• Clinical Research •

Surgical outcomes and the role of probe exit site in nasal endoscopy-guided interventions for congenital nasolacrimal duct obstruction: a cross-sectional study

Yusuf Yıldırım[1], *Elif Ertaş*[2]

[1]Department of Ophthalmology, Diyarbakır Gazi Yaşargil Training and Research Hospital, Diyarbakır 21070, Türkiye
[2]Department of Biostatistics, Faculty of Medicine, Selçuk University, Konya 42130, Türkiye
Correspondence to: Yusuf Yıldırım. Department of Ophthalmology, Diyarbakır Gazi Yaşargil Training and Research Hospital, Diyarbakır 21070, Türkiye. dryusufyldrm1988@gmail.com
Received: 2025-08-03 Accepted: 2025-11-18

Abstract

● **AIM:** To evaluate the clinical presentation, nasal endoscopic findings, and surgical outcomes of probing surgery (PS) or bicanalicular silicone tube intubation (BCI) performed under nasal endoscopic guidance (NEG) in pediatric patients with congenital nasolacrimal duct obstruction (CNLDO), regardless of previous surgical history.

● **METHODS:** This retrospective cross-sectional study included CNLDO patients with data on demographics, fluorescein dye disappearance test (FDDT) results, dacryoscintigraphy findings, prior surgeries, and outcomes of NEG-PS or NEG-BCI. NEG-BCI using Crawford stents was performed intraoperatively in complex cases. Intraoperative and postoperative complications were recorded. Surgical success was evaluated clinically and with FDDT at postoperative months 1 and 6. Stents were retained for a minimum of 12wk, with follow-up for at least 6mo after removal.

● **RESULTS:** Of the 67 pediatric patients (67 eyes, mean age 37.4±17.5mo), 44 (65.7%) were female. Preoperative FDDT was graded 3+ in 85.1% of cases, and dacryoscintigraphy confirmed obstruction in 92.5%. Nine patients (13.4%) had a history of PS. At 6mo, surgical success was achieved in 96.6% (28/29) of the NEG-PS group and 71.1% (27/38) of the NEG-BCI group (P=0.009). All cases with probe exit through the inferior meatus (IM) were successful, whereas exits through the inferior concha (IC) or submucosal IM (SM) were significantly associated with failure (P<0.001).

● **CONCLUSION:** NEG allows intraoperative classification of CNLDO and selection of surgical method based on real-time anatomical findings. Probe exit through the IM predicts a high likelihood of success, whereas IC or SM exits are risk factors for failure. Incorporating NEG into routine practice may improve surgical precision and reduce the need for repeated procedures.

● **KEYWORDS:** nasolacrimal duct obstruction; probing surgery; bicanalicular intubation; nasal endoscopy; pediatric ophthalmology

DOI:10.18240/ijo.2026.05.08

Citation: Yıldırım Y, Ertaş E. Surgical outcomes and the role of probe exit site in nasal endoscopy-guided interventions for congenital nasolacrimal duct obstruction: a cross-sectional study. *Int J Ophthalmol* 2026;19(5):901-908

INTRODUCTION

Congenital nasolacrimal duct obstruction (CNLDO) is a common condition, observed in up to 6%–20% of infants despite nearly 95% of newborns having a congenital obstruction that resolves spontaneously before the onset of lacrimal secretion[1-11]. It usually presents with epiphora and mucopurulent discharge during the first months of life and is unilateral in most cases, though approximately 20% are bilateral[5,10].

Management options for pediatric CNLDO include observation with lacrimal sac massage, topical antibiotics, and surgical interventions such as probing surgery (PS), silicone tube intubation, either monocanalicular intubation (MCI) or bicanalicular intubation (BCI), and dacryocystorhinostomy (DCR)[1,3,7,9,12-15]. However, the optimal treatment strategy remains debated, since most published studies are retrospective, with relatively few randomized controlled trials or systematic reviews available[13-14,16-17].

