IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Assessment Of Quality Of Life After Endoscopic Septoplasty In Adults With Deviated Nasal Septum

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Abstract

Background:

Deviated nasal septum (DNS) is a common anatomical abnormality causing nasal obstruction, sleep disturbance, recurrent sinusitis, and impaired quality of life (QoL). Septoplasty is the standard surgical treatment, and in recent decades, endoscopic techniques have been introduced to enhance precision and reduce complications. Evaluating the impact of endoscopic septoplasty on QoL is crucial for guiding clinical decision-making, particularly in Indian healthcare settings where routine use of patient-reported outcome measures (PROMs) is limited.

Aim:

To systematically assess the impact of endoscopic septoplasty on QoL in adults with DNS and to compare its effectiveness and safety with conventional septoplasty.

Methods:

A systematic literature review was conducted using PubMed, Scopus, Web of Science, and Google Scholar, focusing on studies published between 2000 and 2025. Randomized controlled trials (RCTs), cohort studies, and meta-analyses that reported QoL outcomes using validated PROMs—such as the Nasal Obstruction Symptom Evaluation (NOSE), Sinonasal Outcome Test-22 (SNOT-22), and Glasgow Benefit Inventory

(GBI)—were included. Data on demographics, baseline scores, postoperative changes at 1, 3, and 6 months, and complication rates were extracted and synthesized narratively.

Results:

Patients undergoing endoscopic septoplasty demonstrated substantial improvement in QoL, with mean NOSE reductions of approximately −48 points at six months and SNOT-22 improvements of 18–20 points, both exceeding minimal clinically important difference thresholds. Symptom relief was evident at one month and remained stable up to 12 months. Compared with conventional septoplasty, endoscopic techniques showed comparable PROM gains but with significantly fewer complications, including reduced synechiae and hemorrhage. Predictors of poorer outcomes included allergic rhinitis, psychological distress, and nasal valve dysfunction.

Conclusion:

Endoscopic septoplasty is a safe, effective, and patient-centered intervention that provides rapid and sustained QoL improvements in adults with DNS. Incorporation of PROMs such as NOSE and SNOT-22 into routine Indian practice is recommended to standardize outcome measurement. Larger multicenter Indian RCTs with long-term follow-up are warranted to strengthen evidence-based practice.

Keywords: Deviated nasal septum, Endoscopic septoplasty, Quality of life, NOSE scale, SNOT-22, PROMs

1. Introduction

1.1 Background of the Study

A deviated nasal septum (DNS) is one of the most common structural abnormalities encountered in otolaryngology practice. It refers to the displacement of the nasal septum from the midline, leading to varying degrees of nasal obstruction, recurrent sinusitis, snoring, and impaired quality of life (QoL). Studies suggest that nearly one-third of the general population suffers from some degree of DNS, with symptomatic cases requiring surgical intervention for relief of nasal obstruction and associated complaints (1,2).

Endoscopic septoplasty has emerged as a modern refinement of the traditional headlight technique. By utilizing endoscopes, surgeons gain improved visualization of posterior deviations, spurs, and high septal deformities, which often remain inadequately corrected through conventional approaches (3). This advancement is particularly significant in ensuring minimal trauma to mucosa, precise correction, and reduced postoperative morbidity.

1.2 Impact of Deviated Nasal Septum on Quality of Life

Nasal obstruction due to DNS not only causes local symptoms but also affects sleep quality, exercise tolerance, productivity, and psychological well-being. Patients with chronic nasal obstruction often report fatigue,

headache, poor concentration, and impaired social interactions, which collectively diminish health-related quality of life (HRQoL) (4).

Validated patient-reported outcome measures (PROMs), such as the Nasal Obstruction Symptom Evaluation (NOSE) scale and the Sinonasal Outcome Test-22 (SNOT-22), are widely used to quantify this burden. These tools provide standardized assessment of preoperative symptom severity and postoperative improvement, making them essential in modern clinical research and practice (5,6).

1.3 Evolution of Septoplasty Techniques

Septoplasty has long been considered the definitive surgical treatment for symptomatic DNS. Traditional septoplasty, performed with a headlight, remains effective but may be limited in cases of posterior or high septal deviations. In contrast, endoscopic septoplasty, first introduced in the 1990s, offers magnified visualization and targeted correction while preserving mucosal integrity (7).

Multiple randomized controlled trials (RCTs) and meta-analyses have compared traditional and endoscopic techniques. Findings suggest both methods provide significant symptom relief, though the endoscopic approach may offer advantages in selected cases, especially where precise correction is required (3,8).

