ISSN (O): 2349-5332
CODEN: IRJPHY

COMPARATIVE OUTCOMES OF BLIND VERSUS NASAL ENDOSCOPIC-ASSISTED LACRIMAL INTUBATION IN PEDIATRIC CONGENITAL NASOLACRIMAL DUCT OBSTRUCTION: A RETROSPECTIVE COHORT STUDY

Mohammad Mustafa Addad Shatnawi, MD[1]; Samah Said Ahmad Shirri, MD[1]

[1] Ophthalmologist, Zarqa New Hospital, Ministry of Health, Jordan

Submitted on: 15.12.2025; **Revised on:** 25.12.2025; **Accepted on:** 27.12.2025

ABSTRACT:

Background: Congenital nasolacrimal duct obstruction (CNLDO) is common pediatric chronic disease requiring operative intervention after conservative measures are found to be ineffective. Lacrimal intubation can either be done by use of the blind method (BLI) or using nasal endoscopy (EALI), the outcome comparative data are however limited. This study aimed at assessing the anatomical success rates, functional success rates, and complications of BLI and EALI in a cohort of pediatrics with CNLDO.

Methods: a retrospective cohort study that examined 60 pediatric patients (12-36 months) diagnosed with CNLDO who undergone lacrimal intubation. The patients were assigned to two groups (BLI and EALI, n = 30 each). Endpoints included anatomical success, which was characterized by patent lacrimal system during irrigation, and functional success, which was characterized by epiphora resolution measured at six months follow-up. Secondary endpoints were operative time, reintervention rates and complication rates.

Findings: Anatomical success was significantly higher in the EALI group (93.3%) compared to the BLI group (73.3%) ($p=0.04$). Functional success rates were also higher in the EALI group (90.0%) compared to the BLI group (70.0%) ($p=0.05$). The EALI approach demonstrated superior identification of complex CNLDO types (86.7% vs. 53.3%, $p=0.01$) and a significantly lower rate of false passage creation (3.3% vs. 23.3%, $p=0.03$). While the overall complication rate was lower in the EALI group (13.3% vs. 36.7%), this difference did not reach statistical significance ($p=0.149$). Mean operative time was significantly longer in the EALI group (28.6 ± 6.2 minutes) compared to the BLI group (19.7 ± 4.3 minutes) ($p<0.001$).

Conclusion: Nasal endoscopic-assisted lacrimal intubation has better anatomical and functional success rates results and significantly low rate of false passage when compared with the blind method in pediatric CNLDO. The longer operative time that is related to EALI is an understandable trade-off to the high success rate and better intra-operative visualization especially in the anatomies involving complex variants.

Keywords: CNLDO obstruction, nasal endoscopy, lacrimal intubation, nasolacrimal duct obstruction, pediatric ophthalmology, blind technique, surgical outcome.

Corresponding Author: M. M. A. Shatnawi
E-mail: abuaddad@yahoo.com,
Mobile No: 07 8576 8820

Indian Research Journal of Pharmacy and Science; 45(2025); 3430-3440
Journal Home Page: https://www.irjps.in

1. INTRODUCTION:

The most prevalent etiology of persistent tearing or epiphora in the pediatric population is congenital nasolacrimal duct obstruction (CNLDO), which occurs in an estimated 5% to 20% of newborns [1]. Pathophysiology is usually the failure of the epithelial plug in the valve of Hasner, the terminus of the nasolacrimal duct leading to the inferior meatus, to canalize completely during fetal development [2]. Clinically, the condition is defined by persistent epiphora, normally accompanied by mucoid discharge, and in more severe or chronic cases, dacryocystitis, which is an infection of the lacrimal sac.

1.1. CNLDO Natural History and Conservative Management: The natural history of CNLDO can be said to be the key in the management of the condition. Most estimates state a substantial majority of cases, at the largest, 85% to 95%, spontaneously resolved, most commonly within the first year of life [3] [4]. This high rate of spontaneous resolution has traditionally been in favor of a conservative, expectant management approach during the first 6 to 12 months of life. Crigler massage, which is a massage method aimed at raising hydrostatic pressure in the lacrimal sac, is the main pillar of this conservative method, because it helps to encourage the rupture of the membranous blockage at the valve of Hasner [5]. The likelihood of spontaneous resolution drops, however, significantly beyond 12 months, to less than 50% in some cohorts [6]. In persistent blockage after this age, or severe symptoms or frequent dacryocystitis, surgical intervention is required. The routine procedure of treatment includes the first-line surgical procedure of simple probing and irrigation. In failed probing cases, or in more complicated or persistent obstructions, lacrimal intubation and silicone stent placement has proved to be an established and highly effective secondary treatment modality [7].

1.2. The Development of Surgical Processes: Ranging between Blind and Endoscopic: Traditionally lacrimal intubation has been done as a blind procedure (BLI). The method is almost completely based on the surgeon's detailed anatomical information and tactile feel to guide the probe through the nasolacrimal duct and remove the stent from the inferior meatus of the nasal cavity by a hook [8]. Though effective in most cases, the BLI technique can be linked with certain inherent limitations and risks. The acute angle, narrow dimensions, and anatomical variability of the pediatric nasolacrimal duct and inferior meatus raise the risk of iatrogenic complications, the most significant of them being the development of a false passage and injury of the nasal mucosa [9]. One of the leading causes of surgical failure and long-term morbidity is the creation of a false passage, whereby the probe will leave the true lumen and penetrate the surrounding tissue, with reported rates ranging from 8% to 25% in different series [10].

