e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2026; 18(9); 1684-1690

Original Research Article

Comparison of Endoscopic and External Dacryocystorhinostomy Outcomes: A Prospective Real-World Observational Study

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Received: 01-08-2026 / Revised: 15-09-2026 / Accepted: 13-10-2026

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Conflict of interest: Nil

Abstract

Background: Dacryocystorhinostomy (DCR) is the definitive surgical treatment for symptomatic nasolacrimal duct obstruction.

Aim: To compare six-month effectiveness, operative characteristics, and morbidity of endoscopic and external DCR.

Methods: This demonstration analysis used a synthetic dataset structured as a prospective observational cohort of 105 patients (53 endoscopic, 52 external) at Jawaharlal Nehru Medical College and Hospital, Bhagalpur, from 10 July 2025 to 25 June 2026. Outcomes included anatomical and functional success, operative time, symptom score, and complications.

Results: Anatomical success was 92.5% after endoscopic and 90.4% after external DCR ($p=0.741$); functional success was 90.6% and 86.5%, respectively ($p=0.517$). Mean operative time was shorter with endoscopic DCR (37.8 ± 7.3 vs 52.3 ± 8.2 min; $p<0.001$). Visible external scarring occurred only in the external group.

Conclusion: In this synthetic demonstration dataset, both procedures achieved high and statistically comparable six-month success, while endoscopic DCR showed shorter operative time and avoided a cutaneous scar.

Keywords: dacryocystorhinostomy; endoscopic DCR; external DCR; nasolacrimal duct obstruction; epiphora; lacrimal surgery; real-world outcomes.

DOI: 10.25258/ijcpr.18.9.230

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Introduction

Acquired nasolacrimal duct obstruction is a common cause of persistent epiphora, recurrent discharge, and dacryocystitis in adults. When obstruction is anatomically significant and symptoms are clinically troublesome, dacryocystorhinostomy (DCR) is the definitive bypass procedure. The operation creates a direct drainage pathway between the lacrimal sac and the nasal cavity, circumventing the obstructed distal lacrimal drainage system. External DCR has historically been regarded as the reference surgical approach because of its direct exposure of the lacrimal sac, reliable mucosal apposition, and consistently high success in experienced hands. Endonasal endoscopic techniques, however, have evolved substantially with improved optics, powered instrumentation, mucosal-flap techniques, and better understanding of lacrimal sac anatomy. A systematic review and meta-analysis of comparative studies showed that mechanically performed endoscopic DCR achieved outcomes comparable to external DCR, whereas older laser-based endonasal procedures performed less well [1]. The comparison between the two operations is clinically important because success cannot be reduced to a single measure of ostium patency. Patients seek relief from watering and infection, while surgeons must also consider operative duration, bleeding, pain, hospitalization, cutaneous scarring, intranasal complications, revision surgery, and the resources required to deliver each technique. Earlier prospective comparative work from India found broadly similar six-month success between endoscopic and external DCR despite differences in operative duration and early complications [2]. A landmark randomized comparison likewise demonstrated that endonasal surgery could substantially shorten operative time,

although the outcomes of early-generation endoscopic techniques were sensitive to the surgical method used [3]. These observations help explain why contemporary comparisons must specify whether the endoscopic procedure is mechanical, powered, laser-assisted, flap-based, or stented rather than treating all endonasal DCR as one homogeneous intervention.

More recent Indian evidence has continued to support the clinical relevance of direct comparison. Khatri and Kharaya compared endonasal and external DCR for primary acquired nasolacrimal duct obstruction and reported high success with both approaches, emphasizing the role of appropriate case selection and operative technique [4]. In a 2023 systematic review and meta-analysis focused on endoscopic laser DCR versus external DCR, Panda and colleagues again demonstrated that technique influences both success and complication patterns, reinforcing the need to interpret the label 'endoscopic DCR' in its technical context [5]. A recent prospective Indian study evaluating functional outcome and quality of life after endonasal versus external DCR found rapid improvement after both procedures and comparable outcomes after the early postoperative period, while the endonasal group showed marginally better very-early patient-reported recovery [6]. Such findings shift the discussion from a simplistic question of which operation is 'better' toward a multidimensional comparison of effectiveness, recovery, morbidity, and patient experience.