PS is generally accepted as the first-line surgical approach, with reported success rates ranging between 75% and 95% depending on age, severity, and study design[5,8-10,13,18]. In more complex cases or in patients who fail primary PS, intubation

with silicone tubes (particularly BCI) is recommended as the next surgical step, with success rates reported between 79% and 96%[7,13,16,18]. Although some earlier studies emphasized declining success of PS with increasing age, recent evidence suggests that the type of obstruction (simple versus complex) is more important than age alone in predicting surgical outcome[5,9-13,16,19-20].

Kushner[21] and Jones[22] described practical and anatomical frameworks for classifying CNLDO into simple and complex types; simple obstruction involves a thin membranous blockage at the valve of Hasner, whereas complex obstruction may include proximal narrowing, submucosal misdirection, abnormal lateralization toward the inferior concha (IC), or adhesions between the IC and the lateral nasal wall, consistent with the anatomic underpinnings of the lacrimal system[11,16].

The introduction of nasal endoscopy into lacrimal surgery has provided several advantages. Nasal endoscopy enables direct visualization of the nasal anatomy, identifies probe exit sites in real time, and allows recognition and treatment of concurrent intranasal abnormalities such as septal deviation, turbinate hypertrophy, and adhesions[1,12,16,19,23-24]. Several recent studies and reviews have reported improved outcomes when nasal endoscopic (NE) is incorporated into CNLDO surgery compared to conventional approaches performed without endoscopic guidance[12,16,18-20].

In this study, we aimed to present the clinical features, NE findings, and surgical outcomes of PS and BCI performed under nasal endoscopic guidance (NEG) in pediatric patients with CNLDO. We particularly focused on evaluating the prognostic value of the probe exit site, which has not been systematically assessed in recent studies, thereby highlighting the novelty of our work compared with previous reports.

PARTICIPANTS AND METHODS

Ethical Approval This study was conducted in accordance with the principles of the Declaration of Helsinki and was approved by the Institutional Ethics Committee of Diyarbakır Gazi Yaşargil Training and Research Hospital (Approval number: 495, Date: May 23, 2025). Written informed consent was obtained from the parents or legal guardians of all participants. Additional consent was obtained for the use of intraoperative, preoperative, and postoperative photographs in the study.

Study Design and Participants This retrospective cross-sectional study included 67 eyes of 67 pediatric patients aged ≥12mo who underwent surgery for CNLDO between March 2018 and February 2025 at a tertiary-level referral hospital. Both first-time surgical candidates and patients with a history of previous procedures were included. Exclusion criteria were: parental refusal to participate, partial or complete punctal or canalicular obstruction, canalicular agenesis, craniofacial anomalies, incomplete follow-up of at least 6mo, or missing clinical data, in line with prior reports and reviews[1,8,11,21].

Intraoperative Assessment and Surgical Decision-Making All patients initially underwent PS under general anesthesia and NEG. Nasal endoscopy was used to directly visualize the nasal cavity and confirm the site where the Bowman probe exited[6,16,20,24]. If the probe persistently emerged from an incorrect site, such as the IC due to turbinate fracture, the procedure was converted to bicanalicular silicone tube intubation surgery[1,16](Figure 1).

For children aged 12–16mo presenting with epiphora, PS was performed as the initial intervention regardless of previous surgical history, following the widely adopted Pediatric Eye Disease Investigator Group (PEDIG) *et al*[25] protocol. In patients with a history of failed PS, repeat probing was attempted only if NE demonstrated an anatomically correct probe exit through the inferior meatus (IM) without evidence of severe scarring or narrowing; where false passage or submucosal exit was suspected, conversion to BCI was performed in the same session, consistent with guidance on repeat procedures and decision-making in persistent obstruction[12,16].

Bicanalicular silicone tube intubation was also performed when significant resistance to probe advancement was encountered, when proximal narrowing of the nasolacrimal duct was observed, or when intraoperative manipulation led to creation of a false passage. Crawford silicone tubes were inserted through the upper and lower canaliculi, advanced into the nasal cavity, and retrieved under NEG. The tubes were tied together and positioned at the IM. Stents were retained for a minimum of 12wk before removal, as commonly described in intubation series[12,21].

