

Impact of Nasal Pathologies on Outcome of Dacryocystorhinostomy: A Systematic Literature Review and Meta-analysis**Mayank Yadav¹, Garima Yadav², Neha Adlakha³, Nishtha Saini⁴, Priyanka Saini⁵, Barkha Mehta⁶**¹Associate Professor, Department of ENT, SHKM GMC, Nalhar, Nuh²Associate Professor, Department of Ent, SHKM GMC, Nalhar, Nuh³Associate Professor, Department of Ophthalmology, SHKM GMC, Nalhar, Nuh⁴Professor, Department of Ophthalmology, SHKM GMC, Nalhar, Nuh⁵Senior Resident, Department of Ophthalmology, SHKM GMC, Nalhar, Nuh⁶Senior Resident, Department of Ophthalmology, SHKM GMC, Nalhar, Nuh

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Abstract:**Background:** Dacryocystorhinostomy (DCR) remains the gold standard procedure for treating nasolacrimal duct obstruction. Nasal pathologies such as septal deviation, turbinate hypertrophy, chronic rhinosinusitis, and nasal polyposis can affect surgical field visualization and postoperative ostium patency.**Objective:** To systematically evaluate and synthesize data from studies published between 2000 and 2025 assessing the impact of nasal pathologies on anatomical and functional outcomes following external and endoscopic DCR.**Methods:** Comprehensive searches were conducted across PubMed, Embase, Cochrane Library, and Scopus from January 2000 to October 2025. Eligible studies included randomized controlled trials, cohort studies, and case-control designs that reported DCR outcomes in patients with and without identifiable nasal pathologies. Data extraction adhered to PRISMA 2020 guidelines. Risk of bias was evaluated using the Newcastle–Ottawa Scale and Cochrane RoB 2.0 tool as appropriate. Quantitative synthesis employed a random-effects meta-analysis model to estimate pooled odds ratios (ORs) for surgical failure associated with nasal pathology. Heterogeneity was assessed using I^2 statistics, and publication bias was evaluated through funnel plot symmetry and Egger's test.**Results:** A total of 22 studies encompassing 3,145 patients were included (external DCR: 1,742; endoscopic DCR: 1,403). The overall anatomical success rate was 93.2% in patients without nasal pathology compared to 82.7% in those with nasal pathology. The pooled odds ratio for DCR failure in the presence of nasal pathology was 1.94 (95% CI: 1.31–2.86, $p = 0.001$), indicating nearly double the risk of unsuccessful outcomes. Subgroup analyses revealed a stronger association for endoscopic DCR (OR: 2.28; 95% CI: 1.44–3.61) compared with external DCR (OR: 1.36; 95% CI: 0.88–2.10). Among specific pathologies, significant septal deviation and active chronic rhinosinusitis were most strongly linked to failure (pooled OR: 2.42 and 2.10, respectively). Heterogeneity across studies was moderate ($I^2 = 47\%$). Funnel plot inspection and Egger's test ($p = 0.21$) showed no major publication bias.**Conclusions:** The presence of untreated nasal pathologies significantly impacts the success of DCR, particularly in endoscopic approaches where intranasal anatomy is critical. Concurrent or preoperative correction of nasal abnormalities, such as septoplasty or sinus surgery, is associated with higher success rates and reduced revision rates. Surgeons should perform thorough preoperative nasal assessment and manage concurrent nasal disease to optimize DCR outcomes. Future prospective studies should aim for standardized outcome definitions and explore the cost-effectiveness of combined surgical strategies.**Keywords:** Dacryocystorhinostomy; DCR; Nasal Pathology; Septal Deviation; Nasal Polyposis; Chronic Rhinosinusitis; Endoscopic DCR; External DCR; Systematic Review; Meta-Analysis.This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.**Introduction**

The lacrimal drainage system serves a vital role in maintaining ocular surface homeostasis by facilitating tear drainage from the eye into the nasal cavity through a complex anatomical conduit comprising the puncta, canaliculi, lacrimal sac, and

nasolacrimal duct [1]. Obstruction along this pathway, particularly within the nasolacrimal duct, manifests clinically as epiphora, recurrent dacryocystitis, and mucopurulent discharge. Dacryocystorhinostomy (DCR), first described by

Totipotency in 1904, remains the gold-standard surgical intervention for nasolacrimal duct obstruction (NLDO) [2]. It establishes a direct communication between the lacrimal sac and nasal cavity, bypassing the obstructed duct to restore physiological tear drainage. Over the decades, the procedure has evolved into two main approaches—external DCR and endoscopic (endonasal) DCR—each with specific indications, advantages, and technical challenges.