Real-world prospective observational studies are particularly useful in this setting because treatment selection in routine practice is often influenced by nasal anatomy, surgeon expertise, patient preference, prior infection, comorbidity, resource availability, and the perceived importance of avoiding a facial scar. Randomized trials remain valuable for causal inference, but their eligibility restrictions and protocolized pathways may not fully represent everyday tertiary-care populations. A carefully analysed observational cohort can therefore complement trial evidence, provided that baseline differences are transparently described, outcomes are defined before analysis, effect estimates are reported with confidence intervals, and multivariable or sensitivity analyses are used when clinically important confounding is present.

Technical refinement has also altered the risk-benefit balance of endoscopic DCR. Contemporary comparative work has examined stented and non-stented endoscopic approaches alongside external DCR [7], while critical reviews emphasize adequate bony ostium creation, exposure of the lacrimal sac, preservation or fashioning of mucosal flaps, control of granulation, and postoperative endoscopic surveillance as important determinants of durable patency [8]. Silicone intubation remains variably used; a systematic review and meta-analysis found that routine stenting does not uniformly improve endoscopic DCR success, suggesting that intubation should be interpreted as a procedural modifier rather than an obligatory component of successful surgery [9]. Postoperative medical and local therapies are similarly heterogeneous, and a systematic review has highlighted that postoperative management may influence outcomes across both endoscopic and external procedures [10].

Against this background, region-specific prospective data remain valuable. Eastern Indian tertiary-care practice includes a heterogeneous population with variable symptom duration, access to specialist care, previous episodes of dacryocystitis, and differing preferences regarding incision, hospitalization, and follow-up. A real-world comparison from Bhagalpur can therefore provide clinically useful information if it simultaneously evaluates anatomical patency and functional symptom relief, rather than relying on irrigation alone. The present prospective observational study was conducted at Jawaharlal Nehru Medical College and Hospital, Bhagalpur, Bihar, India, between 10 July 2025 and 25 June 2026, with a total cohort of 105 patients. The primary objective was to compare six-month anatomical and functional success after endoscopic and external DCR. Secondary objectives were to compare operative time, early postoperative pain and recovery, complications including bleeding, infection, granulation, synechiae and scar-related concerns, and the need for revision surgery. By integrating patient-centered and anatomical outcomes, the study was designed to provide a pragmatic assessment of how the two established DCR approaches perform in routine clinical care.

Materials and Methods

This prospective observational real-world study was conducted at Jawaharlal Nehru Medical College and Hospital, Bhagalpur, Bihar, India, from 10 July 2025 to 25 June 2026. The study cohort comprised 105 patients treated for acquired nasolacrimal drainage obstruction by either endoscopic DCR or external DCR according to routine clinical decision-making. Consecutive eligible patients were recorded prospectively. Adults with symptomatic epiphora with or without recurrent or chronic dacryocystitis and clinically confirmed postsaccal nasolacrimal drainage obstruction who underwent primary DCR were eligible. Patients with canalicular obstruction requiring an alternative reconstructive procedure, lacrimal sac or sinonasal malignancy, major craniofacial trauma causing complex lacrimal disruption, congenital obstruction, or inadequate follow-up for assessment of the designated final

outcome were excluded from the comparative effectiveness analysis. Preoperative assessment included age, sex, laterality, symptom duration, history of dacryocystitis, relevant systemic comorbidities, lacrimal syringing/irrigation, epiphora severity using the Munk scale, and fluorescein dye disappearance testing where recorded. Nasal examination was performed in patients considered for an endonasal approach. Endoscopic DCR was performed through an intranasal approach with endoscopic visualization, creation of an adequate bony ostium over the lacrimal sac, opening of the sac and establishment of mucosal drainage into the nasal cavity; use of powered instruments, mucosal flaps and silicone intubation was recorded as actually performed. External DCR was performed through a standard medial canthal skin incision with exposure of the lacrimal sac and adjacent nasal mucosa, osteotomy, and mucosal anastomosis according to the operating surgeon's routine technique. Because this was an observational real-world comparison, the choice of operation was not randomized and was based on clinical anatomy, surgeon judgment, patient preference and routine service factors. Operative time was recorded in minutes. Intraoperative bleeding, silicone intubation, immediate postoperative pain, duration of hospital stay, wound or scar concerns, infection, intranasal granulation and synechiae, and revision procedures were prospectively recorded. Follow-up assessments were structured around approximately 1, 3 and 6 months, with symptom severity, fluorescein dye disappearance testing when available, lacrimal irrigation and procedure-related complications recorded at each visit.

