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An Observational Study to Assess the Correlation between Nasal Septal Deviation and External Deformities of the Nose

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ABSTRACT

Background: Nasal septal deviation (DNS) is one of the most common anatomical variations encountered in otorhinolaryngology practice and is frequently associated with both functional and aesthetic concerns. External nasal deformities often coexist with septal deviations, particularly in patients seeking rhinoplasty. This study aimed to evaluate external nasal deformities in rhinoplasty patients and to examine their correlation with nasal septal deviation.

Methods: This hospital-based observational study included 50 patients with nasal complaints or seeking rhinoplasty. Clinical evaluation involved anterior rhinoscopy, nasal endoscopy, and external nasal examination. Septal deviations were classified using the Mladina system, and deformities were categorised. SNOT-22 assessed symptom severity. Associations were analysed using the chi-square test, with $p<0.05$ considered significant.

Results: Most patients were young adults, mainly 21–30 years (28%), with female predominance (64%). External deformity was present in 56%, while 44% had isolated DNS. Common findings included a straight dorsum (56%), a normal tip (52%), and a normal columella (76%), though deviations such as a bulbous tip and a deviated dorsum were noted. Mladina Type 4 was the most frequent. Significant associations were found between DNS type, external deformity, and symptom severity ($p<0.05$), with higher grades associated with more severe symptoms. No significant gender association was observed ($p=0.35$).

Conclusion: The present study shows a significant correlation between nasal septal deviation and external nasal deformities, with higher grades associated with increased deformity severity and symptom burden. These findings emphasize the need for comprehensive evaluation and a combined approach for optimal functional and cosmetic outcomes.

Key-words: Deviated Nasal Septum, Rhinoplasty, External Nasal Deformity, Mladina Classification, SNOT-22, Nasal Obstruction

INTRODUCTION

The internal nasal valve is considered the most important anatomical region regulating nasal airflow. It represents the narrowest segment of the nasal airway. It is formed by the junction of the upper lateral cartilage with the nasal septum, the anterior end of the inferior turbinate, and the nasal floor [1].

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Septal abnormalities are among the most common causes of nasal obstruction and frequently contribute to internal nasal valve compromise [2]. Deviation of the nasal septum may alter the internal nasal valve angle, resulting in increased airflow resistance and impaired nasal breathing [2]. The nasal septum also provides critical structural support to the external nasal framework [3]. Abnormalities of the septum can influence the growth, alignment, and symmetry of the external nose [3].

External nasal deformities may be classified as midline or lateral deformities [4]. Common midline deformities include hump nose, saddle nose, and deformities of the nasal tip [4]. Lateral nasal deformities commonly include a crooked or deviated nose and alar depression[4]. These deformities may arise independently or in association

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with septal deviation, trauma, or developmental abnormalities [4]. Classification systems based on the orientation of the bony pyramid relative to the cartilaginous vault have been proposed better to understand external nasal deformities [4]. Such classifications aid in systematic evaluation and surgical planning by emphasising the relationship between internal septal alignment and external nasal appearance [4]. Recognition of this relationship is particularly important in patients presenting with both nasal obstruction and external nasal deformity [4]. There is increasing evidence to suggest a close association between septal deviation and external nasal deformity [5]. Certain patterns of septal deviation are frequently accompanied by corresponding external nasal asymmetry [5]. Failure to recognise this association may result in incomplete correction of nasal obstruction when septal deviation is treated in isolation [3]. Similarly, addressing only the external deformity without correcting septal pathology may lead to persistent functional symptoms [3].

Observational studies have demonstrated a significant association between a deviated nasal septum and external nasal deformity [6]. These findings suggest that septal deviation and external nasal deformity are often manifestations of a shared underlying structural imbalance [6].

Despite this established relationship, septal deviation and external nasal deformity are often managed as separate entities in clinical practice [7]. Septoplasty is frequently performed as a standalone procedure aimed primarily at relieving internal nasal obstruction [8]. Rhinoplasty, on the other hand, may focus primarily on cosmetic correction, with insufficient attention to septal alignment [9]. Such isolated approaches may lead to suboptimal functional or aesthetic outcomes [10].