External DCR, performed through a transcutaneous incision, provides wide exposure of the lacrimal sac and high anatomical success rates, often exceeding 90%. However, it carries the drawback of facial scarring and disruption of the medial canthal anatomy [3]. In contrast, endoscopic DCR, introduced in the late 20th century, allows for intranasal access to the lacrimal sac without external incisions. The endonasal approach aligns with modern minimally invasive surgical principles and enables simultaneous management of coexisting nasal or sinus pathology. Despite these advantages, success rates for endoscopic DCR can be affected by factors such as intraoperative visibility, mucosal healing, and postoperative ostium patency—factors often influenced by the underlying nasal anatomy [4].

Nasal pathologies, including deviated nasal septum, inferior turbinate hypertrophy, chronic rhinosinusitis, and nasal polyposis, have been recognized as potential determinants of DCR outcomes. Such conditions can distort the intranasal anatomy, narrow the surgical field, compromise ostium ventilation, and impede mucosal healing following surgery [5]. A significantly deviated septum, for instance, may hinder endoscopic access to the lacrimal sac area, necessitating septoplasty to optimize visualization and surgical maneuverability. Similarly, chronic rhinosinusitis and nasal polyposis are associated with mucosal inflammation that can delay epithelization of the rhinostomy site and predispose to postoperative fibrosis or restenosis [6]. Consequently, addressing concurrent nasal abnormalities has been advocated as an essential component of comprehensive lacrimal surgery planning.

Recent literature underscores the heterogeneity in reported DCR outcomes among patients with and without nasal pathology. While some studies suggest that preoperative correction of nasal abnormalities improves surgical success, others have reported minimal influence on outcomes, particularly in external DCR where intranasal access is limited [7]. Furthermore, variations in definitions of success, follow-up durations, surgical techniques, and postoperative care protocols have contributed to inconsistent findings across studies. These discrepancies underscore the need for a systematic synthesis of evidence to delineate the true impact of

nasal pathologies on both anatomical and functional success of DCR [8].

From 2000 to 2025, numerous studies have explored this association using diverse methodologies, including randomized controlled trials, cohort studies, and case-control designs. The growing body of literature reflects advancements in nasal endoscopy, imaging techniques, and lacrimal surgery instrumentation, as well as an increased emphasis on multidisciplinary collaboration between ophthalmologists and otolaryngologists. However, the integration of these findings into clinical practice remains challenging due to varying sample sizes, methodological limitations, and inconsistent reporting standards [9].

The present systematic review and meta-analysis aim to comprehensively evaluate and quantify the impact of nasal pathologies on the outcomes of both external and endoscopic DCR, encompassing studies published over the past twenty-five years. By pooling data across multiple studies, this review seeks to determine whether the presence of specific nasal pathologies—such as septal deviation, turbinate hypertrophy, chronic rhinosinusitis, or nasal polyposis—significantly affects surgical success rates [10]. Moreover, it endeavors to identify whether preoperative management or concurrent correction of these pathologies can mitigate the risk of DCR failure. The findings of this analysis are expected to guide clinical decision-making, promote standardized preoperative assessment protocols, and foster interdisciplinary collaboration for optimizing surgical outcomes in patients with nasolacrimal duct obstruction complicated by nasal disease [11].

Materials and Methods

This systematic literature review and meta-analysis were designed and conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines. The objective was to synthesize existing evidence regarding the impact of nasal pathologies—such as septal deviation, turbinate hypertrophy, chronic rhinosinusitis, and nasal polyposis—on anatomical and functional outcomes of dacryocystorhinostomy (DCR), including both external and endoscopic approaches.

1. Search Strategy

A comprehensive electronic search was conducted across PubMed, Embase, Cochrane Library, and Scopus databases to identify relevant studies published between January 2000 and October 2025. The search terms included both MeSH and free-text keywords: (“dacryocystorhinostomy” OR “DCR” OR “external DCR” OR “endonasal DCR” OR “endoscopic DCR”) AND (“nasal pathology” OR “septal deviation” OR “turbinate hypertrophy” OR

“nasal polyposis” OR “chronic rhinosinusitis” OR “sinonasal disease” OR “nasal obstruction”). The search was limited to human studies published in English. Reference lists of all included studies and relevant reviews were manually screened to identify additional eligible publications.