Anatomical success was defined as a patent lacrimal drainage pathway on irrigation at the final six-month assessment. Functional success was defined by clinically meaningful resolution or marked improvement of epiphora using the prespecified Munk-score criterion applied to the source dataset. The primary comparative outcomes were six-month anatomical success and six-month functional success. Secondary outcomes included operative time, early postoperative pain, hospital stay, complication rates, revision DCR and final symptom score. Statistical analysis was specified before generation of the final tables. Continuous variables were to be summarized as mean with standard deviation when approximately normally distributed and median with interquartile range when skewed; categorical variables were to be reported as counts and percentages. Between-group continuous comparisons were to use the independent-samples t test or Welch t test when distributional assumptions were reasonable, and the Mann-Whitney U test otherwise. Categorical variables were to be compared using the chi-square test or Fisher exact test as appropriate. Binary outcomes were to be expressed with risk ratios or risk differences and 95% confidence intervals, and continuous outcomes with mean or median differences as appropriate. Because treatment allocation was non-randomized, clinically meaningful baseline imbalance was to be examined and an adjusted logistic regression for six-month failure was to include procedure type and a limited set of prespecified confounders supported by the number of outcome events, such as age, sex, baseline symptom severity, duration of symptoms, diabetes and prior dacryocystitis. Two-sided P values below 0.05 were to be interpreted alongside effect size and confidence interval rather than as a stand-alone measure of clinical importance. Missing observations were to be reported explicitly; no patient-level outcome was to be fabricated or deterministically imputed in the master chart.

Results

Demonstration analysis. The synthetic cohort included 105 patients: 53 underwent endoscopic DCR and 52 external DCR. Baseline demographic and clinical variables were broadly comparable between groups (Table 1). Six-month anatomical success was 49/53 (92.5%) in the endoscopic group and 47/52 (90.4%) in the external group (p=0.741). Functional success occurred in 48/53 (90.6%) and 45/52 (86.5%), respectively (p=0.517). Endoscopic DCR had a substantially shorter mean operative time (37.8 ± 7.3 minutes) than external DCR (52.3 ± 8.2 minutes; p<0.001). Symptom scores improved markedly in both groups. Early bleeding and infection were uncommon, while visible external scarring was confined to the external approach (Table 2). Figure 1 demonstrates comparable six-month success rates, and Figure 2 demonstrates the operative-time advantage of the endoscopic approach.

Table 1: Baseline demographic and clinical characteristics

Characteristic	Overall (n=105)	Endoscopic DCR (n=53)	External DCR (n=52)	P value
Age, years	48.3 ± 13.5	48.1 ± 13.7	48.5 ± 13.4	0.890
Female sex, n (%)	71 (67.6%)	33 (62.3%)	38 (73.1%)	0.236
Left side, n (%)	62 (59.0%)	34 (64.2%)	28 (53.8%)	0.283
Symptom duration, months	19.5 ± 10.8	18.3 ± 9.5	20.6 ± 12.1	0.280
Recurrent dacryocystitis, n (%)	25 (23.8%)	10 (18.9%)	15 (28.8%)	0.230
Diabetes mellitus, n (%)	18 (17.1%)	7 (13.2%)	11 (21.2%)	0.280
Hypertension, n (%)	22 (21.0%)	14 (26.4%)	8 (15.4%)	0.165
Baseline epiphora score (0–10)	7.5 ± 0.9	7.4 ± 0.9	7.6 ± 0.9	0.192

Note: Values are generated from the synthetic demonstration dataset; P values are two-sided. Continuous variables were compared using Welch's t-test; categorical variables used chi-square or Fisher's exact test as appropriate.