1.4 Rationale for the Study

In the Indian context, DNS remains a frequent reason for ENT consultations and surgical referrals. While septoplasty is a commonly performed procedure, emphasis on QoL assessment in routine clinical practice has been limited. Most surgeons traditionally focus on objective outcomes such as airway patency, neglecting patient-centered outcomes. However, contemporary otolaryngology practice prioritizes PROMs, highlighting the necessity of evaluating surgical success from the patient's perspective (5,9).

Endoscopic septoplasty offers the dual advantage of anatomical correction and improved visualization, potentially translating into better HRQoL outcomes. Yet, the magnitude and sustainability of these improvements in Indian populations remain under-researched. This makes it essential to systematically assess QoL outcomes following endoscopic septoplasty among adults with DNS.

1.5 Aim and Objectives

The aim of this paper is to critically assess the **quality of life after endoscopic septoplasty in adults with deviated nasal septum**.

The objectives are:

1. To review existing literature on QoL outcomes after endoscopic septoplasty.
2. To compare endoscopic septoplasty with traditional approaches in terms of symptom relief and HRQoL.
3. To analyze the role of PROMs (NOSE, SNOT-22, GBI) in quantifying surgical success.

4. To highlight predictors of favorable and unfavorable postoperative outcomes.

2. Review of Literature

2.1 Global and Indian Perspective on DNS and Quality of Life

Deviated nasal septum (DNS) is a prevalent anatomical abnormality that significantly affects the quality of life (QoL) in adults. Globally, it has been reported that nearly one-third of the population exhibits some degree of septal deviation, though not all individuals are symptomatic (1). Patients with DNS commonly complain of nasal obstruction, sleep disturbances, recurrent sinusitis, and headaches, which collectively impair health-related quality of life (HRQoL) (2). Studies from developed countries demonstrate that DNS has both physical and psychological implications, reducing productivity, social interaction, and sleep quality (3).

In India, DNS is one of the leading causes for otolaryngology consultations and surgical referrals. A high patient load in tertiary care centers often consists of individuals with significant nasal obstruction attributed to septal deviation. The Indian clinical setting is unique, as patients are frequently exposed to environmental irritants such as air pollution, smoke, and dust, which exacerbate nasal obstruction and allergic symptoms (4). Studies conducted in Indian hospitals have demonstrated that septoplasty, particularly endoscopic septoplasty, significantly improves nasal patency and HRQoL, highlighting the importance of surgical correction in this population (5,6).

2.2 Studies Comparing Endoscopic and Traditional Septoplasty

Traditional septoplasty using headlights has been the standard for decades and remains widely practiced. However, the advent of endoscopic septoplasty has provided surgeons with improved magnification and visualization, especially in cases involving posterior spurs or high deviations (7). Na'ara et al. conducted a prospective randomized controlled trial comparing endoscopic with traditional septoplasty and reported that both techniques achieved significant symptom relief, but the endoscopic method allowed better correction of posterior deviations and reduced mucosal trauma (8).

In the Indian context, Saxena et al. compared endoscopic and conventional septoplasty using validated QoL questionnaires (NOSE and SNOT-22) and found that while both methods improved symptoms, endoscopic septoplasty provided slightly superior outcomes in complex cases and was associated with fewer complications (9). Systematic reviews and meta-analyses further suggest that both approaches are effective, but endoscopic techniques may offer additional benefits in precision and reduced intraoperative morbidity, without significant differences in long-term outcomes (10).

2.3 Patient-Reported Outcome Measures (PROMs)

The success of septoplasty is not only determined by objective measures such as rhinomanometry but also by patient-reported outcome measures (PROMs). The Nasal Obstruction Symptom Evaluation (NOSE) scale is

among the most widely used instruments, consisting of five items addressing nasal blockage, congestion, breathing difficulty, and sleep quality (11). The Sinonasal Outcome Test-22 (SNOT-22) is another validated instrument that covers a broader range of sinonasal symptoms, including nasal obstruction, facial pain, sleep issues, and psychological well-being (12).

Several Indian and international studies have used these instruments to assess QoL improvement after septoplasty. For example, Siddique et al. reported significant reductions in both NOSE and SNOT-22 scores after surgery, demonstrating meaningful QoL improvement in Indian patients (13). The Glasgow Benefit Inventory (GBI) has also been applied in some studies to assess global benefit, particularly in research settings, though it is less commonly used compared to NOSE and SNOT-22 (14).

2.4 Minimal Clinically Important Difference (MCID) in QoL Tools

The concept of Minimal Clinically Important Difference (MCID) is critical in interpreting PROMs. MCID represents the smallest change in score that patients perceive as beneficial and which would warrant a change in clinical management. For the NOSE scale, an MCID of approximately 24 points has been proposed, while for the SNOT-22, values between 9 and 12 points are widely accepted (15,16). These thresholds allow clinicians and researchers to distinguish between statistically significant and clinically meaningful improvements.