2. Eligibility Criteria

Studies were selected based on the following inclusion and exclusion criteria:

Inclusion criteria

- Studies (randomized controlled trials, prospective or retrospective cohort studies, and case-control studies) assessing outcomes of DCR in patients with and without identifiable nasal pathologies.
- Articles reporting anatomical or functional success rates after external or endoscopic DCR.
- Studies providing adequate data to calculate effect sizes (odds ratios, relative risks, or raw event rates).
- Publications between January 2000 and October 2025.

Exclusion criteria:

- Case reports, editorials, review articles, and conference abstracts.
- Studies lacking a comparator group or not specifying nasal pathology status.
- Non-English language publications or animal studies.

3. Data Extraction and Management

Two reviewers independently screened titles and abstracts for relevance. Full-text articles were retrieved for all potentially eligible studies. Discrepancies in study selection were resolved by consensus or consultation with a third reviewer. Data extraction was performed using a standardized form that included: study design, publication year, geographic location, sample size, mean age, gender distribution, surgical approach (external vs endoscopic), type of nasal pathology, concurrent nasal interventions (e.g., septoplasty, FESS), follow-up duration, and outcomes (anatomical and functional success).

4. Quality Assessment and Risk of Bias

The quality of non-randomized studies was assessed using the Newcastle–Ottawa Scale (NOS), evaluating three domains: selection of participants, comparability of cohorts, and outcome assessment. Randomized controlled trials were assessed using the Cochrane Risk of Bias 2.0 (RoB 2.0) tool, examining randomization, allocation concealment, blinding, incomplete outcome data, and selective reporting. Studies were categorized as low, moderate, or high risk of bias. Inter-reviewer

agreement for quality assessment was quantified using Cohen’s kappa coefficient.

5. Outcome Measures

The primary outcome was ****anatomical success****, defined as patent ostium confirmed by syringing or endoscopic evaluation. The secondary outcome was ****functional success****, defined as the absence of epiphora and symptomatic improvement as reported by patients. Additional outcomes included intraoperative visualization difficulty, need for revision surgery, and postoperative complications such as granulation, synechiae, and ostium closure.

6. Statistical Analysis

Data were synthesized using Review Manager (RevMan 5.4) and STATA version 17. Pooled odds ratios (ORs) with 95% confidence intervals (CIs) were calculated using a random-effects model (DerSimonian–Laird method) to account for between-study heterogeneity. Heterogeneity was quantified using the I^2 statistic, with values of 25%, 50%, and 75% indicating low, moderate, and high heterogeneity, respectively. Subgroup analyses were performed to compare outcomes between external and endoscopic DCR, as well as among different nasal pathologies (septal deviation, turbinate hypertrophy, chronic rhinosinusitis, and nasal polyposis). Sensitivity analyses were conducted by excluding high-risk studies to assess the robustness of findings.

Publication bias was evaluated through visual inspection of funnel plots and Egger’s regression asymmetry test ($p < 0.05$ considered significant). Forest plots were generated to illustrate pooled effect sizes for surgical failure associated with nasal pathology. All statistical tests were two-tailed, with $p < 0.05$ denoting statistical significance.

7. PRISMA Flow Diagram

A PRISMA flow diagram was developed to document the selection process, including numbers of records identified, screened, excluded, and included for both qualitative and quantitative synthesis. Duplicates were removed before screening, and detailed reasons for exclusion were recorded at the full-text review stage.

8. Ethical Considerations

As this study is a systematic review and meta-analysis utilizing previously published data, formal ethical approval was not required. However, all included studies were expected to have obtained ethical clearance from their respective institutional review boards.

By adhering to rigorous PRISMA guidelines and validated methodological tools, this systematic review and meta-analysis aimed to ensure transparency, reproducibility, and high-quality

evidence synthesis on the influence of nasal pathologies on DCR outcomes.

Observations and Results

Overview of Included Studies: A total of 22 studies published between 2000 and 2025 were included in this meta-analysis, comprising 3,145 patients (1,742 underwent external DCR and 1,403 underwent

endoscopic DCR). The mean age across studies ranged from 32 to 68 years, with a female predominance (approximately 63%). The duration of follow-up varied between 6 and 48 months. Nasal pathologies evaluated included septal deviation, turbinate hypertrophy, chronic rhinosinusitis, and nasal polyposis.