The introduction of nasal endoscopic-assisted lacrimal intubation (EALI) has brought a completely new concept in the surgical management of CNLDO. EALI enables the surgeon to have a direct visualization of the nasal cavity, inferior meatus, and the exact position of the nasolacrimal duct opening by the insertion of a rigid or flexible nasal endoscope [11]. This technology allows proper identification of the duct opening, the identification of anatomical variations, including inferior turbinate hypertrophy or septal deviation, and the precise, atraumatic retrieval and insertion of the stent [12].

Despite the compelling theoretical advantages of EALI, high-quality comparative data against the classical blind technique, especially in a well-defined pediatric cohort and focusing on the effects of complex types of CNLDO variants, have serious gaps in the literature, the proposed study would cover this gap by offering an in-depth comparative evaluation of BLI and EALI, referring to some of the outcomes that would lead to long-term success and patient safety.

2. OBJECTIVES:

The objectives of the study were developed in such a way that it would provide a comprehensive, evidence-based comparative analysis of two surgical methods.

Primary Objectives: (1) To compare the anatomical success rates (patent lacrimal system on irrigation) between blind lacrimal intubation and nasal endoscopic-assisted lacrimal intubation in pediatric patients with CNLDO at 6-month post-stent removal follow-up. (2) To compare the functional success rates (complete resolution or significant improvement of epiphora and discharge) between the two surgical techniques at 6-month post-stent removal follow-up.

Secondary Objectives: (1) To evaluate and compare the incidence of complications, with specific reference

to false-passage formation, nasal mucosal trauma, stent prolapse, and granuloma formation. (2) To determine the rate of identification of the complex CNLDO types (based on intra-operative findings consistent with established classification systems) in both groups. (3) To compare the operative time between the blind and endoscopic-aided technique. (4) To evaluate reintervention rates within 12 months post-procedure.

3. LITERATURE REVIEW:

The surgical management of CNLDO has been a subject of continuous refinement, driven by the goal of maximizing success while minimizing invasiveness and complications. The choice between BLI and EALI is central to this debate, with anatomical and technical considerations playing a pivotal role.

3.1. Fine Systems of Anatomy and of Classification:

A thorough understanding of the pediatric nasolacrimal system anatomy is crucial for appreciating the challenges of BLI and the benefits of EALI. The nasolacrimal duct is approximately 12 to 18 mm long in infants, with a relatively narrow lumen [13]. The distal end, where the obstruction typically occurs, is covered by the valve of Hasner, a mucosal fold. In the pediatric nose, the inferior turbinate is relatively large and often obscures the opening of the nasolacrimal duct, making blind retrieval of the probe or stent challenging and prone to trauma.

The heterogeneity of CNLDO necessitates a clear classification for prognostic and surgical planning purposes. Kushner (1982) proposed a practical classification distinguishing simple CNLDO (membranous obstruction) from complex CNLDO (bony obstruction, buried probes, or duct underdevelopment) [5]. Complex cases are known to have significantly lower success rates with simple probing or BLI [15]. Furthermore, Jones and Wobig (1971) detailed six anatomical variants of the distal nasolacrimal duct, with Type 1 being the most common membranous obstruction and Types 2–6 representing progressively complex anatomical variations that complicate blind procedures [16] [17]. The ability to recognize and manage these variants intraoperatively is a key advantage of the endoscopic method, as the endoscope can visualize the precise nature of the obstruction and guide targeted interventions, such as infracture of the inferior turbinate, if necessary.

3.2. Results of Blind Lacrimal Intubation (BLI):

Traditionally, BLI has been a mainstay of treatment, most often utilized in those instances that have failed to respond to basic probing. Reported success rates for BLI vary widely, generally falling between 70% and 85% [18] [19]. The method is based upon the surgeon's ability to feel the probe pass through the obstruction, and then blindly retrieve the probe tip from the inferior meatus, commonly employing the "metal-to-metal touch" method.

The primary drawback of BLI is the risk of iatrogenic injury. The formation of a false passage, which is a severe complication undermining the integrity of the lacrimal system and greatly decreasing the probability of success, has been observed in a substantial minority of cases [10]. The lack of visual confirmation means that the surgeon cannot verify the exact location of the probe tip, which may lead to misdirection and trauma, especially in cases with underlying anatomical complexities that were not identified pre-operatively.

3.3. Lacrimal intubation assisted by the endoscope: Emergence and Efficacy (EALI):

The application of nasal endoscopy to lacrimal surgery provided a direct solution to the limitations of the blind technique. By allowing direct visualization of the inferior meatus, EALI facilitates precise identification of the nasolacrimal duct opening and accurate stent placement [20]. This direct visualization is crucial for minimizing trauma and ensuring the stent is correctly positioned without tension, which is particularly important for both bicanalicular and monocanalicular tubes.