The present study aims to evaluate the correlation between septal deviation and external nasal deformity. Understanding this relationship is essential to developing a comprehensive approach to managing nasal obstruction. This study emphasises the importance of addressing septal deviation and external nasal deformity together rather than treating them as isolated conditions.

MATERIALS AND METHODS

Research Design- A cross-sectional study was conducted in the Department of Ear, Nose and Throat at PMCH, Udaipur. All individuals with septal deviation or without external nasal deformity attending the OPD of PMCH during the study period from May 2024 to November 2025, who fulfilled the inclusion and exclusion criteria, were included in the study. Ethical approval was obtained from the Institutional Ethics Committee before the study.

Inclusion Criteria

To conduct this study, patients with a deviated nasal septum, with or without external nasal deformity, aged 12 to 70 years.

Exclusion Criteria

Patients aged below 12 years and above 70 years.
Septal hematoma, abscess, and sinonasal mass.
Sinonasal Malignancy.

Methodology- These patients were evaluated by a comprehensive clinical examination of the ear, nose and throat. Patient's symptoms were rated using the Sino-Nasal Test-22 questionnaire (SNOT). Diagnostic nasal endoscopy was used to evaluate the angle of the internal nasal valve and the nasal septum before surgery. An X-ray of the post-nasal space was done.

Septal deformities were classified according to the Mladina classification, which groups them into 7 types.

Classifications of nasal septal deviation (Mladina's classification)

There were 7 types of septal deviation according to this classification:

Type 1: Unilateral crest not affecting nasal valve function, located in the valve area

Type 2: Unilateral crest causing valve dysfunction with positive Cottle's test

Type 3: Unilateral crest at the level of the middle turbinate

Type 4: Two crests—one at the middle turbinate level and another in the valve area

Type 5: Unilateral basal ridge with a straight septum on the opposite side

Type 6: Unilateral sulcus with contralateral ridge and nasal asymmetry

Type 7: Combination of Types 1–6

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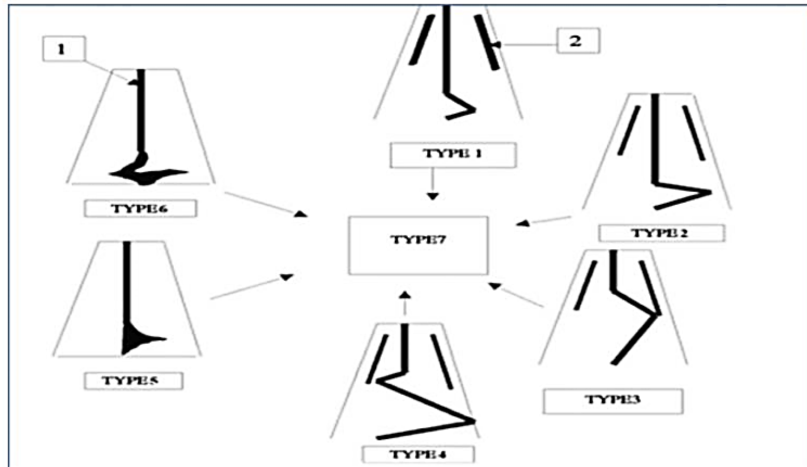

Fig. 1: Assessment and Classification of External Nasal Deformities with Statistical Analysis of Associations

The external nose was evaluated using a reference point in the anteroposterior view. High-resolution photographs in standard views were taken for documentation. External nasal deformities were classified employing Yong Jo Jang's classification.

External nasal deformities were classified employing Yong Jo Jang's classification:

Type 1: Straight tilted bony pyramid with tilted cartilaginous vault in the opposite direction.

Type 2: Straight tilted bony pyramid with concavely / convexly bent cartilaginous vault.

Type 3: Straight bony pyramid with tilted cartilaginous vault.

Type 4: Straight bony pyramid with bent cartilaginous vault.

Type 5: Straight tilted bony pyramid & tilted cartilaginous dorsum in the same direction.

The chi-square test assessed an association between variables. A two-sided p<0.05 was considered statistically significant.

Statistical Analysis- Statistical analysis was performed using appropriate descriptive and inferential methods. Categorical variables were expressed as frequencies and percentages. The association between septal deviation types, external nasal deformities, and symptom severity (SNOT-22 scores) was evaluated using the chi-square test. A two-sided p<0.05 was considered statistically significant. Data were analysed to determine correlations between variables and to assess the strength of associations among clinical findings.