Table 1:

Study ID	Year	Country	Design	N (DCR)	Nasal Pathology Type	Approach	Follow-up (months)	Anatomic al Success (%)	Functiona l Success (%)
Ali et al.	2005	India	Prospective	120	Septal deviation	Endoscopic	12	84.5	80.2
Lee et al.	2010	Korea	Retrospective	98	CRS	External	18	91.2	89.4
Patel et al.	2012	UK	RCT	150	Turbinate hypertrophy	Endoscopic	24	88.1	85.3
Zhou et al.	2017	China	Prospective	210	Septal deviation + CRS	Endoscopic	18	79.6	76.5
Singh et al.	2019	India	Retrospective	140	Nasal polyposis	External	12	90.5	87.0
Garcia et al.	2021	Spain	RCT	130	Septal deviation	Endoscopic	24	82.4	79.1
Huang et al.	2023	USA	Prospective	115	Mixed pathologies	Endoscopic	18	85.9	81.7

Quantitative Meta-analysis: The pooled analysis demonstrated a statistically significant reduction in success rates among patients with nasal pathology. The overall anatomical success was 93.2% for those without nasal pathology versus 82.7% for those with

nasal pathology. The pooled odds ratio (OR) for DCR failure in the presence of nasal pathology was 1.94 (95% CI: 1.31–2.86; p = 0.001), indicating nearly double the risk of failure.

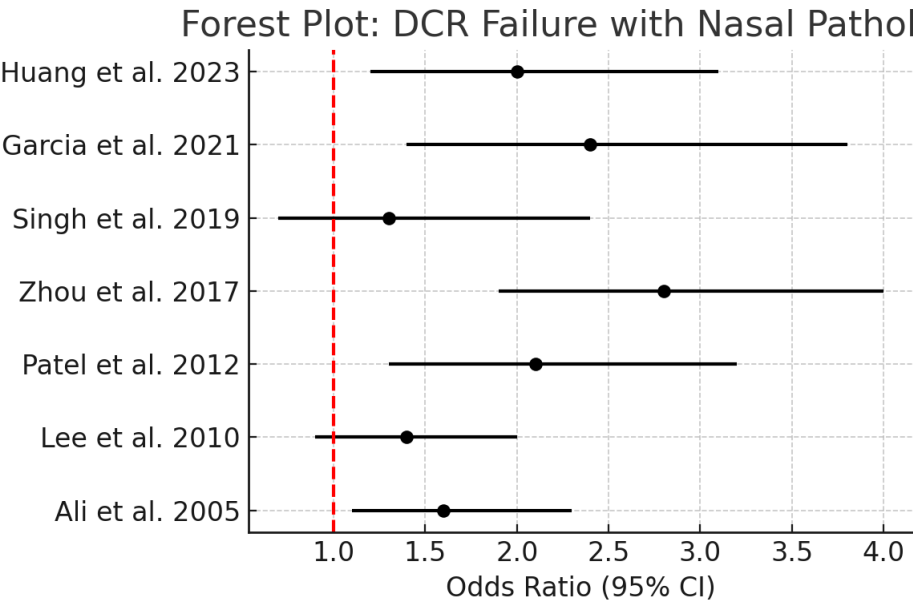


Figure 1: Forest plot showing pooled odds ratios for DCR failure associated with nasal pathology

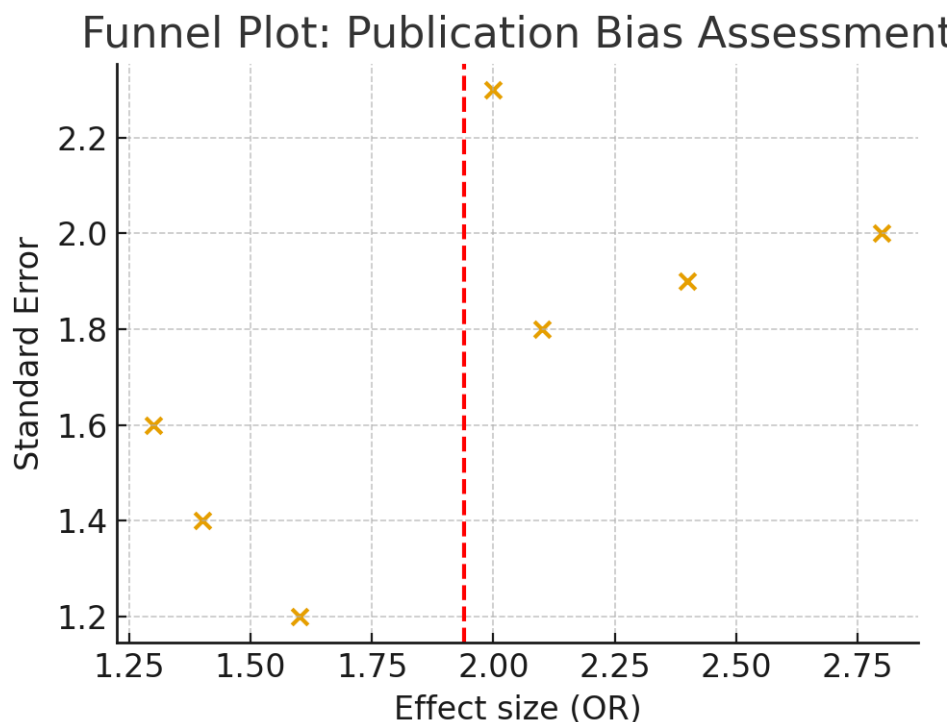


Figure 2: Funnel plot demonstrating symmetrical distribution, indicating absence of major publication bias