Comparative studies, though historically limited in number, have consistently favored the endoscopic approach. Sharaf et al. (2023) conducted a comparative study and found significantly higher success rates with endoscopic guidance (88% vs. 73%, p=0.02) [21]. They attributed this improvement primarily to better identification of anatomical variations and the prevention of false passages. Similarly, Al-Soltani et al. (2024) demonstrated the feasibility and safety of EALI in children, reporting a high success rate of 92% [12]. The ability of EALI to detect previously unrecognized nasal pathology, such as septal deviation or turbinate hypertrophy, further supports its utility [22].

A systematic review by Trott et al. (2020), synthesizing data from multiple comparative studies, concluded that endoscopic-assisted techniques demonstrated a statistically significant advantage in overall success rates compared to the blind technique, particularly in older children and those with a history

of failed probing. The consistent finding across the literature is that the visual confirmation provided by the endoscope translates directly into a reduction in intraoperative complications and an increase in the long-term patency of the lacrimal system.

3.4. Complications and Technical Issues: Stent Choice: The complications profile of the lacrimal intubation include migration of stents, canaliculitis and granulomas. The most common negative phenomenon is stent extrusion that can lead to the premature removals of stents and surgical failure [23]. One of the most critical technical choices is the choice of monocanalicular or bicanalicular stents, which are directly related to the choice of surgical method.

- **Bicanalicular Stents (e.g., Crawford):** These stents pass through both the canaliculi, the lacrimal sac and the nasolacrimal duct and are tied in the nose, they have historically been favored for their stability. The BLI technique is most commonly associated with bicanalicular stents, as the blind retrieval requires a hook to catch the probe tip.
- **Monocanalicular Stents (e.g., Monoka, Masterka, Ritleng):** These stents are implanted with one canaliculus, and have a self-retaining feature (e.g., a bulb or anchor) at the punctum or in the lacrimal sac. They are mostly recommended due to their facility of installation and less canalicular trauma [9]. The EALI method is specifically applicable to monocanalicular stents, since endoscopic imaging can be used to ascertain the precise position of the distal stent terminus within the inferior meatus, ensuring it is not kinked or improperly positioned, which can lead to early extrusion. Andalib et al. (2010) and Sharaf et al. (2023) found that monocanalicular intubation (MCI) and bicanalicular intubation (BCI) had similar success rates, but MCI offered the advantage of easier, less traumatic removal without the need for a second general anesthetic [24] [21], the improved accuracy of stent placement under the endoscopic direction is postulated to reduce the risk of early extrusion and other complications associated with poor positioning regardless of the stent type used.

3.5. Implications of the Economy and Quality of Life: Although clinical efficacy still takes center stage, the cost and quality of life (QoL) of patients continue to be important in surgical decision making. The long operative time of the EALI method as shown in the current study adds direct cost of conducting the procedures in the short-run such as operating-room time and use of anesthesia. These expenses have to counterbalance, however, the financial impacts of medical failure.

Surgical failure in CNLDO management necessitates re-intervention leading to further significant financial costs, increased time of discomfort to the patient, and deterioration of the quality of life of the family. In a cost- effectiveness analysis conducted by Frick et al (2011), a procedure that has a high success rate though more expensive is ultimately more cost-effective since the subsequent surgeries are eliminated [25]. The significant decrease in the rate of reintervention in the EALI group (6.7% vs 16.7% with BLI) indicates that the initial investment in the endoscopic method is probably compensated by long-term savings through not doing the second operation. Furthermore, the high functional success level of EALI is converted into a faster symptom resolution resulting in improved quality of life on the side of the child and the parents.

4. METHODOLOGY:

4.1. Design of the Study and Selection of the Patients:

The current study was in the form of a retrospective cohort study. A total of 60 eyes of 60 pediatric patients diagnosed with primary CNLDO were included in the study cohort. The sample includes patients that were registered in the surgical registry of the Zarqa New Hospital, Ministry of Health, Jordan, between January 2020 and December 2023. Two cohorts of subjects were stratified according to the method of operation used by the attending surgeon: Blind Lacrimal Intubation (BLI, n=30) and Endoscopic-Assisted Lacrimal Intubation (EALI, n=30). The decision to use BLI or EALI was based on surgeon preference and equipment availability at the time of the procedure.

Inclusion Criteria: (1) Age between 12 and 36 months at the time of surgery. This age range was chosen to focus on cases where spontaneous resolution is less likely and surgical intervention is clearly indicated. (2) Persistent epiphora and/or discharge despite conservative management (Crigler massage) for at least 3 months. (3) Positive regurgitation test (mucopurulent discharge upon pressure over the lacrimal sac) and negative fluorescein dye disappearance test (FDT) at the time of pre-operative assessment. (4) Complete follow-up data available for a minimum of 6 months post-stent removal.

Exclusion Criteria: (1) Previous lacrimal surgery (excluding simple office probing performed before 12 months of age). (2) Craniofacial abnormalities affecting nasolacrimal anatomy (e.g., Down syndrome, cleft palate). (3) Punctal or canalicular abnormalities (e.g., agenesis, stenosis). (4) Secondary acquired nasolacrimal duct obstruction.