Classification of CNLDO Type The type of CNLDO was classified intraoperatively according to NEG-PS findings. Simple type: passage of a Bowman probe (No.0 or 00) through the anatomically correct site at the valve of Hasner *via* a thin membranous obstruction[20]; complex type: proximal narrowing, difficulty advancing the probe, thick membranous obstruction, submucosal exit, adhesion of the IC to the lateral nasal wall, or persistent IC exit despite manipulation[1,19-22] (Figure 2).

Surgical Procedures and Techniques All procedures were performed by a single experienced surgeon (Yıldırım Y) under general anesthesia. To improve visualization of the nasolacrimal duct opening, triangular cotton sponges soaked with either 0.025% xylometazoline hydrochloride or 1:100 000 epinephrine were placed beneath the IC for 5min and then removed, as commonly practiced in endoscopic lacrimal surgery[1,6,20].

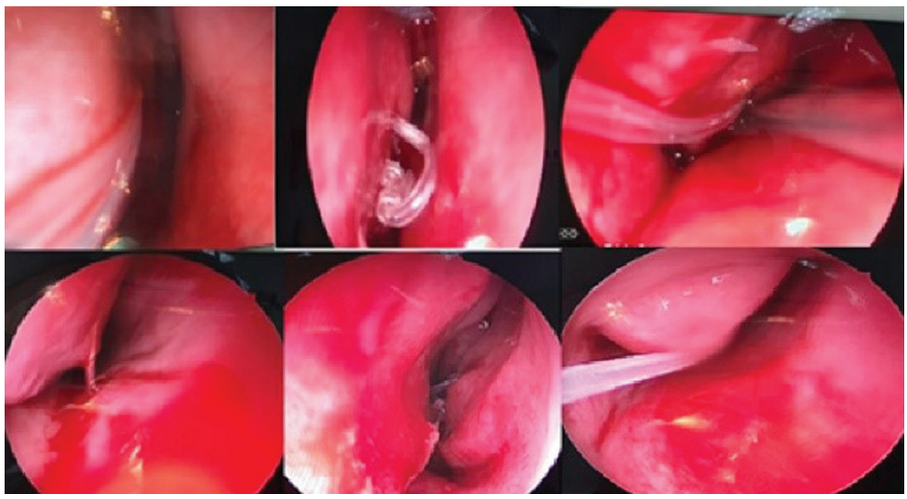

Figure 1 Intraoperative photographs of cases in which nasal endoscopy-guided bicanalicular silicone intubation was performed following probe exit through the inferior concha secondary to turbinate fracture, resulting in surgical failure.

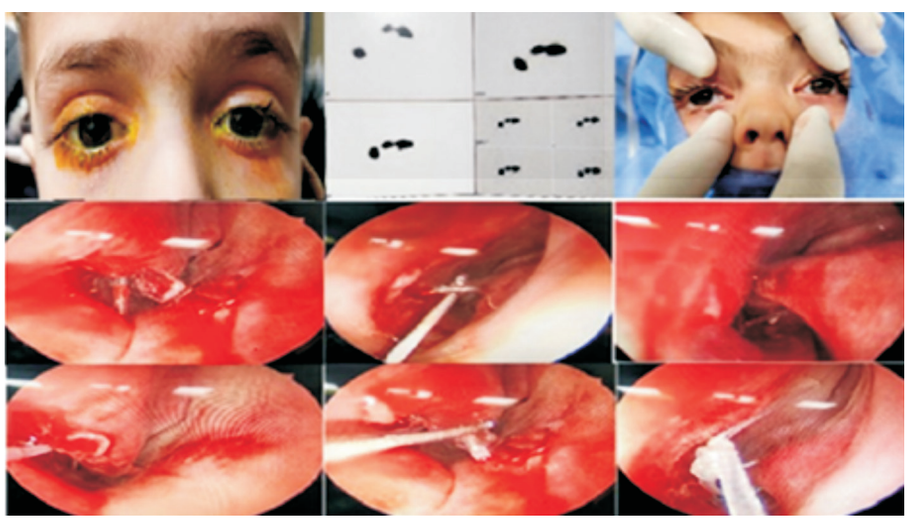

Figure 2 Dacryoscintigraphy, fluorescein dye disappearance test, and preoperative and postoperative images of a 56-month-old patient Nasal endoscopy-guided bicanalicular silicone intubation was performed after inferior turbinate infracture due to adhesion, with postoperative endoscopic visualization demonstrating correct anatomical tube exit.