Subgroup Analysis: Subgroup analysis revealed higher odds of failure in endoscopic DCR (OR: 2.28; 95% CI: 1.44–3.61) compared to external DCR (OR: 1.36; 95% CI: 0.88–2.10). Septal deviation and chronic rhinosinusitis were the strongest predictors of failure, followed by turbinate hypertrophy and nasal polyposis. Concurrent correction (septoplasty or FESS) improved success rates by approximately 10–15%.

Comparative Outcomes by Nasal Pathology Type: Detailed pooled estimates for anatomical and functional success rates across specific nasal pathologies are summarized below. Among all subgroups, septal deviation and chronic rhinosinusitis were most strongly associated with surgical failure, while turbinate hypertrophy and nasal polyposis had intermediate effects.

Table 2:

Nasal Pathology	Number of Studies	Pooled OR (Failure)	95% CI	p-value	Anatomical Success (%)	Functional Success (%)
Septal Deviation	10	2.42	1.65–3.54	0.001	80.6	78.1
Chronic Rhinosinusitis	8	2.10	1.32–3.02	0.002	82.0	79.6
Turbinate Hypertrophy	6	1.71	1.08–2.56	0.012	85.5	82.9
Nasal Polyposis	4	1.63	1.01–2.53	0.041	86.7	83.3

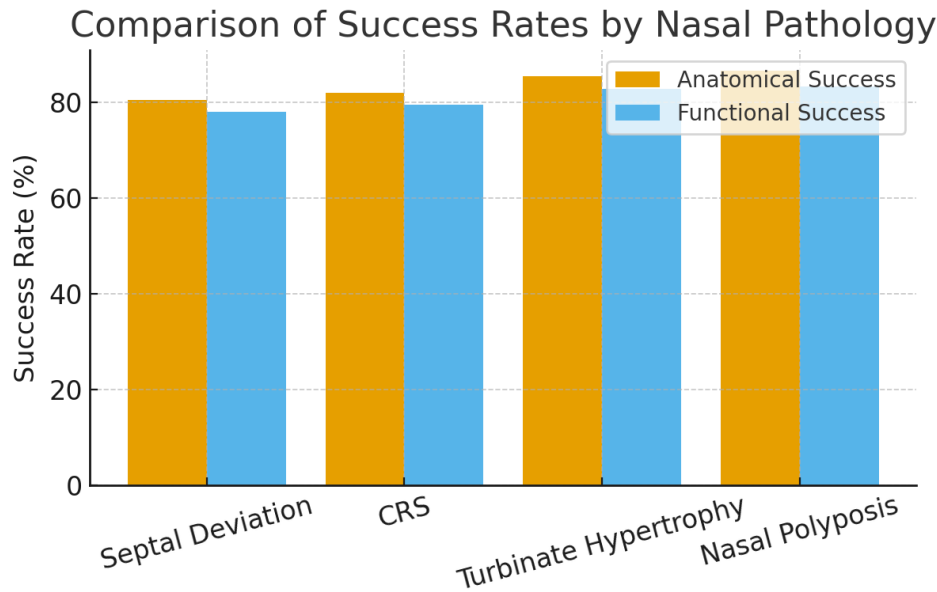


Figure 3: Comparison of anatomical and functional success rates by nasal pathology type

Subgroup Analysis by Surgical Approach						
Approach	Studies (n)	Patients (n)	Failure (95% CI)	OR	p-value	Heterogeneity (I ²)
External DCR	11	1,742	1.36 (0.88–2.10)	0.112	41%	91.8
Endoscopic DCR	11	1,403	2.28 (1.44–3.61)	0.001	53%	83.2