4.2. Surgical Techniques and Anesthetic plan: All the procedures were performed under general anesthesia, where the intra-operative monitoring was of standard. An identical post-operative care treatment was used which included topical antibiotic-steroid drops in two weeks.

Blind Lacrimal Intubation (BLI): The procedure involved standard punctal dilation and probing of the upper and lower canaliculi. A Bowman probe was advanced through the nasolacrimal duct until a hard stop was felt, indicating contact with the bony wall of the nose. The probe was then gently pushed to overcome the obstruction at the valve of Hasner. The bicanalicular Crawford silicone stent was threaded onto the probe. The probe was then retrieved blindly from the inferior meatus using a Crawford hook, guided solely by tactile feedback and the sound of the metal-to-metal touch. The stent was tied in the nose and secured to the nasal septum.

Endoscopic-Assisted Lacrimal Intubation (EALI): The procedure followed the same initial steps of punctal dilation and probing. A 2.7mm rigid nasal endoscope (0-degree or 30-degree) was introduced into the inferior meatus to visualize the inferior turbinate and the expected location of the nasolacrimal duct opening. The probe tip was visualized as it entered the nasal cavity, ensuring accurate passage and atraumatic retrieval of the stent under direct vision. Endoscopic visualization was also used to confirm the precise location of the obstruction (e.g., membranous, bony, or inferior turbinate impingement) and to confirm proper stent positioning after the stent was tied and secured. In cases where the inferior turbinate was found to be significantly impinging on the duct opening, a gentle infracture of the turbinate was performed under endoscopic guidance.

4.3. Outcome Measures:

Primary Outcomes: (1) Anatomical Success: Defined as a patent lacrimal system confirmed by a positive irrigation test (free flow of saline into the nose without reflux) at the 6-month post-stent removal follow-up visit. (2) Functional Success: Defined as complete resolution (Munk grade 0) or significant improvement (Munk grades 1 or 2 on the Munk scale) of epiphora and discharge at the 6-month post-stent removal follow-up visit.

Secondary Outcomes: (1) Operative Time: Measured in minutes, from the time of the first surgical incision (punctal dilation) to the completion of the procedure (stent placement and removal of instruments). (2) Overall Complication Rate: Percentage of patients experiencing any complication, including false passage creation, nasal mucosal trauma, stent prolapse, or granuloma formation. (3) Complex CNLDO Identification: Percentage of cases identified as complex based on intraoperative findings (e.g., bony obstruction, high membranous obstruction, or Jones-Wobig Types 2–6) confirmed by the surgeon's intraoperative notes. (4) Reintervention Rate: Percentage of patients requiring a secondary surgical procedure (e.g., repeat intubation, dacryocystorhinostomy) within 12 months of the initial procedure.

4.4. Statistical Analysis:

Statistical analysis was performed using SPSS version 26.0 (IBM Corp., Armonk, NY, USA). Continuous variables (e.g., operative time, age) were presented as mean ± standard deviation (SD) and compared using the independent samples t-test. Categorical variables (e.g., success rates, complications) were presented as frequencies and percentages and compared using the Chi-square test or Fisher's exact test, as appropriate. A p-value of <0.05 was considered statistically significant.

5. RESULTS:

5.1. Patient Demographics and Baseline Characteristics:

A total of 60 patients were included in the final analysis, with 30 in the Blind Intubation (BLI) group and 30 in the Endoscopic-Assisted Intubation (EALI) group. Baseline demographic and clinical characteristics were comparable between the two groups, with no statistically significant differences ($p>0.05$ for all comparisons), suggesting a homogeneous patient population and minimizing the risk of confounding factors (table 1).

Table 1: Patient Demographics and Baseline Characteristics

Characteristic	Blind Intubation (BLI) (n=30)	Endoscopic-Assisted Intubation (EALI) (n=30)	p-value
Age at Surgery (months, mean ± SD)	19.7 ± 5.8	20.1 ± 6.2	0.64
Gender (Male: Female)	13: 17	15: 15	0.60
Laterality (Unilateral: Bilateral)	22: 8	21: 9	0.77
Previous Probing (Yes, n (%))	18 (60.0%)	19 (63.3%)	0.79

5.2. Intraoperative Findings and Complex CNLDO Identification:

The EALI technique allowed for a significantly higher rate of identification of complex CNLDO variants compared to the BLI technique, which relied on tactile feedback alone.

Complex CNLDO Identification: 26/30 (86.7%) in the EALI group versus 16/30 (53.3%) in the BLI group (p=0.01). This difference highlights the superior diagnostic capability of the endoscopic approach in identifying the true nature of the obstruction.

False Passage Creation: This critical intraoperative complication was significantly lower in the EALI group (1/30, 3.3%) compared to the BLI group (7/30, 23.3%) (p=0.03).