For PS, the upper and lower puncta were dilated, and a Bowman probe No.0 was advanced through the lacrimal system until it exited at the IM. Exit of the probe at the IM was confirmed by NE. If the probe passed through a thin membrane at the valve of Hasner, the obstruction was classified as simple and PS was completed. If probing was difficult or exit was abnormal, the procedure was converted to BCI in the same session[1,12,16].

For BCI, silicone stents (Crawford tubes) were passed separately through the upper and lower canaliculi, advanced through the nasolacrimal duct, and retrieved under NE guidance at the IM. The metal probes were hooked with a Crawford hook, and the tubes were tied together and secured at the IM. In cases where the probe exited submucosally or through the IC, the silicone tubes were positioned at the abnormal site to allow a chance of resolution before considering DCR surgery[1,20] (Figure 3).

Postoperative Management and Follow-up Postoperatively, all patients received topical antibiotic-steroid eye drops four times daily, antibiotic ointment once daily, and a nasal decongestant spray (xylometazoline 0.15%) twice daily for one month. In BCI cases, silicone tubes were retained for at least 3mo[1,21]. Removal was performed under general anesthesia and NEG. During removal, the interpunctal segment was cut and the tube was retrieved from the nasal cavity using a Crawford hook. Any granulomas, nasal adhesions, or cheese-wiring at the puncta were documented. Follow-up visits were scheduled at day 1, week 1, and at the 3rd and 6th postoperative months. At each visit, the fluorescein dye disappearance test (FDDT) and tear meniscus height were assessed. Fluorescein dye disappearance test was graded as + (mild), 2+ (moderate), or 3+ (severe). Surgical success was defined as complete resolution of symptoms and a negative or +FDDT[6,21,26] (Figure 4).

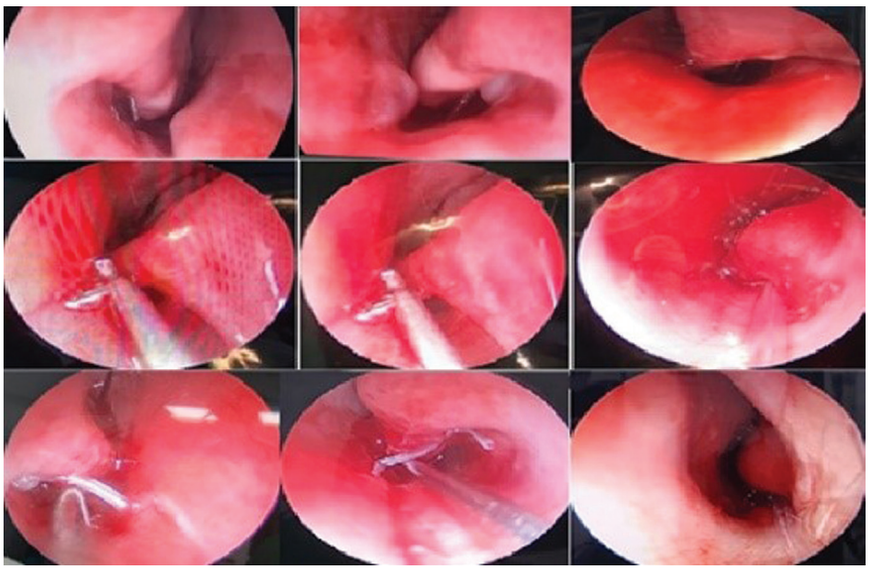

Figure 3 Intraoperative images of cases with successful outcomes following nasal endoscopy-guided probing surgery and nasal endoscopy guided bicanalicular silicone tube intubation surgery, showing probe exit through the normal anatomical site.