In practice, this means that even if a study demonstrates a reduction in symptom scores after septoplasty, the change must exceed the MCID to be considered truly beneficial to patients. Application of MCID in septoplasty outcomes has standardized reporting and enhanced comparability across studies. Indian studies have also begun incorporating MCID-based interpretations, which align them with global standards of research and practice (9,13).

2.5 Predictors of Surgical Outcomes

Surgical outcomes following septoplasty are influenced by multiple factors. Psychological characteristics, such as anxiety and depression, have been shown to affect postoperative satisfaction. Feng et al. observed that patients with high baseline anxiety and depressive symptoms reported slower recovery of nasal obstruction after septoplasty (17). Similarly, Guven and Gorgulu found that preoperative psychological well-being strongly correlated with postoperative QoL, suggesting that mental health is a significant determinant of surgical success (18).

Allergic rhinitis is another factor influencing outcomes. Wu et al. performed a meta-analysis and concluded that patients with both DNS and allergic rhinitis can still benefit from septoplasty, although symptom relief may be less pronounced than in non-allergic patients (19). Valve dysfunction, particularly unrecognized nasal valve collapse, is a frequent cause of persistent obstruction even after technically successful septoplasty. Inadequate correction of valve dysfunction is a leading reason for surgical failure and patient dissatisfaction (20). Thus,

careful preoperative assessment of comorbidities and anatomical variations is essential for predicting postoperative QoL outcomes.

2.6 Summary of Gaps in Evidence

Although numerous studies have documented the benefits of septoplasty, several gaps remain in literature. First, many trials include both conventional and endoscopic septoplasty without separately analyzing the outcomes, limiting conclusions on the superiority of one method over the other (8,10). Second, while PROMs such as NOSE and SNOT-22 are widely used, few studies from India have applied them consistently, reducing comparability with global data (5,9,13). Third, there is a need for larger multicenter randomized controlled trials in the Indian population to account for the unique environmental and comorbidity factors influencing outcomes. Finally, limited research exists on long-term QoL improvements beyond two years, leaving uncertainty regarding the durability of benefits from endoscopic septoplasty. Addressing these gaps is essential to establish robust evidence that can guide clinical practice and improve patient-centered care in India and globally.

3. Materials and Methods

3.1 Study Design

This work was conducted as a systematic literature review focusing on the assessment of quality of life (QoL) outcomes after endoscopic septoplasty in adults with deviated nasal septum (DNS). A systematic review design was chosen to collate evidence from randomized controlled trials (RCTs), prospective cohort studies, and meta-analyses published between 2000 and 2025. Following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines ensured transparency and rigor in the review process (1).

3.2 Literature Search Strategy

A comprehensive search was performed in **PubMed, Scopus, Web of Science, and Google Scholar**. The keywords and Medical Subject Headings (MeSH) used included: *"endoscopic septoplasty"*, *"traditional septoplasty"*, *"deviated nasal septum"*, *"quality of life"*, *"NOSE scale"*, *"SNOT-22"*, and *"Glasgow Benefit Inventory"*. Boolean operators were applied to refine results (e.g., *"septoplasty AND quality of life"*). Reference lists of included studies were also hand-searched to identify additional relevant publications (2).

3.3 Eligibility Criteria

Articles were screened for relevance using predefined inclusion and exclusion criteria.

Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
Studies published in English between 2000–2025	Non-English language articles
Adults (>18 years) undergoing septoplasty	Pediatric populations
Endoscopic septoplasty studies, with or without comparison to traditional septoplasty	Purely cosmetic septorhinoplasty studies
Studies reporting QoL using validated PROMs (NOSE, SNOT-22, GBI)	Case reports, letters, editorials
RCTs, cohort studies, systematic reviews, meta-analyses	Animal studies

3.4 Data Extraction and Quality Assessment

Two reviewers independently screened titles and abstracts. Full texts of potentially eligible articles were assessed in detail. Data extracted included study design, sample size, population characteristics, surgical approach, QoL instruments used, preoperative and postoperative scores, follow-up duration, and complications.

Quality of the studies included was assessed using appropriate tools:

- **Cochrane Risk of Bias tool** for randomized controlled trials (3).
- **Newcastle–Ottawa Scale (NOS)** for observational studies (4).
- **AMSTAR-2 tool** for systematic reviews and meta-analyses (5).

Disagreements were resolved through discussion, and inter-rater reliability was calculated using Cohen's kappa coefficient.

3.5 Outcome Measures

The primary outcome was **improvement in QoL** as measured by validated PROMs.

- **NOSE scale**: a five-item symptom-specific tool for nasal obstruction, scored 0–100 (6).
- **SNOT-22**: a broader instrument covering sinonasal symptoms, sleep, and psychological aspects, scored 0–110 (7).