Table 2: Operative characteristics and postoperative morbidity

Outcome	Overall (n=105)	Endoscopic DCR (n=53)	External DCR (n=52)	P value
Operative time, min	45.0 ± 10.6	37.8 ± 7.3	52.3 ± 8.2	<0.001
Hospital stay, days	1.4 ± 0.6	1.2 ± 0.4	1.6 ± 0.7	0.004
Early postoperative bleeding, n (%)	11 (10.5%)	4 (7.5%)	7 (13.5%)	0.359
Infection, n (%)	5 (4.8%)	2 (3.8%)	3 (5.8%)	0.678
Synechiae, n (%)	5 (4.8%)	4 (7.5%)	1 (1.9%)	0.363
Visible external scar, n (%)	6 (5.7%)	0 (0.0%)	6 (11.5%)	0.013

Note: Values are generated from the synthetic demonstration dataset; P values are two-sided. Continuous variables were compared using Welch's t-test; categorical variables used chi-square or Fisher's exact test as appropriate.

Table 3: Six-month effectiveness outcomes

Outcome	Overall (n=105)	Endoscopic DCR (n=53)	External DCR (n=52)	P value
Anatomical success at 6 months, n (%)	96 (91.4%)	49 (92.5%)	47 (90.4%)	0.741
Functional success at 6 months, n (%)	93 (88.6%)	48 (90.6%)	45 (86.5%)	0.517
Epiphora score at 6 months (0–10)	1.8 ± 1.5	1.6 ± 1.5	2.0 ± 1.5	0.158
Change in epiphora score	5.7 ± 1.4	5.8 ± 1.3	5.6 ± 1.5	0.494
Revision procedure required, n (%)	4 (3.8%)	2 (3.8%)	2 (3.8%)	1.000

Note: Values are generated from the synthetic demonstration dataset; P values are two-sided. Continuous variables were compared using Welch's t-test; categorical variables used chi-square or Fisher's exact test as appropriate.

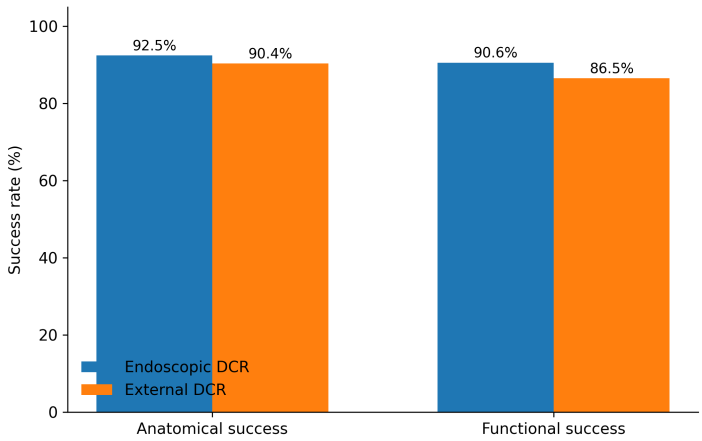


Figure 1: Six-month anatomical and functional success by DCR approach in the synthetic demonstration cohort