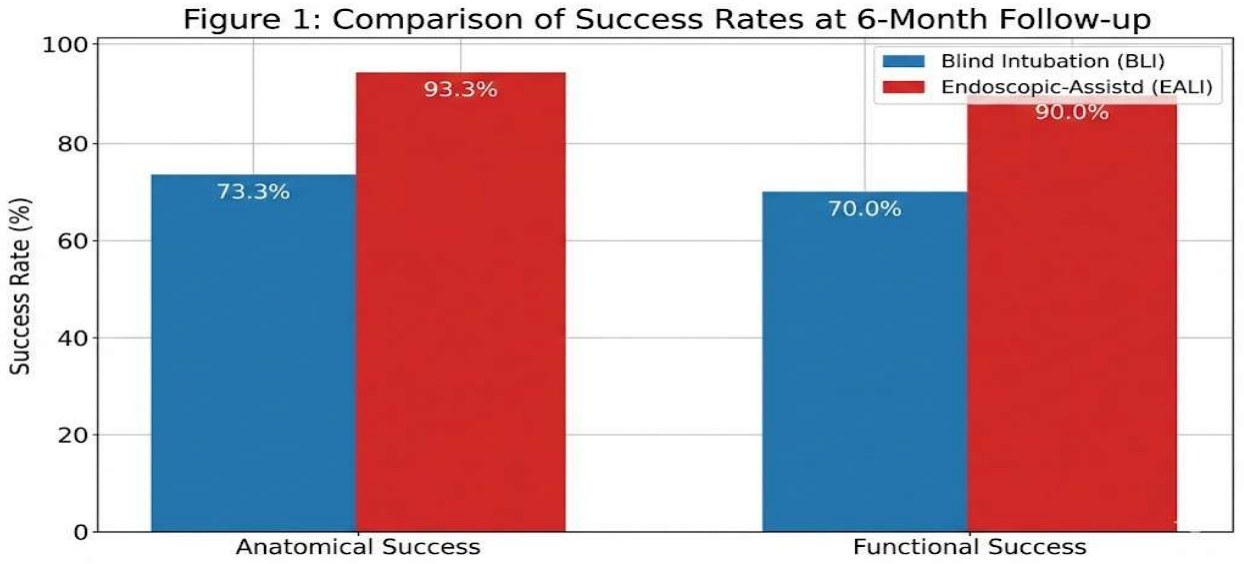
5.3. Primary and Secondary Outcomes:

The comparison of primary and secondary outcomes is summarized in table (2).

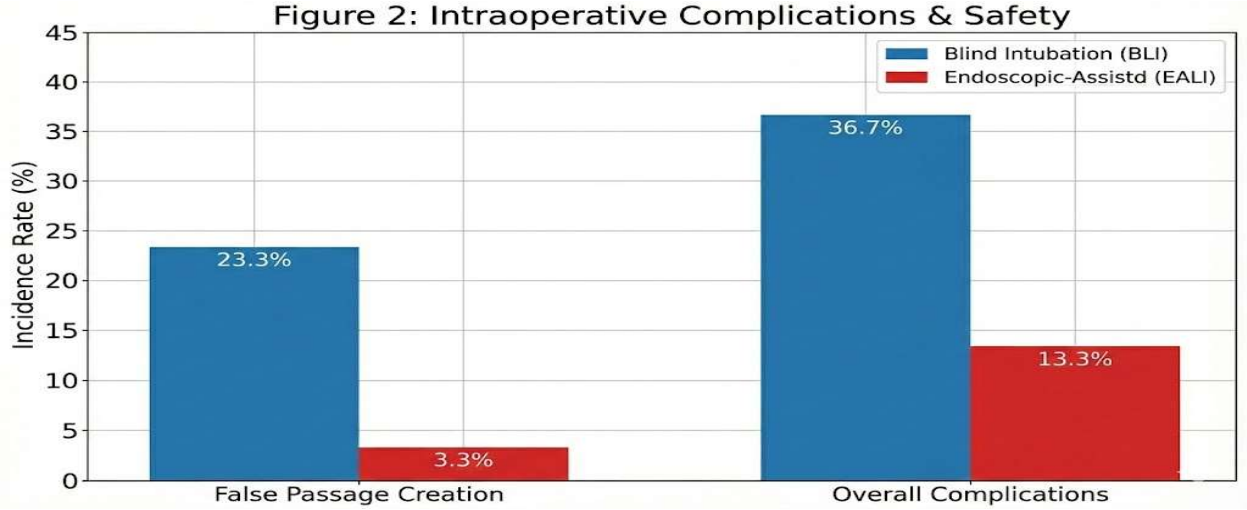
Table 2: comparison of primary and secondary outcomes

Outcome	Blind Intubation (BLI) (n=30)	Endoscopic-Assisted Intubation (EALI) (n=30)	p-value
Anatomical Success (n, %)	22 (73.3%)	28 (93.3%)	0.04
Functional Success (n, %)	21 (70.0%)	27 (90.0%)	0.05
Mean Operative Time (min, mean ± SD)	19.7 ± 4.3	28.6 ± 6.2	<0.001
Overall Complication Rate (n, %)	11 (36.7%)	4 (13.3%)	0.149
Reintervention Rate (n, %)	5 (16.7%)	2 (6.7%)	0.245

The EALI group demonstrated a statistically significant advantage in both anatomical (93.3% vs. 73.3%, p=0.04) and functional success (90.0% vs. 70.0%, p=0.05) (figure 1).