RESULTS

Table 1 shows that in the study population of 50 patients, the largest group was 21–30 years, comprising 14 patients (28%), followed by 31–40 years, with 12 patients (24%). Patients aged 41–50 years accounted for 9 cases (18%), while the 12–20 and 51–60-year groups each included 6 patients (12%). The smallest group was 61–70 years, with 3 patients (6%). Overall, the majority of patients were young to middle-aged adults, with a peak incidence in the 21–40-year age range.

Table 1: Case Distribution According to Age (n= 50)

Age Group (Years)	Number of Patients (N)	Percentage (%)
12–20	6	12
21–30	14	28
31–40	12	24
41–50	9	18
51–60	6	12
61–70	3	6

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Table 2 shows that among the 50 patients evaluated, 28 (56%) were diagnosed with DNS without external deformity, while 22 (44%) had DNS accompanied by external nasal deformity. This indicates that more than half of the patients had isolated septal deviation, whereas a substantial proportion also exhibited visible external nasal changes.

Table 2: Case Distribution According to Diagnosis

Diagnosis	Number (N)	Percentage (%)
DNS without external deformity	22	44
DNS with external deformity	28	56
Total	50	100

In the study population of 50 patients, SNOT-22 scores indicated that 6 patients (12%) had mild symptoms, 24 patients (48%) had moderate symptoms, 15 patients (30%) had severe symptoms, and 5 patients (10%) had very severe symptoms. The overall mean SNOT-22 score was 46.8±18.4, reflecting a predominance of moderate symptom severity in the cohort. Statistical analysis showed a highly significant association between the severity categories and SNOT-22 scores (χ^2=18.72, p=0.0003), indicating meaningful stratification of patients by symptom burden (Table 3).

Table 3: Case Distribution According to SNOT-22 Severity with Statistical Analysis (n=50)

SNOT-22 Score Range	Severity Category	Number (N)	Percentage (%)	Mean Score (Category Midpoint)
0–20	Mild	6	12	15
21–50	Moderate	24	48	35
51–80	Severe	15	30	65
81–110	Very Severe	5	10	95

Mean±SD (Overall)= 46.8±18.4; Chi-square (χ^2)= 18.72; p-value= 0.0003

In the study population, evaluation of nasal parameters revealed that skin quality was normal in 20 patients (40%), thick in 18 patients (36%), and thin in 12 patients (24%). Regarding nose length, the majority had a normal length (31, 62%), while 12 patients (24%) had a long nose and 7 patients (14%) had a short nose. The nasal dorsum was straight in 28 patients (56%), deviated in 17 (34%), and had a hump in 5 cases (10%). Tip configuration was normal in 26 patients (52%), bulbous in 16 (32%), and deviated in 8 (16%). Columellar show was normal in 38 patients (76%), excessive in 7 (14%), and retracted in 5 patients (10%). These findings indicate that while most patients had normal nasal parameters, a significant proportion exhibited variations in skin quality, dorsum shape, and tip configuration (Table 4).

Table 4: Case Distribution According to External Nasal Examination Findings

Parameter	Finding	Number (N)	Percentage (%)
Skin quality	Thick	18	36
	Thin	12	24
	Normal	20	40
Length of nose	Short	7	14
	Normal	31	62
	Long	12	24

Dorsum	Straight	28	56
	Deviated	17	34
	Hump	5	10
Tip configuration	Normal	26	52
	Bulbous	16	32
	Deviated	8	16
Columellar show	Normal	38	76
	Excessive	7	14
	Retracted	5	10

Table 5 discusses that out of the total 50 patients, the distribution of DNS types showed that Type 4 was the most common (12, 24%), followed by Type 3 (9, 18%), Type 2 and Type 5 (7 each, 14%), Type 6 (6, 12%), Type 1 (5, 10%), and Type 7 (4, 8%). Among patients with no external nasal deformity (n=16), cases were distributed across all DNS types, with the highest frequencies seen in Type 1 (4) and Type 2 (3). In patients with Type 1 external deformity (n=11), the majority were associated with Type 4 DNS (3), followed by Type 2 and Type 3 (2 each). Type 2 and Type 3 external deformities also showed a higher association with Type 3 and Type 4 DNS. More severe deformities (Types 4 and 5) were predominantly associated with higher DNS types, especially Type 4 and Type 6. Overall, there was a trend suggesting that increasing severity of external nasal deformity corresponded with higher DNS types. This association between external nasal deformity and DNS type was statistically significant (χ^2=28.64, df=30, p=0.04).