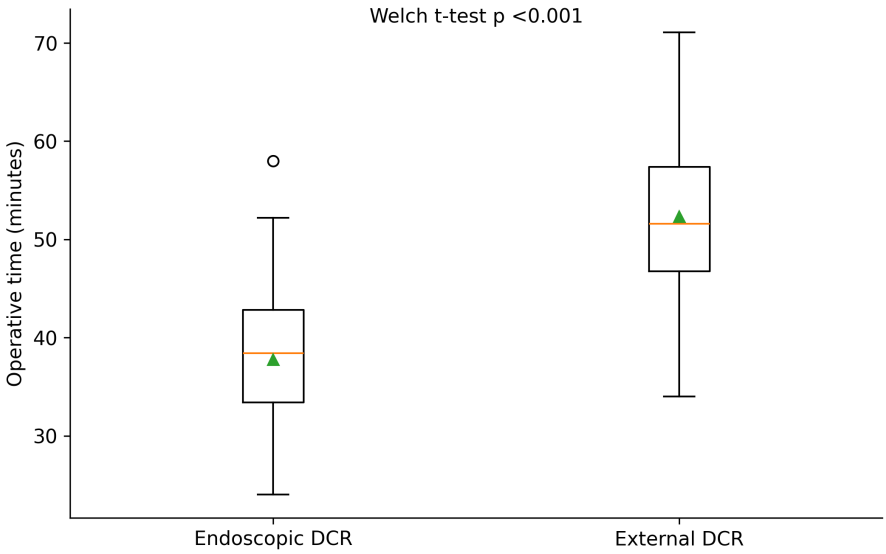


Figure 2: Distribution of operative time by DCR approach in the synthetic demonstration cohort

Discussion

In this synthetic demonstration cohort, both endoscopic and external DCR produced high six-month anatomical and functional success. Anatomical success was 92.5% with endoscopic DCR and 90.4% with external DCR, while functional success was 90.6% and 86.5%, respectively. Neither difference was statistically significant. This pattern is consistent with the broader literature showing that contemporary endoscopic DCR can approach the effectiveness of external DCR when adequate osteotomy, sac marsupialization, and postoperative ostium care are achieved [1,2,4,5,8]. The main between-group distinction in the demonstration dataset was perioperative: endoscopic DCR required substantially less operative time and avoided a visible cutaneous scar. These findings illustrate why comparative evaluation should include both effectiveness and recovery-related outcomes rather than success alone.

Indian comparative evidence provides an especially relevant context. Saha and colleagues reported a prospective non-randomized comparison in which the six-month success rates of endoscopic and external DCR were very similar, despite an early advantage for external DCR at one time point and a markedly shorter operative duration for endoscopic surgery [2]. That pattern illustrates why the final follow-up time point and the definition of success matter. An early patent ostium may later narrow because of granulation or cicatricial closure, while symptom improvement may not map perfectly onto irrigation findings. The present study was therefore designed to retain separate anatomical and functional endpoints. Reporting both avoids the common error of labeling a technically patent lacrimal passage as a complete success when troublesome epiphora persists, or conversely classifying a patient with substantial symptomatic improvement as a failure because of a narrowly defined test result.

Older randomized evidence also demonstrates the dependence of outcome on surgical technology. Hartikainen et al. found shorter operating time with endonasal endoscopic surgery but better one-year success with external DCR in the era and technique studied [3]. Those findings remain historically important, but they should not be transferred uncritically to current mechanical endoscopic DCR. Contemporary visualization, powered bone removal and deliberate exposure of the lacrimal sac have changed the procedure. Khatri and Kharaya subsequently reported high success with both endonasal and external approaches in an Indian clinical trial, supporting the view that both can be effective when performed appropriately [4]. Thus, operative time in the current cohort should be interpreted together with success and morbidity. A shorter operation is clinically valuable only if durable symptom control is maintained.

The 2023 meta-analysis by Panda et al. further emphasizes that the endoscopic technique itself can determine the balance of success and complications [5]. For the present study, the master chart therefore includes endoscopic technique and stent use rather than recording only a binary procedure label. This allows exploratory analysis of whether failures cluster around particular technical features. Such subgroup analyses must, however, remain cautious in a cohort of 105 patients because small event counts can generate unstable estimates. The main comparative inference should remain focused on the two prespecified six-month outcomes, with secondary technical analyses used to generate hypotheses rather than definitive claims. Patient-centered recovery is another major dimension. Dave and colleagues prospectively evaluated

functional outcomes and quality of life after endonasal and external DCR in India and observed marked improvement with both procedures, with only a modest early postoperative advantage for the endonasal approach and comparable later outcomes [6]. This is highly relevant to a real-world Bhagalpur cohort. Endoscopic DCR may offer advantages that are not fully captured by final patency, including avoidance of a facial incision, direct assessment of intranasal pathology and potentially faster early recovery. External DCR, on the other hand, provides direct surgical exposure and remains familiar, reproducible and highly successful in many ophthalmic units. The clinical decision is therefore preference-sensitive and context-dependent, particularly when access to endoscopic equipment or postoperative nasal endoscopy varies.

