

Efficacy and predictive factors of endoscopic dacryocystorhinostomy: a 10-year retrospective study

Original Article

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Abstract

Objectives: To evaluate the efficacy of primary endoscopic dacryocystorhinostomy (DCR) with stent placement and identify predictive factors of success at 6 months.

Study Design: Retrospective observational study.

Material and Methods: Patients aged ≥ 18 years who underwent primary endoscopic DCR with stent placement between 2013 and 2023 were included. A logistic regression model was created to establish the association between possible predictive factors and patency at 6 months postoperatively. Odds ratios (OR) with 95% confidence intervals (CI) were calculated.

Results: A total of 70 DCRs were included. The success rate was 83%. The use of corticosteroid eye drops was associated with patency at 6 months [OR = 4.56 (95% CI: 1.39-15.02)].

Conclusions: Endoscopic DCR is effective and postoperative topical ocular corticosteroid therapy was a predictive factor of patency at 6 months. Prospective studies are needed to validate these findings.

Keywords: Endoscopic dacryocystorhinostomy; Predictive factors

Introduction

Dacryocystorhinostomy (DCR) is the surgical treatment of choice for obstruction of the lacrimal system at the level of the lacrimal sac or nasolacrimal duct.¹ Chronic obstruction of the lacrimal pathway typically manifests as epiphora, recurrent dacryocystitis, or even dacryocystocele, significantly affecting the quality of life of the affected individuals.² The estimated annual incidence of lacrimal pathway obstruction is approximately 30 cases per 100,000 population.³

DCR aims to create an artificial ostium that allows direct drainage of tears from the lacrimal sac into the nasal cavity, bypassing the

obstructed segment.^{1,4} The endoscopic DCR technique, first described by McDonough and Meiring in 1989, has emerged as an alternative to the external approach and demonstrated success rates of 76–90%.^{5,6} However, despite its high success rates, symptom recurrence may occur in approximately 10–35% of cases.^{7,8} Multiple factors can affect surgical outcomes, including concomitant sinonasal disease; systemic comorbidities such as type 2 diabetes mellitus; specific technical aspects such as removal of the mucoperiosteal flap and exposure, and opening of the agger nasi; and postoperative complications.^{9–12} Nevertheless, no clear predictors of surgical success or failure have been established yet. In this context, identifying the clinical variables that may influence the outcomes of endoscopic DCR is important to optimize the therapeutic strategies for patients with lacrimal pathway obstruction. This study aimed to evaluate the efficacy of primary endoscopic DCR with stent placement and to identify the predictors of surgical success at six months postoperatively.

Materials and methods

This retrospective observational study was based on a review of the medical records of patients aged 18 years or older who underwent primary endoscopic DCR with stent placement between 2013 and 2023 at the Local Health Unit (ULS) of São José. The exclusion criteria were a history of lacrimal system intervention, prior head and neck radiotherapy, post-traumatic nasal or paranasal deformities, canalicular obstruction, or missing postoperative lacrimal patency data. The collected data included demographic characteristics (age and sex) and clinical information, such as preoperative symptoms (epiphora, recurrent dacryocystitis, and/or mucocele) and findings of preoperative dacryocystography (DCG) and/or computed tomography (CT) of the paranasal sinuses. Lacrimal pathway obstruction was classified as proximal or distal to the valve of Krause based on the DCG findings when available. Additional variables recorded were laterality

of the procedure, postoperative use of antibiotics (oral, eyedrops, and/or ophthalmic ointment), postoperative use of ophthalmic corticosteroids (eyedrops and/or ointment), postoperative intranasal corticosteroid therapy, duration of stent placement, and lacrimal pathway patency at six months. Postoperative DCR-related complications were also documented.

Statistical analysis

Descriptive analysis was conducted using Microsoft Excel, and statistical analysis was performed with Python[®] version 3.12.4 (Python Software Foundation, Wilmington, DE, USA). Potential predictors of surgical response were selected using Least Absolute Shrinkage and Selection Operator (LASSO) regression. Selected variables included age, presence of preoperative dacryocystocele, postoperative granulation tissue around the neo-ostium, postoperative use of antibiotic eyedrops, postoperative use of corticosteroid eyedrops, and postoperative use of intranasal corticosteroid therapy. Subsequently, a logistic regression model was created to assess associations between these variables and postoperative lacrimal patency at six months. Odds ratios (OR) with 95% confidence intervals (CI) were calculated for each variable to assess the statistical significance of the associations.