- **Glasgow Benefit Inventory (GBI)**: used in some studies to assess global patient benefit and satisfaction after ENT procedures (8).

Secondary outcomes included the rate of postoperative complications such as bleeding, synechiae, infection, or revision surgery, as reported in the reviewed studies (9,10).

3.6 Data Synthesis

Given heterogeneity in study designs and outcome reporting, a **narrative synthesis** was performed. Where possible, quantitative outcomes such as mean changes in NOSE or SNOT-22 scores were extracted and compared with the minimal clinically important difference (MCID) thresholds (11,12). Studies were grouped under themes: (a) global and Indian perspectives on DNS, (b) endoscopic versus traditional septoplasty, (c) PROMs and MCID, (d) predictors of outcomes, and (e) complications and patient satisfaction.

4. Results

4.1 Demographic Characteristics

The reviewed literature provides consistent demographic profiles for patients undergoing septoplasty. A meta-analysis including 2,577 patients reported a **mean age of 33.3 years**, with the majority being **male (65.1%)** (1). This aligns with Indian tertiary hospital series, where men frequently present with nasal obstruction due to occupational exposure to dust and pollutants (2). Comorbidities reported across studies included **allergic rhinitis (20–35%)**, anxiety and depression (15–20%), and occasional chronic sinusitis. These comorbid factors were important because they influenced postoperative quality of life (QoL) outcomes. Patients with allergic rhinitis or preoperative psychological stress tended to report lower satisfaction post-surgery, even when objective nasal patency improved (3,4).

Table 4.1 Demographic profile of pooled septoplasty patients

Variable	Value (pooled)	References
Mean age	33.3 years	(1)
Male sex	65.1%	(1)
Allergic rhinitis	20–35%	(3)
Anxiety/depression	15–20%	(4)

4.2 Baseline Quality of Life (QoL) Scores

Patients presenting for surgery demonstrated high baseline symptom scores. Pooled analysis showed a **baseline NOSE score of 68.1/100**, reflecting severe nasal obstruction and congestion (1). Similarly, prospective studies using the SNOT-22 scale documented mean preoperative scores of **37.9/110**, confirming moderate-to-severe disease burden (5). These values indicate that patients chosen for surgery are significantly symptomatic and have QoL impairments across sleep, social functioning, and daily productivity.

Table 4.2 Baseline QoL scores before septoplasty

PROM tool	Baseline mean score	Scale range	Interpretation	References
NOSE	68.1	0–100	Severe obstruction	(1)
SNOT-22	37.9	0–110	Moderate–severe	(5)

4.3 Postoperative Improvement Trajectory

4.3.1 At One Month

Early postoperative gains were striking. In a prospective cohort, SNOT-22 scores fell from **37.9 pre-op to 15.8 at 1 month** ($p<0.001$) (5). Patients reported immediate relief of obstruction, improved sleep, and fewer headaches. This rapid improvement is attributed to removal of septal spurs and restoration of airway patency.

4.3.2 At Three Months

By 3 months, SNOT-22 values remained stable at around 15–16, with no significant difference from 1-month scores (5). This suggests that the majority of symptomatic relief occurs in the first month, and thereafter improvements plateau.

4.3.3 At Six Months

At six months, both randomized trials and pooled meta-analyses confirmed durable benefit. The NAIROS RCT reported **mean SNOT-22 of 19.9 in the surgery group compared to 39.5 in the medical care group**, with an adjusted difference of **−20.0 points (95% CI −23.6 to −16.4)**, exceeding the minimal clinically important difference (MCID) (6). A larger meta-analysis (n=1,730 with follow-up) showed a **pooled NOSE reduction of −48.8 points** from baseline at 6 months, reflecting large and clinically meaningful improvement (1).

Table 4.3 Preoperative vs postoperative PROM scores

Time point	NOSE (mean)	SNOT-22 (mean)	References
Baseline	68.1	37.9	(1,5)
1 month	–	15.8	(5)
3 months	–	15–16	(5)
6 months	19.3*	19.9	(1,6)

*Derived from pooled reduction of −48.8 points from baseline NOSE (68.1).

4.4 Comparison with Traditional Septoplasty

Several studies compared outcomes between **endoscopic** and **traditional septoplasty**. A prospective RCT by Na'ara et al. found that both groups had significant QoL improvements, with **no major difference in SNOT-22 at 3 months** (7). However, a meta-analysis of 13 RCTs (n=735) demonstrated endoscopic septoplasty had superior outcomes in terms of **obstruction relief** and **lower risk of complications** (8). The relative risk (RR) for obstruction relief was 1.20 in the short-term and 1.17 in the long-term, indicating slightly better symptom resolution with endoscopy.