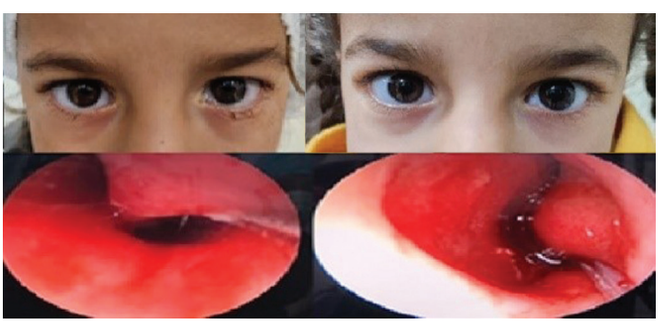

Figure 4 Preoperative and postoperative photographs of a 38-month-old patient with left-sided congenital nasolacrimal duct obstruction Nasal endoscopy guided bicanalicular silicone tube intubation was performed during the same surgical session, with postoperative images demonstrating proper anatomical positioning of the silicone tube.

Statistical Analysis Continuous variables were presented as mean±standard deviation (SD), median, minimum, and maximum values. Categorical variables were expressed as counts and percentages. The Chi-square test was used to evaluate associations between categorical variables; if significant, two-proportion *Z*-tests were applied. For continuous variables, comparisons between two groups were performed using the Student's *t*-test. A *P*-value <0.05 was considered statistically significant. Statistical analyses were performed using IBM SPSS Statistics version 25 (IBM Corp., Armonk, NY, USA).

RESULTS

A total of 67 eyes from 67 patients diagnosed with CNLDO were included in this study. The mean age of the patients was 37.4±17.5mo (range: 13–79mo), and the median age was 30mo. Among them, 44 patients (65.7%) were female and 23 (34.3%) were male. Right eye involvement was present in 38 cases (56.7%), and left eye involvement in 29 cases (43.3%). A history of previous PS was found in 9 patients (13.4%; Table 1).

The surgical procedures performed were PS in 29 cases (43.3%) and BCI in 38 cases (56.7%). Preoperative FDDT results were graded as 1+ in 1 patient (1.5%), 2+ in 9 patients (13.4%), and 3+ in 57 patients (85.1%). Dacryoscintigraphy demonstrated complete obstruction in 62 cases (92.5%), partial obstruction in 4 cases (6.0%), and patency in 1 case (1.5%; Table 1).

During surgery, the probe exited through the IM in 60 cases (89.6%), the IC in 5 cases (7.5%), and submucosally through the IM (SM) in 2 cases (3.0%). Early tube loss occurred in 3 patients (4.5%). The overall surgical success rate was 82.1% (55/67; Table 1).

When comparing the PS and BCI groups, patients undergoing BCI were significantly older than those undergoing PS (43.5±12.5 *vs* 29.3±12.5mo, *P*=0.007). When surgical procedures were analyzed within each sex group, PS was more common among female cases, whereas BCI was more common among male cases (*P*=0.04). No statistically significant differences were found between groups regarding laterality, previous surgical history, preoperative FDDT, or dacryoscintigraphy results. In all PS cases, the probe exited through the IM; in the BCI group, the exit sites were IM in 81.6%, IC in 13.2%, and SM in 5.3% (Table 2).

Surgical success was significantly higher in the PS group (96.6%) compared to the BCI group (71.1%; *P*=0.009). Age and previous surgery history were not significantly associated with surgical success. The probe exit site was strongly related to outcome: all IM exits were successful, while IC and SM exits were significantly associated with failure (*P*<0.001 and *P*=0.002, respectively; Table 3).

Table 1 Descriptive characteristics of the study population (*n*=67)

mean±SD or *n* (%)

Characteristics	Value
Mean age at diagnosis, mo	37.4±17.5 (range: 13–79)
Mean age at first surgery, mo	22.0±7.4 (range: 11–37)
Mean silicone tube retention, d	150.2±38.9 (range: 15–220)
Gender	
Female	44 (65.7%)
Male	23 (34.3%)
Operated eye	
Right	38 (56.7%)
Left	29 (43.3%)
Previous surgery	
None	58 (86.6%)
Probing	9 (13.4%)
Procedure performed	
Probing	29 (43.3%)
Silicone tube intubation	38 (56.7%)
Fluorescein dye disappearance test	
1+	1 (1.5%)
2+	9 (13.4%)
3+	57 (85.1%)
Dacryoscintigraphy	
Patent	1 (1.5%)
Obstructed	62 (92.5%)
Partially obstructed	4 (6.0%)
Probe exit site	
Inferior meatus	60 (89.6%)
Inferior concha	5 (7.5%)
Submucosal inferior meatus	2 (3.0%)
Postoperative complications	
None	64 (95.5%)
Early tube loss	3 (4.5%)
Surgical success	
Successful	55 (82.1%)
Unsuccessful	12 (17.9%)

SD: Standard deviation.