Results

Between 2013 and 2023, a total of 236 endoscopic DCR procedures were performed at ULS São José. Among these, 166 cases were excluded: 65 were reinterventions, 61 lacked postoperative patency data at six months, 35 involved patients younger than 18 years, two involved canalicular obstruction, and three had prior traumatic lacrimal pathway injury. A total of 70 primary endoscopic DCR procedures were analyzed (13 bilateral, 44 unilateral), corresponding to 57 patients (49 women and eight men; female: male ratio = 6.1). The mean patient age was 61.6 ± 13.4 years (18–86 years). Among the 70 DCR procedures, epiphora was reported in 63

Table 1
Demographic characteristics of the participants

Demographic Characteristics	n (%) or mean \pm SD
Number of patients	57
Number of endoscopic DCRs	70
Sex	
Female	49 (86%)
Male	8 (14%)
Age	61.6 \pm 13.4 years (18–86)
DCR laterality	
Right	36 (51%)
Left	34 (49%)
Symptom	
Epiphora	63 (90%)
Recurrent dacryocystitis	26 (37%)
Dacryocystocele	7 (10%)
Smoking	8 (11%)
Complementary diagnostic methods	
Dacryocystography	67 (96%)
Perinasal CT	49 (70%)
Type of lacrimal obstruction*	
Proximal to the valve of Krause valve	17 (25%)
Distal to the valve of Krause	50 (75%)
Postoperative therapy	
Oral antibiotics	57 (81%)
Antibiotic eyedrops	31 (44%)
Antibiotic eye ointment	6 (9%)
Corticosteroid eyedrops	21 (30%)
Corticosteroid eye ointment	3 (4%)
Topical intranasal corticosteroids	55 (79%)
Stent duration	10.5 weeks \pm 4.8 (1-34)

SD, standard deviation; DCR, dacryocystorhinostomy; CT, computed tomography

*% refers to the total number of DCG procedures performed (n = 67) based on the dacryocystography (DCG) findings

(90%), recurrent dacryocystitis in 26 (37%), and dacryocystocele in seven (10%) cases; and eight patients (11%) were smokers. Preoperative DCG was performed in 67 (96%) cases, and paranasal CT in 49 (70%). Obstruction was distal and proximal to the valve of Krause in 50 (75%) and 17 (25%) cases, respectively. Regarding laterality, 34 procedures (49%)

were performed on the left side and 36 (51%) on the right. Postoperatively, 57 (81%) patients received oral antibiotics; 31 (44%) received antibiotic eyedrops; and six (9%) were prescribed antibiotic ointment. Regarding corticosteroid therapy, 21 (30%) and three (4%) patients received corticosteroid eyedrops and ointment, respectively. Postoperative topical

Table 2
Postoperative Complications

Complication	n (%)
Symptom recurrence*	15 (21%)
Granulation tissue around the neo-ostium	6 (9%)
Turbinate-septal synechiae	6 (9%)
Lateral turbinate synechiae	7 (10%)
Accidental stent extrusion	2 (3%)
DCR reintervention	12 (17%)