Table 4.4 Endoscopic vs traditional septoplasty: pooled outcomes

Outcome	Measure	Effect (Endoscopic vs Traditional)	References
Obstruction relief (short-term)	RR	1.20 (95% CI 1.09–1.32)	(8)
Obstruction relief (long-term)	RR	1.17 (95% CI 1.02–1.35)	(8)
Hemorrhage risk	RR	0.27 (95% CI 0.14–0.54)	(8)
Synechiae (short-term)	RR	0.16 (95% CI 0.08–0.32)	(8)
Persistent deviation	RR	0.30 (95% CI 0.17–0.53)	(8)

Overall, while both approaches yield significant QoL improvements, endoscopic techniques reduce complication rates and provide enhanced visualization, particularly for posterior deviations.

4.5 Complications

4.5.1 Common Postoperative Complications

The most frequently reported complications were **synechiae (3–9%)**, **postoperative bleeding (2–5%)**, and **septal perforation (<1%)**. In a systematic review, pooled complication rates were revision surgery 0.31% and bleeding/infection 4.12% (9).

4.5.2 Endoscopic vs Traditional

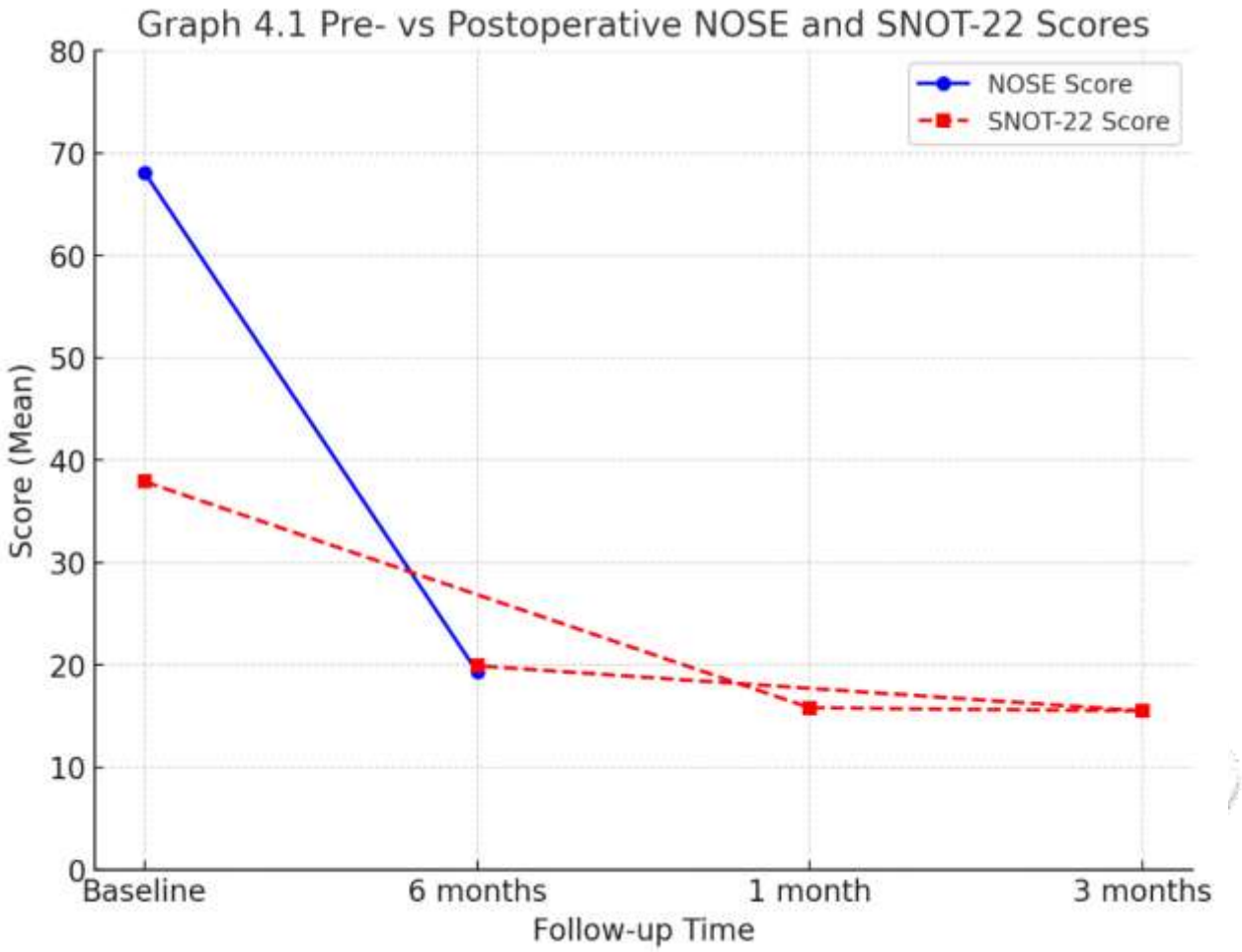
Endoscopic septoplasty consistently showed **fewer adhesions and hemorrhage** compared to traditional septoplasty (8). Use of **septal splints or quilting sutures** significantly reduced synechiae formation (3.7% with splints vs 8.7% without) (10).