Table 2 Comparison of surgical method with demographic and clinical variables (*n*=67)

mean±SD or *n* (%)

Variable	Probing (*n*=29)	Silicone intubation (*n*=38)	*P*
Age at diagnosis, mo	29.3±12.5	43.5±12.5	0.007
Gender			0.04
Female	23 (79.3%)	21 (55.3%)	
Male	6 (20.7%)	17 (44.7%)	
Operated eye			0.78
Right	17 (58.6%)	21 (55.3%)	
Left	12 (41.4%)	17 (44.7%)	
Previous surgery history			0.28
None	27 (93.1%)	31 (81.6%)	
Probing	2 (6.9%)	7 (18.4%)	
Fluorescein staining			0.37
1+	1 (3.4%)	0	
2+	5 (17.2%)	4 (10.5%)	
3+	23 (79.3%)	34 (89.5%)	
Dacryoscintigraphy			0.61
Patent	1 (3.4%)	0	
Obstructed	26 (89.7%)	36 (94.7%)	
Partially obstructed	2 (6.9%)	2 (5.3%)	
Probe exit site			0.06
Inferior meatus	29 (100%)	31 (81.6%)	
Inferior concha	0	5 (13.2%)	
Submucosal inferior meatus	0	2 (5.3%)	
Postoperative complications			0.25
None	29 (100%)	35 (92.1%)	
Early tube loss	0	3 (7.9%)	
Surgical success			0.009
Successful	28 (96.6%)	27 (71.1%)	
Unsuccessful	1 (3.4%)	11 (28.9%)	

Student's *t*-test and Chi-square test were used for comparisons. SD: Standard deviation.

Table 3 Association between surgical success and clinical characteristics (*n*=67)

mean±SD or *n* (%)

Parameters	Successful (*n*=55)	Unsuccessful (*n*=12)	*P*
Age at diagnosis, mo	37.1±11.8	39.1±12.8	0.77
Previous surgery history			0.35
None	49 (89.1%)	9 (75.0%)	
Probing	6 (10.9%)	3 (25.0%)	
Probe exit site			
Inferior meatus	55 (100%)	5 (41.7%)	<0.001
Inferior concha	0	5 (41.7%)	<0.001
Submucosal inferior meatus	0	2 (16.7%)	0.002

Student's *t*-test, Chi-square test, and *Z*-test for proportions were used. SD: Standard deviation.

Table 4 Duration of silicone tube retention in silicone intubation group according to surgical outcome (*n*=38)

Surgical outcome	Mean±SD (d)	*P*
Successful (*n*=27)	157.9±35.1	
Unsuccessful (*n*=11)	131.9±34.8	0.14

Student's *t*-test was used to compare mean retention durations. SD: Standard deviation.

In the BCI group, the mean silicone tube retention duration was longer in successful cases (157.9±35.1d) than in unsuccessful cases (131.9±34.8d), but this difference was not statistically significant (P=0.14; Table 4).

Intraoperative complications were significantly more frequent in the BCI group (81.6%) compared to the PS group (0; P<0.001). The most common intraoperative finding was IC adhesion (77.4%), followed by IC hypertrophy (12.9%), proximal lacrimal stenosis (6.5%), and septal deviation (3.2%). No statistically significant difference was found between groups regarding postoperative complications (Table 5).