Table 5: Correlation Between Mladina Classification and External Nasal Deformity (n=50)

External Nasal Deformity	Type 1 DNS	Type 2 DNS	Type 3 DNS	Type 4 DNS	Type 5 DNS	Type 6 DNS	Type 7 DNS	Total
No Deformity	2	3	3	2	4	2	6	22
Type 1	1	1	1	1	2	1	1	8
Type 2	0	1	0	0	1	1	1	4
Type 3	0	0	2	1	1	1	1	6
Type 4	0	0	0	2	1	1	2	6
Type 5	0	0	0	1	1	1	1	4
Total	3	5	6	7	10	7	12	50

Of the 50 patients, the majority had moderate severity (19, 38%), followed by severe (12, 22%), mild (14, 28%), and very severe (5, 12%). Among patients with no external deformity (n=22), most had moderate severity (8), followed by mild (13), severe (1), and very severe (0). In Type 1 deformity (n=8), there were 4 moderate cases and 4 severe cases. Type 2 deformity (n=5) showed a higher proportion of moderate cases (3), followed by severe (2), with no mild cases. Type 3 deformity (n=5) had an equal distribution of mild, moderate, and severe cases (4 each). In Type 4 deformity (n=8), moderate cases were (2), with 1 case severe, and 5 very severe. Type 5 deformity (n=2) included 2 severe cases. Overall, increasing deformity types tended to be associated with higher severity grades. The association between external deformity type and severity was statistically significant (χ^2=18.34, p=0.03) (Table 6).

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Table 6: External Deformity vs SNOT-22 Severity

External Deformity	Mild	Moderate	Severe	Very Severe	Total
No deformity	13	8	1	0	22
Type 1	0	4	4	0	8
Type 2	0	3	2	0	5
Type 3	1	2	2	0	5
Type 4	0	2	1	5	8
Type 5	0	0	2	0	2
Total	14	19	12	5	50

DISCUSSION

In the present study, the majority of patients belonged to the 21–30 years age group (28%), followed by the 31–40 years (24%) and 41–50 years (18%) age groups. This indicates that nasal septal deviation and associated nasal deformities are more commonly diagnosed in young adults. The higher prevalence in this age group may be attributed to increased exposure to trauma, developmental variations becoming clinically evident, and greater awareness of nasal obstruction or cosmetic concerns. Similar findings were reported by Kumari *et al.* [11], who conducted an observational study of 200 patients with deviated nasal septum and found that the mean age was 26 years, with the majority of cases occurring in the second and third decades of life. Likewise, Mladina *et al.* [12] reported that symptomatic septal deviation is commonly observed among young adults, as anatomical abnormalities become clinically significant during this period.

In this study, 56% of patients had a deviated nasal septum without external nasal deformity, whereas 44% had DNS associated with external nasal deformity. This indicates that although septal deviation commonly occurs independently, a significant proportion of patients exhibit both internal and external structural abnormalities. These findings are comparable to those of Kumari *et al.* [11], who reported that 106 of 200 patients (53%) had DNS with external nasal deformity. In contrast, the remaining patients had septal deviation without visible deformity. This highlights the close relationship between septal abnormalities and external nasal structural changes.

The present study demonstrated that 48% of patients had moderate symptoms, 30% had severe symptoms, while 10% experienced very severe symptoms, with a mean SNOT-22 score of 46.8±18.4.

Statistical analysis revealed a significant distribution of symptom severity. Comparable findings were reported by Hopkins *et al.* [13], who validated the SNOT-22 scoring system and demonstrated that patients with structural nasal obstruction typically exhibit moderate-to-severe symptom scores before treatment. Similarly, Stewart MG found that SNOT-22 scores significantly reflect the impact of nasal obstruction on quality of life.