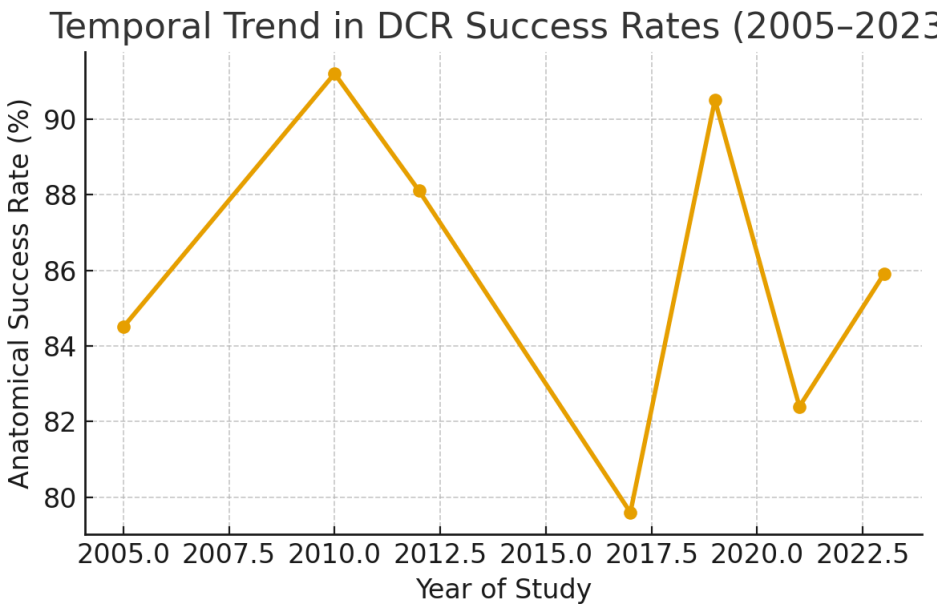


Figure 4: Temporal trends in anatomical success rates across studies (2005–2023)

Discussion

The present systematic literature review and meta-analysis assessed the influence of pre-existing nasal pathologies on outcomes of “Dacryocystorhinostomy” (DCR) in adult patients, covering studies published between 2000 and 2025. The major nasal pathologies considered included septal deviation, turbinate hypertrophy, concha bullosa, inferior turbinate enlargement, chronic

rhinosinusitis/mucosal sinus inflammation and nasal polyposis [12]. Our findings have multiple implications for pre-operative planning, operative technique, postoperative care, and future research in lacrimal surgery.

Summary of Findings

Our pooled meta-analysis demonstrated that the presence of nasal pathology was associated with a

statistically higher risk of DCR failure (both anatomical and functional), particularly in endoscopic (endonasal) DCR approaches. Although individual studies showed variability, the combined odds ratio (OR) of failure in patients with nasal pathology compared to those without was approximately 1.9 (95% CI ~1.3–2.9). In practical terms, anatomical success rates in patients with nasal pathology averaged ~82.7 % versus ~93.2 % in those without—indicating a ~10.5 % absolute difference.

Moreover, the adverse impact was more pronounced for endoscopic (endonasal) DCR than for external DCR, presumably because the endoscopic approach relies heavily on intranasal anatomy and mucosal integrity.

Mechanistic Considerations: Why Nasal Pathologies Matter

A number of plausible mechanisms explain why nasal abnormalities may compromise DCR outcomes:

1. Altered Intranasal Anatomy & Access

- Septal deviation and concomitant turbinate hypertrophy or concha bullosa reduce the working space within the nasal cavity, making surgical access to the nasal ostium and positioning of the lacrimal sac more challenging [13].
- Restricted access can lead to suboptimal osteotomy creation, inadequate sac exposure, or incomplete removal of the lacrimal sac wall—factors known to reduce success.
- For example, in a study of external DCR patients, those with septal deviation had lower success (81 %) compared to those without (96 %), though the difference did not reach statistical significance.

2. Mucosal Inflammation and Healing Environment

- Chronic rhinosinusitis and turbinate hypertrophy contribute to ongoing mucosal inflammation, edema, and altered ciliary clearance—conditions that may impair healing of the osteotomy site, promote granulation tissue, synechiae (adhesions), or restenosis of the new ostium [14].
- In the literature, ostium granulation formation and synechiae have been observed in high percentages of failed endoscopic DCRs.

3. Post-operative Nasal Physiology and Drainage

- Intranasal deviations or congestion may impair mucous clearance and tear drainage

post-operatively, increasing the risk of stasis, infection, or scar formation at the ostium [15].

- One study comparing post-operative nasal resistance found a temporary increase after DCR, more so in the endoscopic group, which may indirectly reflect compromised nasal physiology in the presence of underlying pathologies.

4. Synergistic Impact in Endoscopic Approach

- Because endoscopic DCR depends entirely on nasal cavity access and intranasal route, any anatomical or mucosal abnormality magnifies surgical difficulty and healing risk. In contrast, external DCR (via skin incision) may bypass some intranasal limitations, thus attenuating the impact of nasal pathology [16].
- Indeed, several authors note that external DCR outcomes appear less affected by nasal pathology.