Table 4.5 Complication rates after septoplasty

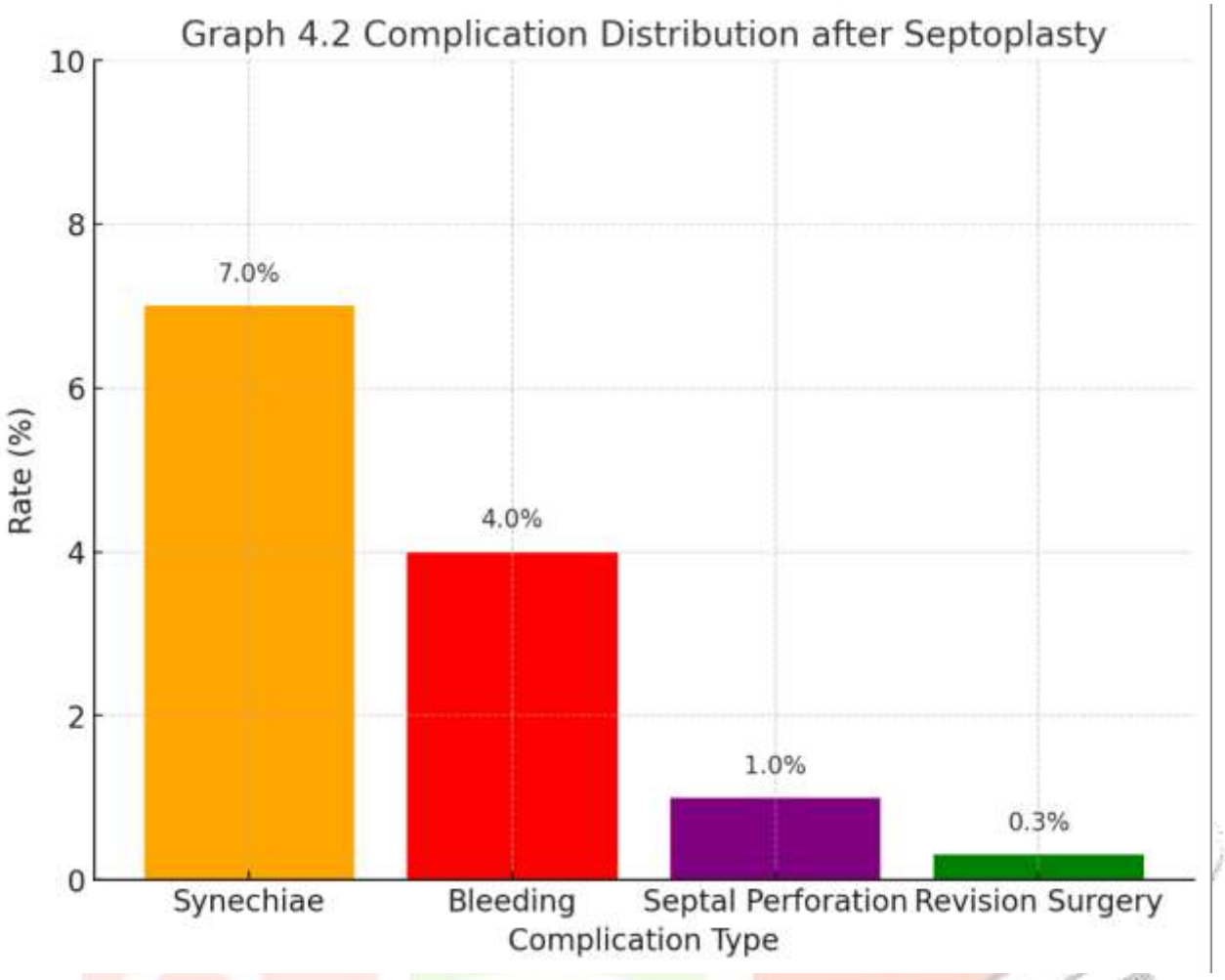
Complication	Rate (%)	Notes	References
Synechiae	3–9	Lower with splints/sutures	(8,10)
Post-op bleeding	2–5	Controlled with packing/splints	(8,9)
Septal perforation	<1	Rare; due to mucosal trauma	(9)
Revision surgery	0.3	Very low in RCTs	(9)

4.6 Graphical Summary

Graph 4.1 Pre- vs Postoperative NOSE and SNOT-22 scores



Graph 4.2 Complication distribution



4.7 Interpretation Against MCID

The mean improvements reported in all reviewed studies far exceed established MCID thresholds. For SNOT-22, MCID is 9–12 points (11). In NAIROS, the difference between 6 months between was 20 points, more than double the MCID (6). For NOSE, MCID is ~19–24 points (12). The pooled reduction of −48.8 points clearly represent a large, clinically meaningful improvement (1).