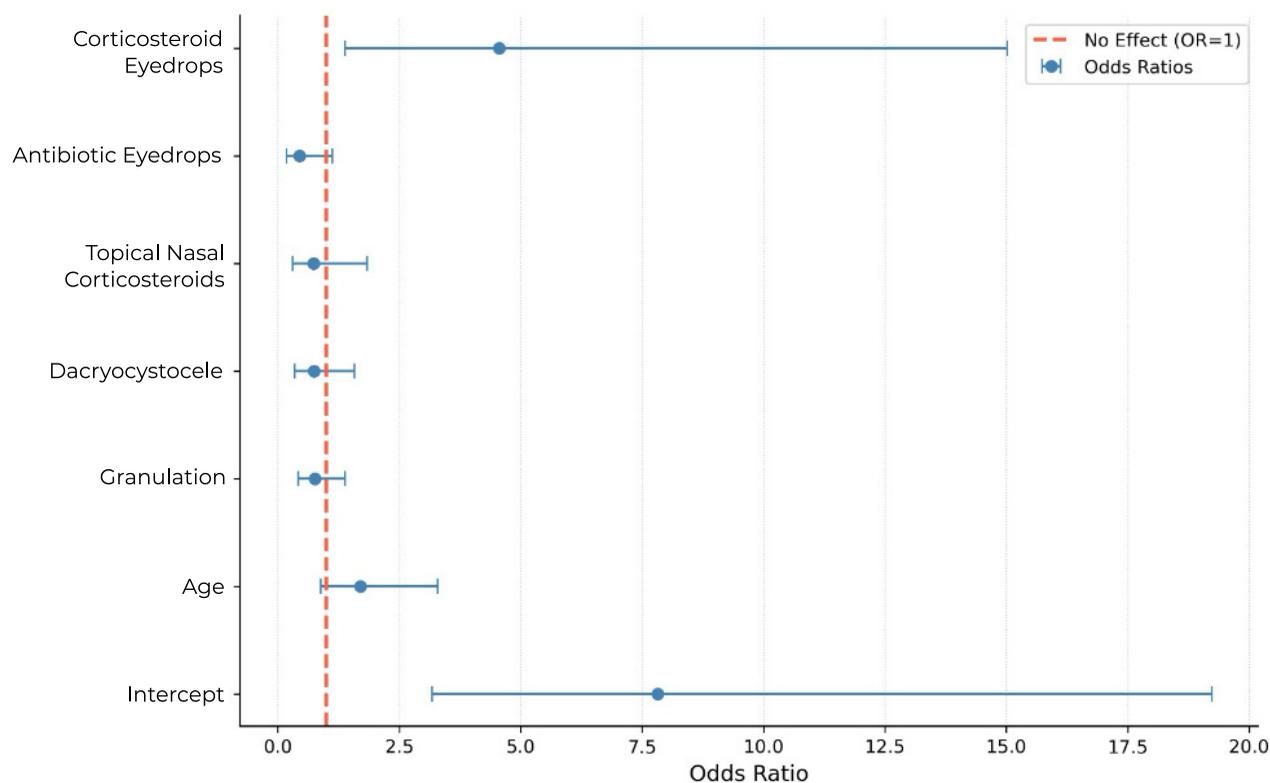
* Includes transient epiphora recurrence and need for surgical reintervention; DCR, dacryocystorhinostomy

intranasal corticosteroids were prescribed to 55 (79%) patients. The mean stent duration was 10.5 weeks (1–34 weeks). Lacrimal pathway patency was achieved in 58 (83%) patients at six months postoperatively. Postoperative complications were recorded in 29 patients (41%), including symptom recurrence (n = 15, 21%), granulation tissue around the neo-

ostium (n = 6, 9%), turbinate-septal synechiae (n = 6, 9%), lateral turbinate synechiae (n = 7, 10%), and accidental stent extrusion (n = 2, 3%), as shown in Table 2. Reintervention was required in 12 patients (17%).

LASSO regression identified the potential predictors of surgical outcome. Logistic regression analysis revealed that postoperative

Figure 1
Predictors of six-month patency following endoscopic dacryocystorhinostomy (logistic regression model)



Forest plot based on the logistic regression model shows the odds ratios (OR) for predictors of patency at six months postoperatively. Corticosteroid eyedrop use was significantly associated with higher patency (OR > 1). The vertical red line marks the point of no effect (OR = 1). Horizontal bars represent 95% confidence intervals.

corticosteroid eyedrop use was a statistically significant predictor of patency at six months (OR 1.70, 95% CI 1.39–15.02). Other variables, including age (OR 1.70, 95% CI: 0.88–3.28), dacryocystocele (OR 0.74, 95% CI: 0.35–1.57), postoperative granulation (OR = 0.76, 95% CI: 0.42–1.39), antibiotic eyedrop use (OR 0.44, 95% CI: 0.18–1.12), and intranasal corticosteroid use (OR 0.74, 95% CI: 0.30–1.83), showed no statistically significant associations. The Receiver Operating Characteristic (ROC) curve of the logistic regression model used demonstrated an area under the curve (AUC) value of 0.79, indicating acceptable discriminative ability for predicting postoperative lacrimal patency at six months.

