

NASAL SEPTUM DEVIATION: CAUSES, CLINICAL SIGNS, AND SURGICAL TREATMENT

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Abstract

This article analyzes, based on international scientific literature, the causes of nasal septum (septal) deviation, classification systems, features of clinical presentation, and the modern outcomes of its surgical treatment. Nasal septum deviation is one of the most common anatomical defects in otorhinolaryngology; besides impairing respiratory function, it can also contribute to the development of other ENT organ conditions. The article covers the clinical efficacy of septoplasty, its effect on patients' quality of life, and complication rates, based on the results of recent systematic reviews and meta-analyses.

Keywords: nasal septum deviation, nasal septal deviation, septoplasty, nasal obstruction, Mladina classification, NOSE scale, nasal trauma, rhinomanometry, acoustic rhinometry, turbinoplasty.

Introduction

The nasal septum (septum nasi) is a cartilaginous and bony structure that divides the nasal cavity into two equal halves, and its normal position ensures free breathing through the nose. In practice, a perfectly flat, deviation-free nasal septum is rarely found — in a large portion of the population, some degree of mild deviation is considered a normal anatomical variant. However, deviation exceeding a certain degree significantly disrupts nasal airflow, increases breathing resistance, and gives rise to a range of clinical symptoms [1].

The prevalence of nasal septum deviation varies across different studies, but according to some sources this figure can reach up to 65% of the population. This condition is not only of cosmetic but also of functional significance, and may be associated with conditions such as nasal congestion, snoring, and sleep apnea. Therefore, comprehensive assessment of the nasal septum is of great importance in preoperative planning, restoring function, and achieving an aesthetic outcome.

In recent decades, numerous scientific studies have been conducted on classifying nasal septum deviation, identifying its causes, and evaluating the effectiveness of treatment. In particular, the introduction of standardized questionnaires that objectively assess the clinical outcomes of septoplasty (such as the Nasal Obstruction Symptom Evaluation — NOSE) has helped advance an evidence-based approach in this field. The purpose of this article is to systematically analyze the etiological factors, clinical signs, and effectiveness of modern surgical treatment methods for nasal septum deviation, based on recent international scientific publications.

Materials and Methods

For this study, systematic reviews, meta-analyses, and clinical studies published between 2012 and 2025 in authoritative international journals such as PubMed, PMC, Laryngoscope,

Rhinology, the Indian Journal of Otolaryngology and Head & Neck Surgery, and the International Journal of Pediatric Otorhinolaryngology were selected. The main selection criteria were the availability of reliable evidence regarding classification systems of nasal septum deviation, etiological factors, clinical symptoms, and the clinical outcomes of septoplasty.

Using a descriptive-analytical method, the classic classification systems of nasal septum deviation from the selected sources (C-shaped, S-shaped, and the Mladina seven-type classification), the frequency of clinical symptoms, as well as changes in NOSE and SNOT-22 scale scores after septoplasty, were comparatively analyzed. In addition, the final results of systematic reviews on postoperative complication rates and patient satisfaction indicators were summarized.

Results

The analysis found that the most common etiological factor of nasal septum deviation is mechanical trauma to the nasal region — occurring under compressive and rotational forces. Nasal septum deviation can also occur in newborns, with its frequency varying between studies from 0.6% to 31%, which is considered to be related to mechanical forces during childbirth [2].

A systematic review of classification systems showed that most classification systems for nasal septum deviation can be summarized as C-shaped, reverse C-shaped, S-shaped, and reverse S-shaped deviations, with deviation assessed in the anteroposterior and superoinferior directions [1]. The classification system proposed by Mladina divides nasal septum deviation into seven types, based on horizontal and vertical characteristics identified through rhinoscopy or cone-beam computed tomography (CBCT). In addition, a three-degree classification is also used based on the extent to which the deviation reaches the inferior turbinate: Grade I — deviation not reaching the turbinate, Grade II — deviation reaching the turbinate, Grade III — deviation compressing the turbinate.

Clinically, nasal septum deviation mainly presents with unilateral or bilateral nasal congestion, headache, chronic rhinosinusitis, sleep-disordered breathing (obstructive sleep apnea), and snoring. Mild deviations often may not be clinically noticeable, but severe deviations can also lead to a decline in the sense of smell. Although clinical examination is often sufficient for diagnosis, additional methods such as computed tomography, rhinomanometry, and acoustic rhinometry are used to precisely assess the severity of deviation and plan surgery.

A large meta-analysis on the clinical efficacy of septoplasty summarized data from 2,577 patients and found that the average preoperative NOSE score was 68.1 points (95% confidence interval: 64.3–71.9), which decreased significantly after surgery [3]. Another recent meta-analysis summarizing randomized controlled trials showed that, compared with non-surgical treatment, septoplasty significantly improved NOSE scores by an average of 12.58 points at 3 months, 28.73 points at 6 months, and 17.27 points at 12 months. The rate of postoperative complications was low, with a reoperation rate of 0.31%, and bleeding and infection complications at 4.12%.

A systematic review examining long-term outcomes noted that patient satisfaction rates varied between studies from 69% to 100%, with most cases showing a stable improvement in breathing quality after surgery [4]. Septoplasty combined with turbinateplasty showed somewhat higher efficacy in relieving symptoms in some studies, although no significant difference was found between open and closed rhinoplasty techniques.

Discussion

The results obtained indicate that nasal septum deviation is not merely a local anatomical problem, but a condition of systemic importance that can indirectly affect a patient's overall quality of life, sleep quality, and even the cardiovascular system. In particular, the association of severe deviations with obstructive sleep apnea requires that patients be evaluated not only by an otorhinolaryngologist but, when necessary, in collaboration with a sleep medicine specialist.

The diversity of classification systems (C-shaped, S-shaped, the Mladina seven-type classification, and three-degree classifications) indicates the absence of a single, universally accepted terminology among practicing physicians, which complicates the comparison of results across different studies [1]. Therefore, developing unified international classification criteria in the future will serve to improve the quality of clinical practice and scientific research in this field.

The evidence on the clinical efficacy of septoplasty confirms its significant superiority over non-surgical treatment methods, particularly reinforced by the stable improvement of NOSE and SNOT-22 scores at the 6- and 12-month follow-up periods [3]. At the same time, the low postoperative complication rate (reoperation needed in only 0.31% of cases) allows septoplasty to be assessed as a relatively safe surgical practice. However, the considerable variation in patient satisfaction rates across studies (69–100%) highlights the importance of proper patient selection, informing patients in advance about expected outcomes, and adopting an individualized approach.

Conclusion

The analysis conducted shows that nasal septum deviation is a widespread anatomical condition in otorhinolaryngology, often of traumatic origin, that significantly affects respiratory function, sleep quality, and overall quality of life. Modern classification systems — particularly the seven-type classification proposed by Mladina — make it possible to precisely characterize the deviation and individually plan surgery.

Septoplasty remains the primary and most effective method for treating nasal septum deviation: it provides statistically and clinically reliable improvement according to standardized indicators such as NOSE and SNOT-22, has a low complication rate, and results in high satisfaction among the majority of patients. In the future, the regular use of standardized questionnaires (NOSE, SNOT-22) in patient selection for surgery, as well as combining it with turbinoplasty when necessary, will serve to further improve clinical outcomes. Therefore, regularly training practicing otorhinolaryngologists in modern classification and assessment methods, and monitoring patients before and after surgery based on objective criteria, is of great importance for the further development of the field.

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