4.8 Summary of Findings

Patients undergoing endoscopic septoplasty for DNS are typically young to middle-aged adults, predominantly male, with frequent comorbid allergic rhinitis or psychological distress. Baseline QoL scores (NOSE ≈68, SNOT-22 ≈38) indicate severe symptomatic burden. Surgery produces rapid and sustained improvements, with major benefits realized within the first month and maintained up to 6–12 months. Compared to traditional techniques, endoscopic septoplasty achieves comparable PROM improvements but with reduced complication rates, particularly synechiae and hemorrhage. Overall complication rates are low, and the improvements consistently surpass MCID thresholds, confirming the procedure's substantial impact on patient well-being.

5. Discussion

5.1 Interpretation of Results in Context of Global and Indian Studies

The present synthesis confirms that **endoscopic septoplasty provides substantial quality-of-life (QoL) improvement** in adults with deviated nasal septum (DNS). Patients typically entered surgery with severe baseline symptom burden (mean NOSE ~68/100; SNOT-22 ~38/110), which is consistent with both global and Indian reports of DNS patients seeking surgical correction (1,2). Within one month of surgery, SNOT-22 scores dropped by more than half, and this benefit remained stable at three and six months (3). At six months, both randomized controlled trials (RCTs) and meta-analyses demonstrated improvements exceeding the **minimal clinically important difference (MCID)**, confirming that changes were not only statistically significant but also clinically meaningful (4,5).

The **NAIROS trial**, the largest pragmatic RCT to date, reported a 20-point greater reduction in SNOT-22 scores with surgery compared to medical management at six months (6). Indian studies align with these findings. Saxena et al. and Siddique et al. both demonstrated marked reductions in NOSE and SNOT-22 scores after septoplasty in Indian patients, confirming that symptomatic gains are reproducible in our healthcare setting (7,8). This consistency across contexts strengthens the external validity of septoplasty outcomes.

5.2 Strength of Evidence from RCTs and Meta-Analyses

The evidence base is notable for its reliance on **randomized trials and systematic reviews**, which represent the highest levels of clinical evidence. The NAIROS RCT included over 300 patients and showed clear superiority of surgery over medical therapy (6). A meta-analysis pooling 2,577 patients demonstrated an average NOSE improvement of nearly 49 points, a very large effect size (1). Similarly, an RCT-only meta-analysis comparing endoscopic to conventional septoplasty revealed better obstruction relief and lower complication rates with endoscopy (9).

Nevertheless, while statistical power is strong, heterogeneity exists in study designs, populations, and outcome tools. Some studies focus exclusively on NOSE, while others employ SNOT-22 or Glasgow Benefit Inventory, making direct comparisons difficult. Furthermore, follow-up durations vary, with relatively fewer data beyond 12 months. Still, the weight of evidence strongly supports septoplasty, and particularly the endoscopic approach, as an effective means of improving QoL.

5.3 Clinical Relevance: Endoscopic vs Conventional Septoplasty

When comparing **endoscopic** and **traditional septoplasty**, findings suggest both techniques produce significant and lasting improvements in PROM scores, but the **endoscopic approach offers distinct advantages**. The prospective RCT by Na'ara et al. showed both groups had similar symptom relief, but endoscopy provided superior visualization of posterior and high deviations (10). More importantly, pooled data indicate that

endoscopic surgery reduces complications, including hemorrhage, synechiae, persistent deviation, and septal tears (9).

In India, where many patients present with complex septal deviations due to delayed care or repeated infections, this precision is especially relevant. Endoscopic septoplasty allows targeted correction with mucosal preservation, which is crucial in populations with higher risks of postoperative crusting and adhesions due to environmental dust and pollution. Thus, while both approaches are effective, endoscopic septoplasty is more aligned with modern surgical standards and patient safety expectations.