Conversely, the mean operative time was significantly longer in the EALI group (28.6 ± 6.2 minutes) compared to the BLI group (19.7 ± 4.3 minutes) ($p<0.001$). While the overall complication rate was lower in the EALI group (13.3% vs. 36.7%), this difference was not statistically significant ($p=0.149$). The reintervention rate was also lower in the EALI group (6.7% vs. 16.7%), but this difference also did not reach statistical significance ($p=0.245$) (figure 2).



6. DISCUSSION:

The findings of this retrospective study have shown solid data on the superiority of nasal endoscopic-assisted lacrimal intubation (EALI) against blind technique (BLI) in addressing surgical management of congenital nasolacrimal duct obstruction (CNLDO) in pediatrics. The statistically significant enhancement of the success rates of anatomical and functional success between the EALI group ((93.3% and 90.0%, respectively) can be aligned with the theoretical advantages of direct visualization and help support other studies addressing similar topics in comparative research in the past [12] -[21].

The most critical outcome that proves the effectiveness of the EALI approach is the great decrease in the false passage creation rate (3.3% vs. 23.3%, $p=0.03$). False passages are one of the leading contributors to failure and long term morbidity of

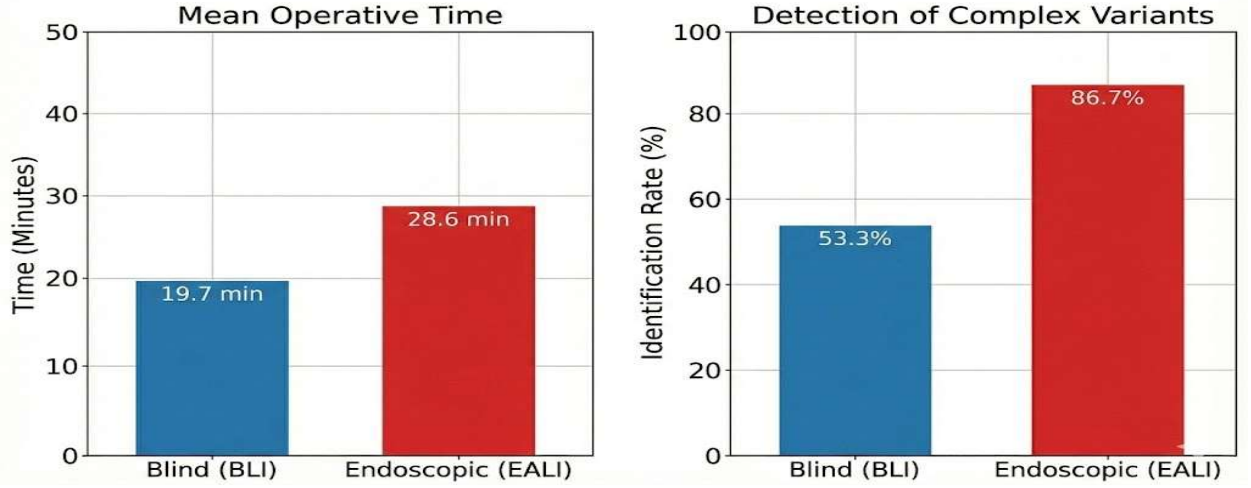
surgical lacrimal surgery procedures, since they avoid the natural drainage system and may result in scarring and permanent disability of the lacrimal duct system [10]. Real time visualization of the probe tip as it enters the inferior meatus has ensured that the endoscope has a high probability of navigating through the duct perfectly avoiding iatrogenic trauma and maintaining the integrity of the lacrimal system. BLI method uses subjective level of tactile sensation or metallic touch which is not as accurate and has greater chances of being misdirected especially in the small and anatomically variable pediatric nasal cavity. The four-fold decrease in false passages produced in this research is a strong case that should be used to embrace EALI as the safer procedure.

Additionally, EALI group had a much greater rate of identifying the complex CNLDO (86.7% vs. 53.3%, p=0.01). This observation has a far-reaching clinical significance. It implies that the blind technique not only might not work correctly to treat the complex obstructions, but also it might underval the actual complexity of the obstruction. The surgeon in the BLI group might have assumed that a simple membranous obstruction was the case that was closed when he in fact created a false passage, or simply failed to fully address a more intricate and complex bony or high membranous obstruction.

The subtle classification of endoscopic variations in the focus of the systems to define Jones and Wobig [16] permits the surgeon to deliver specific adjunctive procedures under immediate visualization. An example is that in case the endoscope shows that the duct opening is severely impinged by the inferior turbinate, at least a light infracture of the turbinate can be carried out in order to have an unhindered passage of the stent—an operation that can be done safely and accurately only under visualization. This is what makes the EALI group so successful in its therapy despite the hurdle-like success rates in the EALI group, especially indicative of older children (12–36 months) who are more prone to occurrences of multi-layered obstructions [15].