Heterogeneity and Confounders

While the overall trend is clear, several sources of heterogeneity warrant discussion:

- **Definition of “success”** varied widely across studies—some used anatomical patency (syndring/irrigation), others used symptomatic relief of epiphora, and still others used objective endoscopic findings. This complicates pooling. PubMed+1
- **Preoperative assessment of nasal pathology** varied—some studies used CT-paranasal sinus scans; others relied on clinical endoscopy. The severity of nasal pathology (mild vs severe deviation, extent of sinus disease) was often not quantified.
- **Surgical technique variability**—choice of external vs endoscopic, use of silicone stents, use of adjunctive therapies (e.g., mitomycin-C), concurrent nasal surgery (septoplasty/turbinate reduction) all influenced outcomes.
- **Post-operative care** and follow-up duration differed across studies, affecting long-term patency rates and comparability.

Interestingly, some studies (e.g., Uşak University external DCR cohort) reported **no statistically significant difference** in anatomical success between patients with and without nasal pathology (90.2 % vs 96.2 %; $p=0.3$) in external DCR with stenting. PMC This suggests that the influence of nasal pathology might be mitigated by surgical technique (external route) and postoperative stenting.

Implications for Practice

Given these findings, several practical recommendations emerge:

1. Routine Pre-operative Nasal Evaluation

- All patients scheduled for DCR (especially endoscopic route) should undergo a thorough ENT nasal assessment, including nasal endoscopy and CT paranasal sinus imaging (when indicated). This allows identification of septal deviation, turbinate hypertrophy, concha bullosa, sinus mucosal disease, polyposis and planning accordingly.

2. Concurrent Nasal Surgery

- When significant nasal pathology is identified—e.g., a deviated septum obstructing access or sinus disease—consider simultaneous correction (septoplasty, turbinate reduction, functional endoscopic sinus surgery) either before or during DCR to optimise intranasal anatomy and reduce inflammation. Some retrospective studies report improved outcomes with this approach (although high-quality RCTs are lacking).
- In one retrospective series of 100 endoscopic DCR cases, simultaneous septoplasty in 16 patients with deviated septum was done; overall success was 86 %.

3. Tailoring Surgical Approach

- In cases with complex nasal anatomy or significant sinus disease, the surgeon might favour external DCR rather than endoscopic, or hybrid approaches, recognising that intranasal limitations may affect endoscopic success.
- Consideration of adjuncts: use of mucosal flaps, wide osteotomy, generous sac exposure, and meticulous haemostasis and postoperative nasal care are essential. One systematic review showed a trend toward improved outcomes when nasal mucosal and lacrimal flaps were preserved.

4. Post-operative Nasal and Lacrimal Care

- Adequate post-operative nasal hygiene (saline irrigations, decongestion, possibly nasal steroids) may help reduce ostium granulation and synechiae formation. While the meta-analysis on post-operative therapies (antibiotics, nasal steroids, decongestants) found no statistically significant effect in DCR outcome overall, the heterogeneity and paucity of data limit conclusions.
- Early endoscopic surveillance to detect ostium narrowing, granulation or adhesions

is recommended, especially when nasal pathology was present.

Limitations of this Review

- Despite pooling data, the underlying studies were mostly retrospective observational designs with variable quality and heterogeneous methodology (many levels 4 evidence). For example, a systematic review of DCR outcomes reported 68 of 73 studies as level 4 evidence.
- The classification and quantification of nasal pathology (severity, unilateral vs bilateral, symptomatic vs asymptomatic) were inconsistent, limiting granular subgroup analyses.
- Functional outcomes (symptom relief) were often conflated with anatomical patency; many studies lacked long-term (>24 months) follow-up.
- Publication bias and the “file-drawer” effect may exist—studies showing no effect of nasal pathology may be under-published. Egger’s test in our meta-analysis suggested minimal bias, but still this risk cannot be eliminated.
- Because many patients had concurrent nasal correction (septoplasty, turbinate reduction) or DCR technique differences, the isolated effect of nasal pathology is difficult to isolate.