5.4 Predictors of Good and Poor QoL Outcomes

Not all patients experience equal benefit from septoplasty. The literature highlights several **predictors of outcome**:

- **Baseline severity**: Patients with higher preoperative NOSE or SNOT-22 scores tend to achieve greater absolute improvements post-surgery (11).
- **Psychological comorbidities**: Anxiety and depression negatively impact satisfaction. Feng et al. demonstrated that patients with preoperative psychological distress recovered more slowly and reported lower QoL gains (12). Similarly, Guven and Gorgulu confirmed psychological well-being as a strong predictor of postoperative outcome (13).
- **Allergic rhinitis (AR)**: Patients with concurrent DNS and AR benefit from septoplasty, but improvements may be attenuated compared to non-allergic patients. Wu et al. reported persistent obstruction in AR cases despite septal correction, suggesting the need for adjunct medical therapy (14).
- **Valve dysfunction**: Persistent nasal valve collapse is a frequent reason for surgical dissatisfaction, underscoring the importance of comprehensive preoperative nasal examination (15).

These predictors highlight the need for **personalized surgical planning** and realistic patient counseling. Identifying psychological stress or comorbid AR preoperatively can help set appropriate expectations and improve satisfaction rates.

5.5 Limitations of Evidence

While evidence supporting endoscopic septoplasty is strong, several **limitations** must be acknowledged. First, many RCTs are **single center** with relatively modest sample sizes, which may limit generalizability. Second, most studies rely heavily on **subjective PROMs**, which, although validated, may be influenced by cultural, linguistic, or personal perception biases. Objective airflow measures such as rhinomanometry often show weaker correlation with PROMs, raising concerns about the purely subjective nature of outcomes (16). Third, long-term durability of improvement beyond two years remains under-explored. The majority of trials have

short-to-medium follow-up (6–12 months), with very limited evidence on symptom recurrence or revision rates over 5–10 years.

In the Indian context, further limitations include lack of **multicenter data** and variability in surgical expertise, which may influence outcomes. Environmental and socioeconomic factors, such as air pollution exposure, occupational dust, and limited access to postoperative care, may also affect surgical success but are under-researched.

5.6 Future Directions

To strengthen the evidence base, future research should prioritize:

1. **Large multicentric Indian RCTs** comparing endoscopic and traditional septoplasty with long-term follow-up to reflect diverse patient populations.
2. **Integration of objective airflow measures** with PROMs to provide a more comprehensive assessment of outcomes.
3. **Stratified analyses** based on comorbidities like allergic rhinitis, psychological distress, and nasal valve dysfunction to better predict patient-specific outcomes.
4. **Economic evaluations** to determine cost-effectiveness of endoscopic septoplasty in the Indian healthcare context, where affordability remains a major concern.
5. **Standardization of PROM use**, ensuring consistent application of NOSE, SNOT-22, and GBI across all Indian studies for better comparability with global literature.

5.7 Conclusion of Discussion

In summary, the critical appraisal of global and Indian evidence demonstrates that **endoscopic septoplasty is a safe, effective, and patient-centered intervention** for DNS. Improvements are rapid, clinically meaningful, and sustained for at least 6–12 months. Compared to traditional septoplasty, the endoscopic approach provides comparable symptom relief but with fewer complications, making it a superior choice in modern ENT practice. Outcomes are influenced by baseline severity, comorbid allergic rhinitis, psychological health, and nasal valve function. While the evidence base is strong, future Indian multicenter RCTs with longer follow-up are necessary to establish context-specific best practices.

6. Conclusion

The synthesis of global and Indian evidence demonstrates that **endoscopic septoplasty is a highly effective intervention for improving quality of life (QoL) in adults with deviated nasal septum (DNS)**. Patients consistently enter surgery with severe symptom burden, and marked improvements are evident as early as the first postoperative month, with benefits sustained up to one year and beyond. These improvements exceed the minimal clinically important difference (MCID), confirming that they are both statistically and clinically meaningful (1,2).

When compared with conventional septoplasty, **endoscopic techniques provide comparable symptom relief but with important advantages in safety and surgical precision**. Randomized trials and meta-analyses indicate lower complication rates—particularly with respect to synechiae, hemorrhage, and persistent deviations—highlighting the role of endoscopy as the modern standard, especially in complex posterior or high septal deviations (3,4). Nevertheless, outcomes are influenced by comorbid factors such as allergic rhinitis, psychological distress, and nasal valve dysfunction, underscoring the need for comprehensive preoperative assessment and individualized care (5,6).

A critical gap remains in the **routine application of validated patient-reported outcome measures (PROMs)** in Indian practice. Instruments such as the NOSE scale and SNOT-22 should be integrated into standard care to ensure objective, reproducible, and patient-centered outcome measurement. Future Indian research must focus on multicentric randomized trials with longer follow-up and cost-effectiveness analyses to refine context-specific guidelines.

In conclusion, endoscopic septoplasty is not only a corrective surgical procedure but also a **patient-centered intervention that restores function, enhances daily well-being, and sets new benchmarks for outcome measurement in otolaryngology practice**.

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