoscopic DCRs have been comparable [17,18]. Nevertheless, the data on endoscopic DCR in children are limited and the issue about the advantages of its application is still open.

Analyzing the reports published about this topic, our aim was to investigate the outcomes of endoscopic DCR for the treatment of pediatric NLDO.

2. Materials and methods

In October 2014, a literature search was performed using the following search string on PubMed:

- (“Child” [Mesh]) and “Dacryocystorhinostomy” [Mesh]

The initial search returned a total of 307 results. Abstracts and titles obtained were screened independently by two of the authors (FMG and MR) who subsequently met and discussed disagreements on citation inclusion.

Inclusion criteria for citations were:

- Reports presenting cohorts of patients with diagnosis of NLDO
- Exclusion criteria for citations were:
 - Studies concerning others techniques than endoscopic DCR
 - Studies describing clearly unrelated pathologies.

Between the 307 articles, 23 met the initial inclusion criteria according to both authors (FMG and MR), so they were obtained and reviewed in detail by the same two authors, who met and discussed disagreements on article inclusion. Inclusion criteria for full text articles and single patients identified were:

- Sufficient and accurate description of surgical procedure
- Sufficient and accurate presentation of post surgical outcomes.

Exclusion criteria were:

- Analysis including groups of adult patients
- Analysis including patients treated with others techniques than endoscopic DCR.

A total of eleven studies were excluded because of insufficient data about the surgical procedure (one study) and post surgical outcomes (three studies) while seven studies were ruled out

because patients treated with others techniques were comprised. A further manual check was performed on the references included in the articles and two additional studies were identified that met the inclusion criteria. The final number of articles included in the present review was identified, and the main information was extracted and summarized.

We performed a non-comparative meta-analysis and the heterogeneity between studies was assessed by the χ^2 -based Cochran’s *Q* statistic test and *I*² metric. Heterogeneity was considered significant at $p < 0.01$ for the *Q* statistic (to assess whether observed variance exceeds expected variance). And for the *I*² metric ($I^2 = 100\% \times (Q - df)/Q$), the following cut-off points were used: *I*² = 0–25%, no heterogeneity; *I*² = 25–50%, moderate heterogeneity; *I*² = 50–75%, large heterogeneity; *I*² = 75–100%, extreme heterogeneity. All analyzes were performed using Comprehensive Meta-Analysis statistical software, version 2.0 (Biostat, Englewood, NJ, USA).

3. Results

After an initial check, full-text retrieval, and manual cross-checking of references included in the articles, 14 studies comprising a total of 346 subjects and 393 surgical procedures were chosen for analysis (Fig. 1). The characteristics of these selected studies are showed in Table 1.

The majority of the included studies were performed with a retrospective cohort design (only two reports being prospective). The average length of follow-up was reported in thirteen studies resulting 15.2 months and ranging from 3 to 27.1 months.

Overall, the number of patients in each study included in this analysis varied from 6 to 71.

Patients’ mean age was reported in ten studies varying from 3.9 years to 11.2 years.

Overall 161 NLDOs were congenital while acquired NLDOs resulted 12, but it must be noted that the majority of reports did not specified the origin of NLDO.

The 2.7 mm and 4 mm nasal endoscopes were equally used by different surgeons. To perform osteotomy many authors reported the application of a powered diamond burr while others preferred a Kerrison rongeur or a punch. In two studies (Cakmak et al. and Uysal et al.) a laser technique was applied.

Concerning the placement of silicone tube, between eleven articles (comprising overall 297 procedures) specifying this detail, there were 240 (80.8%) placements.

No major complications were reported in the articles analyzed. Among minor complications were described four cases of nasal synechiae, three cases of nasal granulomas, one abscess, one case of mild postoperative epistaxis and one important intraoperative bleeding.

In the majority of studies the success was defined as a “complete resolution of the symptoms of tearing and discharge”. In four articles the success was considered as a “symptomatic relief” while one study defined the surgical outcome on the basis of “fluorescein dye disappearance test (FDT)”.

3.1. Statistical analysis

The rate of total failure in the 14 included studies is illustrated in Fig. 2. The total number of included procedures was 393. Results were moderate heterogeneity ($Q = 30.5$, $I^2 = 57.4\%$, $p = 0.004$) and statistically significant. The mean (95% CI) rate of failure was 0.14 (0.09–0.21).

The rate of total success in the 14 included studies in illustrate in Fig. 3. The total number of included procedures number was 393. Results were moderate heterogeneity ($Q = 30.7$, $I^2 = 57.6\%$,

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