DISCUSSION

The use of nasal endoscopy in the surgical management of CNLDO provides significant advantages over conventional PS or BCI performed without endoscopic guidance[16]. Direct visualization allows accurate classification of CNLDO into simple and complex types and tailoring of the surgical strategy accordingly. Nasal endoscopy also enables real-time identification of false passages, detection of intranasal anomalies such as inferior turbinate adhesions or hypertrophy,

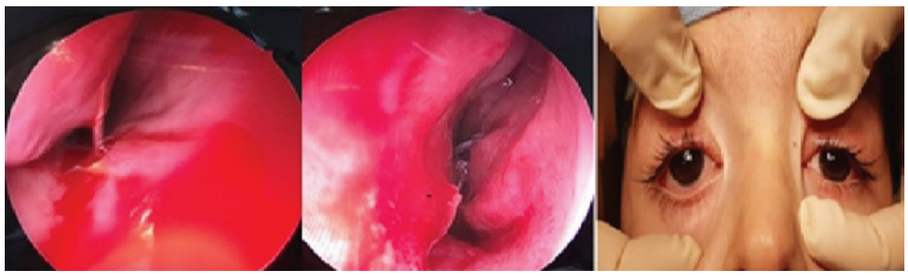

Figure 5 A 30-month-old patient with a history of previous probing surgery showing probe exit through the inferior concha due to turbinate fracture Nasal endoscopy guided bicanalicular silicone tube intubation was performed prior to planned dacryocystorhinostomy, and the silicone tube was visualized and knotted at the inferior concha.

Table 5 Association between surgical method and complications (*n*=67) *n* (%)

Complication type	Probing (*n*=29)	Silicone intubation (*n*=38)	*P*
Postoperative complications			0.13
None	28 (96.6%)	32 (84.2%)	
Early tube loss	1 (3.4%)	6 (15.8%)	
Intraoperative complications			<0.001
None	29 (100%)	7 (18.4%)	
Present	0	31 (81.6%)	
Intraoperative complications			
Inferior concha adhesion	—	24 (77.4%)	
Septal deviation	—	1 (3.2%)	
Inferior concha hypertrophy	—	4 (12.9%)	
Proximal lacrimal stenosis	—	2 (6.5%)	

Chi-square test was used for statistical analysis.

and confirmation of the exact probe exit site, thereby reducing the likelihood of surgical failure[1,16].

Recent studies confirm the benefit of endoscopic guidance. In a systematic review by Trott *et al*[27], conventional PS achieved a 75% success rate, whereas NE-assisted PS achieved 95%. Similarly, Al-Faky[19] reported higher success with endoscopic versus conventional probing in a comparative study. Recently, Khashkouli *et al*[12,16] showed that probe exit visualization under NE improved intraoperative decision-making and outcomes. In contrast, our series included both primary and secondary procedures, thereby representing a broader clinical spectrum.

Alruwaili *et al*[28] demonstrated that BCI achieved higher overall success than PS, with no significant difference between MCI and BCI, although MCI was associated with fewer complications. Al-Faky *et al*[26] compared PS and BCI as first-line procedures and reported similar success rates (84% and 89%, respectively); however, subgroup analysis showed markedly lower outcomes in complex cases (47% for PS, 85% for BCI), and NE was not used. In our series, intraoperative visualization of the probe exit side under NE allowed more accurate prediction of PS success, resulting in a 96.6% success rate for NEG-PS compared with 71.1% for NEG-BCI.

The relatively lower success rate in our NEG-BCI group can be explained by the inclusion of more complex cases. Indeed, 25% of unsuccessful BCI cases had a history of failed PS, which may have negatively influenced outcomes. This reflects an inherent selection bias, since simpler cases underwent PS while BCI was reserved for anatomically challenging cases; this limitation also highlighted by Khashkouli *et al*[16] in a recent publication (previous failed probing/intubation was 34.1%) that is 10-year results of a 1-stage, obstruction based, endoscopic approach in children with CNLDO. Thus, direct comparison between PS and BCI must be interpreted cautiously.

Our findings are consistent with Singh *et al*[29], who reported an 80% success rate for NEG-BCI in complex CNLDO. In their cohort, 100% of eyes had undergone prior procedures, compared with only 18% in our series. They also noted inferior turbinate adhesions in 61% and hypertrophy in 16% of cases. In our study, abnormal probe exits (particularly through the IC or SM) were strongly associated with surgical failure. Among unsuccessful cases, 41% had IC exits and 16% had SM exits. Failures occasionally occurred even in anatomically correct IM exits, suggesting additional factors such as canalicular stenosis or fibrosis may influence outcomes. Nonetheless, IC and SM exits were significantly associated with failure (P<0.001 and P=0.002), reinforcing the importance of intraoperative anatomical assessment and classification under NE[12,16,29] (Figure 5).