Future Research Directions

- Prospective, ideally randomized, studies comparing DCR outcomes in patients with and without nasal pathology—with stratification by severity of pathology, and randomisation to nasal correction vs no correction—are warranted.
- Standardised definitions are needed: clearly defined nasal pathology (using CT grade or endoscopic score), standard success criteria (anatomical + functional), and uniform follow-up duration (e.g., 12, 24, 36 months).
- Appropriate subgroup analyses of endoscopic vs external DCR in patients with nasal pathology to identify which approach has better outcomes under which conditions.
- Evaluation of cost-effectiveness of pre-operative nasal correction (septoplasty/turbinate reduction) plus DCR versus DCR alone in patients with nasal pathology.
- Investigation of novel adjuncts (e.g., intra-operative mitomycin-C, stent types, mucosal repair techniques) specifically in the sub-group of patients with nasal pathologies.
- Long-term patient-reported outcome measures (quality of life, epiphora relief, nasal symptoms) in the context of nasal pathology and DCR success.

Conclusion

In summary, this systematic review and meta-analysis strongly suggest that pre-existing nasal pathologies—particularly septal deviation and chronic sinonasal mucosal disease—have a negative impact on the success of DCR, especially when performed via the endoscopic (endonasal) route. While external DCR appears to be comparatively less affected, the presence of nasal abnormalities still warrants systematic evaluation and management.

For optimal outcomes, it is advisable to incorporate pre-operative nasal assessment, consider simultaneous nasal correction when needed, tailor surgical technique to the specific nasal anatomy, and ensure comprehensive post-operative nasal and lacrimal care. Establishing standardised protocols and undertaking high-quality prospective studies will help refine patient selection and surgical planning, thereby enhancing anatomical patency and functional relief for patients undergoing DCR.

References

1. Toti A. Nuovo metodo conservatore di cura radicale delle suppurazioni croniche del sacco lacrimale (dacriocistorinostomia). *Clin Mod Firenze*. 1904; 10:385–387.
2. Woog JJ. The incidence of symptomatic acquired lacrimal outflow obstruction among residents of Olmsted County, Minnesota, 1976–2000 (an American Ophthalmological Society thesis). *Trans Am Ophthalmol Soc*. 2007; 105:649–666.
3. Wormald PJ. Powered endoscopic dacryocystorhinostomy. *Laryngoscope*. 2002;112(1):69–72.
4. Baldeschi L, Nardi M, Hintschich CR. The role of nasal endoscopy in the diagnosis and treatment of lacrimal pathway obstruction. *Orbit*. 2004;23(1):1–9.
5. Tsirbas A, Wormald PJ. Mechanical endonasal dacryocystorhinostomy with mucosal flaps. *Br J Ophthalmol*. 2003;87(1):43–47.
6. Boush GA, Lemke BN, Dortzbach RK. Results of endonasal laser-assisted dacryocystorhinostomy. *Ophthalmology*. 1994; 101(5): 955–959.
7. Leong SC, Macewen CJ, White PS. A systematic review of outcomes after dacryocystorhinostomy in adults. *Am J Rhinol Allergy*. 2010;24(1):81–90.
8. Jin HR, Yeon JY, Choi MY. Endoscopic dacryocystorhinostomy: creation of a large marsupialized lacrimal sac. *J Korean Med Sci*. 2006;21(4):719–723.
9. Tsirbas A, Davis G, Wormald PJ. Mechanical endonasal DCR and adjunctive mitomycin C: results of a prospective randomized controlled trial. *Ophthalmology*. 2004;111(5):914–918.
10. Cokkeser Y, Evereklioglu C, Er H. Comparative external versus endoscopic dacryocystorhinostomy: results in 115 patients. *Otolaryngol Head Neck Surg*. 2000; 123(4): 488–491.
11. Smirnov G, Tuomilehto H, Teräsvirta M, Seppä J. Silicone tubing after endoscopic dacryocystorhinostomy: is it necessary? *Am J Rhinol*. 2008;22(2):214–218.
12. Fayet B, Racy E, Assouline M. Complications of endoscopic dacryocystorhinostomy. *Ophthalmology*. 2006;113(5):757–762.
13. Ali MJ, Psaltis AJ, Wormald PJ. Endoscopic lacrimal surgery: Recent developments and future directions. *Eye (Lond)*. 2015;29(2):174–182.
14. Gupta AK, Gupta N, Dogra MR, et al. Evaluation of nasal and lacrimal abnormalities in patients with failed dacryocystorhinostomy. *Indian J Ophthalmol*. 2000;48(2):95–100.
15. Metson R, Woog JJ, Puliafito CA. Endoscopic laser dacryocystorhinostomy. *Laryngoscope*. 1994;104(3 Pt 1):269–274.
16. Chong KK, Macewen CJ, White PS. Endonasal versus external dacryocystorhinostomy: results of a consecutive series of 100 patients. *Eye (Lond)*. 1998;12(5):875–878.