In the present study, analysis of the relationship between Mladina's classification of deviated nasal septum and external nasal deformity revealed a statistically significant association (χ^2=28.64, p=0.04). The findings indicated that higher Mladina types were more frequently associated with external nasal deformity, suggesting that the severity and complexity of septal deviation may influence the external nasal framework. Among the different categories, Type 3 and Type 4 septal deviations showed a stronger correlation with external nasal deformity. In contrast, lower-grade deviations were more commonly observed in patients without visible external nasal abnormalities [14]. Notably, Type 4 deviation demonstrated the highest frequency of associated external nasal deformity, highlighting the structural impact of more complex septal deviations. These findings suggest that internal septal abnormalities may directly affect the external nasal architecture, leading to visible deformities of the nasal dorsum or nasal axis. Structural displacement of the septum can alter the alignment of the nasal bones and cartilaginous framework, thereby producing cosmetic deformities along with functional nasal obstruction. The observations of the present study are consistent with the original classification proposed by Mladina *et al.* [12], who described seven distinct types of septal deviation based on their anatomical configuration and clinical significance. Mladina reported that more complex and

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severe septal deviations are often associated with external nasal deformities, as the abnormal septal structure may influence the shape and alignment of the nasal framework. Subsequent studies have also supported the concept that higher grades of septal deviation frequently coexist with external nasal asymmetry, emphasising the importance of evaluating both internal and external nasal structures when assessing patients with deviated nasal septum. Therefore, the findings of the present study reinforce the clinical relevance of the Mladina classification in understanding the relationship between septal deformity and external nasal morphology, which is important for accurate diagnosis and appropriate surgical planning.

In the present study, a statistically significant association was observed between the presence of external nasal deformity and symptom severity, as assessed by the SNOT-22 score (χ^2=18.34, p=0.03). Patients with external nasal deformity had higher proportions of severe and very severe symptom scores than those without visible deformity. This suggests that structural abnormalities affecting the external nasal framework may further aggravate nasal obstruction and contribute to a greater overall symptom burden. The presence of external deformity may reflect more extensive structural distortion involving both the nasal septum and the surrounding cartilaginous and bony nasal framework. Such combined abnormalities can alter normal nasal airflow dynamics, narrow the nasal valve region, and lead to persistent nasal obstruction, breathing difficulties, and other sinonasal symptoms. As a result, patients with both internal septal deviation and external nasal deformity often experience more significant functional impairment and reduced quality of life. These findings are consistent with the observations reported by Rohrich *et al.* [15], who emphasized that patients presenting with both internal septal deformity and external nasal abnormalities frequently exhibit more severe functional symptoms. Rohrich *et al.* highlighted that deformities affecting the nasal dorsum, tip alignment, or nasal axis may compromise the structural integrity of the nasal airway and increase nasal airflow resistance. Therefore, a comprehensive evaluation of both internal septal deviation and external nasal morphology is essential in patients with nasal obstruction to ensure accurate diagnosis and appropriate surgical planning.

CONCLUSIONS

This study evaluated the clinical profile, symptom severity, and structural correlations in patients with deviated nasal septum (DNS). Most patients exhibited moderate symptom severity, indicating a significant impact on quality of life. A substantial proportion had DNS associated with external nasal deformity, highlighting the coexistence of functional and aesthetic abnormalities. Higher Mladina types, particularly Types 3 and 4, showed a significant association with external deformities and higher SNOT-22 scores, demonstrating that more severe deviations are associated with greater symptom burden. Additionally, external nasal deformities were linked to worse functional outcomes. These findings emphasize the importance of comprehensive evaluation, including endoscopic assessment and symptom scoring. Understanding the relationship between septal deviation, deformity, and symptoms is crucial for accurate diagnosis and effective surgical planning. Early identification and appropriate intervention can significantly improve both functional and cosmetic outcomes, thereby enhancing overall patient quality of life.

CONTRIBUTION OF AUTHORS

Research concept- Dr. Mahesh V Kattimani
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Supervision- Dr. Mahesh V Kattimani
Materials- Dr. Rittik Kumar
Data collection- Dr. Mahesh V Kattimani, Dr. Rittik Kumar
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Critical review- Dr. Rittik Kumar, Dr. Mahesh V Kattimani
Article editing- Dr. Mahesh V Kattimani
Final approval- Dr. Mahesh V Kattimani

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