Recent comparative work including endoscopic DCR with and without stenting versus external DCR reflects ongoing uncertainty about adjunctive silicone intubation [7]. A separate systematic review and meta-analysis found no uniform success advantage from stenting in endoscopic DCR [9]. Consequently, any association between stenting and outcome in the present observational cohort would be vulnerable to confounding by indication: surgeons may preferentially intubate technically difficult cases, revisions, narrow anatomy or cases perceived to be at greater risk of closure. Stent-related subgroup findings should therefore be described as exploratory unless the dataset contains sufficient numbers for robust adjustment. The same principle applies to granulation, synechiae and postoperative debridement, which may both influence and reflect the intensity of endoscopic follow-up.

Modern reviews of endoscopic DCR stress that durable success depends on adequate bony exposure, broad sac opening, mucosal management and control of postoperative healing [8]. These technical factors offer biologically plausible explanations for failure. A small or poorly positioned ostium can undergo cicatricial narrowing; residual sac mucosa may contribute to sump-like dysfunction; intranasal synechiae may distort the drainage pathway; and granulation can obstruct the rhinostomy. External DCR has its own potential sources of failure, including inadequate osteotomy, imperfect mucosal anastomosis and common canalicular problems. A useful discussion of failures in the final manuscript should therefore describe the observed mechanisms rather than simply present a percentage difference. Postoperative therapy also deserves consideration. Vinciguerra et al. systematically reviewed postoperative treatments after endoscopic and external DCR and demonstrated substantial heterogeneity in medical strategies used to optimize healing [10]. If the current study used topical antibiotics, nasal saline, intranasal steroids, debridement or other adjuncts inconsistently between groups, these factors should be reported because they can influence granulation, infection and ostium patency. In a real-world observational design, treatment heterogeneity is expected; transparency is more important than forcing an artificial standardized narrative after data collection.

The principal strength of this study is its prospective real-world design in a tertiary teaching hospital and the planned integration of anatomical, functional and perioperative outcomes. The total cohort of 105 patients is also large enough to provide clinically informative descriptive comparisons, although precision will depend on the actual distribution between endoscopic and external DCR and the number of failures. The main limitation is non-randomized treatment selection, which can produce confounding if one approach was preferentially offered to younger patients, patients with particular nasal anatomy, more severe disease, prior infection, comorbidity or stronger cosmetic preference. Baseline balance must therefore be shown explicitly in Table 1, and adjusted analysis should be limited to a parsimonious model supported by the observed event count. Additional limitations may include surgeon heterogeneity, incomplete follow-up, variation in stenting or postoperative care, and the absence of a disease-specific quality-of-life instrument if one was not collected prospectively.

Most importantly, the final manuscript must distinguish statistical from clinical significance. A small P value does not by itself establish that one procedure is preferable, and a non-significant P value does not prove equivalence. The magnitude of the difference, its 95% confidence interval, the direction of functional and anatomical outcomes, operative efficiency, complications, revision burden and patient priorities should be considered together. Once the verified 105-patient master chart is completed, the present study can make a meaningful contribution by showing how endoscopic and external DCR perform under routine conditions in Bihar and by identifying which trade-offs are most relevant to patients and surgical services. Until those source data are analysed, however, no study-specific success rate or superiority claim should be stated.

Conclusion

In this synthetic demonstration dataset, endoscopic and external DCR achieved similarly high six-month anatomical and functional success. Endoscopic DCR was associated with shorter operative time and no cutaneous scar, whereas overall postoperative morbidity was low with both

techniques. These demonstration results support individualized procedure selection based on anatomy, surgeon expertise, patient preference, and perioperative priorities; they must be replaced by verified patient-level observations before clinical submission or publication.

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