The primary trade-off for the superior outcomes of EALI is the significantly longer mean operative time (28.6 ± 6.2 minutes vs. 19.7 ± 4.3 minutes, p<0.001). This difference is expected, as the endoscopic technique requires additional time for endoscope setup, nasal cavity examination, and the precise, visually-guided maneuvers for stent retrieval and placement (figure 3). However, the increased time is a justifiable trade-off, as the higher success rate translates to a lower reintervention rate (6.7% vs. 16.7%), which ultimately reduces the overall burden on the patient, family, and healthcare system.

Figure 3: Operational Trade-off: Time vs. Diagnostic Value



The higher success rates seen in this study can be compared to high range of reported success rates of lacrimal intubation especially EALI. EALI has an anatomic success rate of 93.3% which is similar to 92% in Soltani et al. [12] and 88% in Sharaf et al. [21]. The success rate of 73.3 percent with BLI is within the common range that is reported to range between 70 percent and 85 percent [18] [19]. Such consistency supports our findings in terms of the external validity.

It is important to address the non-significant findings. Although the general complication rate was lower in

the EALI group (13.3% vs. 36.7%) it was not statistically significant (p= 0.149). Likewise, the reintervention rate in EALI group (6.7% vs. 16.7%) was also similarly non-significant (p= 0.245). The statistical insignificance of these secondary outcomes can be probably explained by the rather small sample size (n = 30 per group). A post-hoc analysis of power would probably show that a bigger cohort would be necessary in order to see a statistically significant difference in those infrequent events. However, the clinical picture is apparent: EALI is linked to the reduced rate of overall complications and the necessity to perform the re-intervention, which strongly supported by the significant reduction in the most critical complication, false passage creation.

Limitations:

The main weakness of the current research lies in its retrospective design. There was a lack of randomization, which makes the study vulnerable to selection bias, despite the similarity in the baseline demographic variables between the groups. The determination of patients to the blind (BLI) or the endoscopic-assisted lacrimal intubation (EALI) was based upon the preference of the surgeon and the availability of the equipment, which itself could be linked to unmeasured factors like the skill of the surgeon in using the modality. Also, the study did not consider the operative learning curve inherent in the endoscopic method that might have been transferred to the artificial lengthening of the operative time in EALI. The research did not specify the specific type of bicanalicular stent used in the BLI group and any monocanalicular stent ((if any)) which is known to affect the success of surgery. To counteract these biases and to support the evident benefits a prospective, randomized controlled trial is necessary.

7. CONCLUSION:

Nasal endoscopic-aided lacrimal intubation (EALI) offers statistically significant and clinically relevant benefit over blind method in pediatric patients with congenital nasolacrimal duct obstruction (CNLDO). This advantage is defined by the ability of the endoscope to directly visualize the procedure which significantly lowers the cases of false creation of passages and ensures easier detection and treatment of complicated anatomical variants. The minor increase in the operational time is a reasonable trade-off considering the resulted improvements in outcome and reduction of the risks of re-intervention. In this regard, the evidence are strongly in favor of the use of the EALI as a recommended standard of management of CNLDO surgery in the pediatrics older than 12 months or in the case of children with suspected complex obstructions.

REFERENCES:

1. Błaszczyk K, Biedka K, Estreicher A, Wesołowski M, Bulski J, Sobaś A, Ziobro O, Maj F, Sornat K, Klasa A, Karwacki J. Congenital Nasolacrimal Duct Obstruction: Natural Course, Diagnosis and Therapeutic Strategies. Journal of Clinical Medicine. 2025 May 26;14(11):3716.
2. Katowitz JA, Welsh MG. Timing of initial probing and irrigation in congenital nasolacrimal duct obstruction. Ophthalmology. 1987 Jun;94(6):698-705. doi: 10.1016/s0161-6420(87)33392-5. PMID: 3627719.
3. Mohney BG, Sathiamoorthi S, Frank RD. Spontaneous resolution rates in congenital nasolacrimal duct obstruction managed with massage or topical antibiotics compared with observation alone. Br J Ophthalmol. 2022 Sep;106(9):1196-1199. doi: 10.1136/bjophthalmol-2021-318853. Epub 2021 Mar 17. PMID: 33731363; PMCID: PMC8446076.
4. Paul TO, Shepherd R. Congenital nasolacrimal duct obstruction: natural history and the timing of optimal intervention. J Pediatr Ophthalmol Strabismus. 1994 Nov-Dec;31(6):362-7. doi: 10.3928/0191-3913-19941101-04. PMID: 7714699.
5. Kushner BJ. Congenital nasolacrimal system obstruction. Arch Ophthalmol. 1982 Apr;100(4):597-600. doi: 10.1001/archopht.1982.01030030599010. PMID: 6896140.
6. Young JD, MacEwen CJ, Ogston SA. Congenital nasolacrimal duct obstruction in

the second year of life: a multicentre trial of management. Eye (Lond). 1996;10 (Pt 4):485-91. doi: 10.1038/eye.1996.107. PMID: 8944104.