In addition, a recent randomized controlled trial comparing standalone probing, MCI and combinations with inferior turbinate infracture found that the addition of infracture did not yield universal benefits and should be considered selectively rather than routinely[17].

In a Meta-analysis, Eshraghi *et al*[8] reported PS success rates of 88% in simple cases and 46% in complex cases, compared with BCI success rates of 92% and 82%, respectively; they also highlighted that older age adversely affected success mainly in complex CNLDO. In our study, children undergoing BCI were significantly older than those undergoing PS (P=0.007), likely reflecting the association between increasing age and anatomical complexity rather than age alone as a risk factor, an approach also emphasized in contemporary reviews[12,16].

The one-stage approach in CNLDO surgery has been gaining increasing importance. In a study conducted with a similar approach to ours, Oklar[20] performed nasal endoscopy-guided surgery on 55 eyes with previous unsuccessful probing. In their intraoperative obstruction classification, the reported success rate for the membranous type (simple type) was 77.8%, for the incomplete complex type was 66.7%, and for the complete complex type was 100%, as all cases in this group underwent DCR. It has been suggested that the use of the one-stage approach combined with nasal endoscopy may lead to a paradigm shift in CNLDO surgery.

Taken together, our results support a tailored, stepwise surgical strategy: NEG-PS in simple CNLDO cases, with intraoperative conversion to NEG-BCI in complex cases. This approach achieves high success within a single surgical session, minimizing repeated anesthesia exposure and avoiding unnecessary overtreatment. Our study differs from recent studies by systematically evaluating the prognostic role of the probe exit site and highlighting its practical value in real-time surgical decision-making[12,16].

This study has several limitations. First, the retrospective cross-sectional design precludes causal inference and may be prone to confounding. Second, intraoperative decision-making, where PS was performed in simpler cases and BCI reserved for complex cases, introduces selection bias and limits direct comparison of success rates, as also discussed in comparative reports[12,16]. Third, although IM exit was strongly correlated with surgical success, this association is anatomically expected, whereas IC or SM exits indicate false passages inherently predisposed to failure[23,30]. Thus, our findings may reflect anatomical principles rather than novel predictors; nevertheless, our systematic evaluation of the probe exit site under NE provides incremental clinical value. Fourth, although NE improved safety and visualization, adjunctive intranasal techniques (*e.g.*, turbinate infracture or cyst marsupialization) were not standardized and might have improved exposure and outcomes[6]. Recent randomized evidence further emphasizes that inferior turbinate infracture should not be universally applied, as its benefit appears to depend on case selection[17]. Fifth, the relatively small sample size, particularly in subgroup analyses, may limit statistical power. Finally, due to study design, our data cannot be used for valid statistical comparison with conventional non-endoscopic procedures; only descriptive comparison with published reports is appropriate.

In conclusion, the novelty of our work lies in the systematic endoscopic evaluation of the probe exit site and its prognostic implications in pediatric CNLDO. Unlike prior reports, including recent studies[12,16], we directly demonstrate how intraoperative exit-site assessment under NE can guide the real-time choice between PS and BCI, thereby improving surgical planning and outcomes.

ACKNOWLEDGEMENTS

Special thanks to the staff of Diyarbakır Gazi Yaşargil Training and Research Hospital, Department of Ophthalmology, for their assistance during patient recruitment and data collection.

Authors' Contributions: Yıldırım Y: Study conception and design, data collection, surgery, manuscript drafting and revision; Ertaş E: Statistical analysis and methodological support. All authors read and approved the final version of the manuscript.

Availability of Data and Materials: The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

Artificial Intelligence Statement Disclosure: The authors declare that artificial intelligence tools (ChatGPT, OpenAI, San Francisco, CA, USA) were not used to assist in language editing and formatting of the manuscript. The final content was reviewed and approved by all authors, who take full responsibility for the scientific integrity of the work.

Conflicts of Interest: Yıldırım Y, None; **Ertaş E,** None.

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