Discussion

In this study, primary endoscopic DCR with stent placement demonstrated a high success rate, with lacrimal pathway patency achieved in 83% cases at the six-month follow-up, consistent with the findings in the literature. *Zilelioglu* et al. reported a success rate of 79.4% for primary endoscopic DCR in a cohort of 64 procedures.¹³ *Chi e Lai* described success rates ranging from 76% to 90%.⁶

Additionally, the immediate postoperative use of corticosteroid eyedrops was an independent predictor of surgical success, increasing the likelihood of six-month patency by 4.6-fold (OR 4.56). This association was obtained through a multivariate logistic regression model to identify independent predictors of surgical success, which revealed acceptable discriminatory capacity in ROC analysis (AUC of 0.79). Although some surgical protocols recommend topical corticosteroids after DCR to reduce local inflammation and synechiae, few studies have directly examined their effect on surgical outcomes.¹⁴ *Chen* et al. described statistically significant improvements in surgical outcomes with the intraoperative use of corticosteroid-soaked Spongostan sponges, which may share a similar therapeutic mechanism as the postoperative use of corticosteroid eyedrops described in this study.¹⁵ Fewer

than one-third of the patients in this study received postoperative topical corticosteroids, highlighting the absence of a standardized institutional protocol. Prescription patterns relied on the clinical discretion of individual surgeons and perceived risk of local inflammation and synechiae formation. This variability aligns with the current literature, which lacks strong evidence supporting routine postoperative corticosteroid use in endoscopic DCR in terms of success rates, complications, or reported symptoms. No formal recommendations from international scientific societies currently endorse universal prescription of corticosteroids, contributing to heterogeneous practice patterns.

Among the postoperative complications, only granulation tissue around the neo-ostium was identified as a potential predictor of failure in LASSO regression, although no statistically significant association with six-month patency was found in the multivariate analysis. Other complications were not included in the statistical model due to the limited sample size and case variability.

This study has some limitations. Its retrospective design and reliance on clinical records limit data uniformity. Additionally, despite spanning ten years, the sample size remained small, which may have affected the results. Technical details of the individual procedures were often insufficiently documented, and surgeries were performed by multiple surgeons with varying experience levels, potentially influencing the outcomes. Distinguishing between surgical techniques would enhance the generalizability of findings. Furthermore, as this was a single-center study, caution is advisable in extrapolating the results to other populations.

Additional prospective, multicenter, controlled studies are required to validate these findings and clarify the role of corticosteroid eyedrops in optimizing the outcomes of endoscopic DCR.

Conclusion

Primary endoscopic DCR with stent placement demonstrated a high success rate, with 83% lacrimal pathway patency at six months. The use of postoperative corticosteroid eyedrops was associated with a higher likelihood of success, indicating it may serve as an independent predictor of favorable outcomes. These findings indicate that topical corticosteroids could play an important role in optimizing postoperative results in endoscopic DCR. Prospective multicenter studies are warranted to confirm these observations and to further evaluate the impact of adjuvant therapy in this setting.

Conflicts of interest

The authors declare that they have no conflict of interest regarding this article.

Data confidentiality

The authors declare that they followed the protocols of their work in publishing patient data.

Human and animal protection

The authors declare that the procedures followed are in accordance with the regulations established by the directors of the Commission for Clinical Research and Ethics and in accordance with the Declaration of Helsinki of the World Medical Association. Privacy policy, informed consent and Ethics committee authorisation. The authors declare that they have obtained signed consent from the participants and that they have local ethical approval to carry out this work.

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Scientific data availability

There are no publicly available datasets related to this work.

Declaration on the Use of Generative AI and AI-Assisted Technologies in the Writing Process

During the preparation of this work, the authors used ChatGPT (OpenAI), Perplexity AI, EvidenceHunt, and OpenEvidence to support scientific writing, language revision, and consultation of relevant scientific literature. After using these tools/services, the authors reviewed and edited the content as necessary and assume full responsibility for the content of the publication.

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