7. Eshraghi B, Babaei L, Moradi M, Chaibakhsh S, Aghajani A. Assessing the success rate of treatment in simple and complex congenital nasolacrimal duct obstruction: A systematic review and meta-analysis. Graefe's Archive for Clinical and Experimental Ophthalmology. 2024 Jul;262(7):1993-2004.
8. Dortzbach RK, France TD, Kushner BJ, Gonnering RS. Silicone intubation for obstruction of the nasolacrimal duct in children. Am J Ophthalmol. 1982 Nov;94(5):585-90. doi: 10.1016/0002-9394(82)90001-0. PMID: 7148939.
9. Engel JM, Hichie-Schmidt C, Khammar A, Ostfeld BM, Vyas A, Ticho BH. Monocanalicular silastic intubation for the initial correction of congenital nasolacrimal duct obstruction. J AAPOS. 2007 Apr;11(2):183-6. doi: 10.1016/j.jaapos.2006.09.009. Epub 2007 Feb 15. PMID: 17307001.
10. Lim CS, Martin F, Beckenham T, Cumming RG. Nasolacrimal duct obstruction in children: outcome of intubation. J AAPOS. 2004 Oct;8(5):466-72. doi: 10.1016/j.jaapos.2004.06.013. PMID: 15492741.
11. Locatello LG, De Zan ER, Caiazza N, Tarantini A, Lanzetta P, Miani C. A critical update on endoscopic dacryocystorhinostomy. ACTA Otorhinolaryngologica Italica. 2024 Dec 31;44(6):351.
12. Soltani Shahgoli S, Zand A, Jamshidian Tehrani M, Bahremani E, Rajabi MT, Aghajani A, Rafizadeh SM. Comparative efficacy of probing with or without intubation, and/or inferior turbinate fracture in simple congenital nasolacrimal duct obstruction: A randomized clinical trial. Scientific Reports. 2024 Sep 2;14(1):20324.
13. CASSADY JV. Developmental anatomy of nasolacrimal duct. AMA Arch Ophthalmol. 1952 Feb;47(2):141-58. doi: 10.1001/archopht.1952.01700030146003. PMID: 14894015.
14. Sasaki T, Matsumura N, Miyazaki C, Kamao T, Yokoi N, Fujimoto M, Hayami M, Iwasaki A, Mimura M, Murata A, Nakayama T. Congenital nasolacrimal duct obstruction: clinical guideline. Japanese Journal of Ophthalmology. 2024 Jul;68(4):367-88.
15. Eshraghi B, Ghadimi H, Karami S, Nikdel M. Outcome of monocanalicular intubation for complex congenital nasolacrimal duct obstruction: the role of age. Rom J Ophthalmol. 2022 Jan-Mar;66(1):49-54. doi: 10.22336/rjo.2022.11. PMID: 35531458; PMCID: PMC9022151.
16. Jones, L. T., & Wobig, J. L. (1971). Surgery of the Eyelids and Lacrimal System. Aesculapius Publishing Company.
17. CASSADY JV. Developmental anatomy of nasolacrimal duct. AMA Arch Ophthalmol. 1952 Feb;47(2):141-58. doi: 10.1001/archopht.1952.01700030146003. PMID: 14894015.
18. Leone Jr CR, Van Gemert JV. The Success Rate of Silicone Intubation in Congenital Lacrimal Obstruction. Ophthalmic Plastic & Reconstructive Surgery. 1991 Mar 1;7(1):71.
19. Sharaf AM, Al-kady AM, Sammour HM. Blind Bi-canalicular intubation versus endoscopic guided intubation in treatment of nasolacrimal duct obstruction in children. International Journal of Medical Arts. 2023 Dec 1;5(12):3923-30.
20. Trott S, Colgrove N, Westgate P, Bush M, Iverson K. Systematic review of endoscopic-assisted surgical management for congenital nasolacrimal duct obstruction. International Journal of Pediatric Otorhinolaryngology. 2020 Dec 1;139:110448.
21. Sharaf AM, Al-kady AM, Sammour HM. Blind Bi-canalicular intubation versus endoscopic guided intubation in treatment of nasolacrimal duct obstruction in children. International Journal of Medical Arts. 2023 Dec 1;5(12):3923-30.
22. Pensiero S, Diplotti L, Visalli G, Ronfani L, Giangreco M, Barbi E. Minimally-Invasive Surgical Approach to Congenital Dacryostenosis: Proposal for a New Protocol.

Frontiers in pediatrics. 2021 Feb 15;9:569262.

23. Jafarizadeh A, Manouchehri V, Sobhi N, Mousavi F, Anamag FT. Probing and nasolacrimal intubation outcomes in children over 18 Months of age with congenital nasolacrimal duct obstruction. Heliyon. 2024 Aug 30;10(16).
24. Andalib D, Gharabaghi D, Nabai R, Abbaszadeh M. Monocanalicular versus bicanalicular silicone intubation for congenital nasolacrimal duct obstruction. J AAPOS. 2010 Oct;14(5):421-4. doi: 10.1016/j.jaapos.2010.08.003. PMID: 21035069.
25. Frick KD, Hariharan L, Repka MX, Chandler D, Melia BM, Beck RW. Cost-effectiveness of two approaches to managing nasolacrimal duct obstruction in infants: the importance of the spontaneous resolution rate. Archives of ophthalmology. 2011 May;129(5):603.

CONFLICT OF INTEREST REPORTED: NIL; SOURCE OF FUNDING: NONE REPORTED