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# Association of external nose deformity in individuals with nasal septal deviation

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## ABSTRACT

**Background:** Deviated nasal septum presents a challenge as often functional problems as well as aesthetic deformities must be addressed. Deviated nasal septum can be a result of varying pathologies and etiologies. Classifying the nasal deviation enables the surgeon to choose the appropriate operative intervention. This study is intended to know the association of external nose deformity in patients with deviated nasal septum.
**Methods:** 100 patients were attending to the Department of ENT, Vijayanagara Institute of Medical Sciences, Ballari with deviated nasal septum, septal dislocation, septal spur and external nose deformity. Deviated nasal septum was classified as per the classification proposed by Mladina. External nose deformity was classified into 5 types proposed by Yong Jo Jang's classification depending on the orientation of 2 horizontal units (bony pyramid and cartilaginous subunits) with respect to facial midline.
**Results:** Out of 100 patients with deviated nasal septum, external nose deformity was present in 61% of the patients. Significant association was present between the deviated nasal septum and external nose deformity (p=0.01).
**Conclusions:** Type II (33%) deviated nasal septum was most common followed by type VII (31%). Among the external nose deformity, type I was most common followed by type V. Type II deviated nasal septum was associated most commonly with type V external nose deformity, type VII deviated nasal septum with type I external nose deformity and type IV deviated nasal septum with type I/II external nose deformity in equal frequency.

**Keywords:** Deviated nasal septum, Types, External nose deformity

## INTRODUCTION

Petermilling (1953) defines deviation of nasal septum as the condition in which septum instead of being placed central and there by dividing nasal cavity into two equal chambers of same size is inclined to one side or other, to increase one cavity at the expense of the other. The crooked nose is defined as a nose in which the midline is off center without tissue loss. This leaves a nose that is angulated at the nasion or the rhinion.[1]

Monumental statement made by Beckhius 'As goes the septum so goes the nose' speaks profusely on the indispensable role of nasal septum in supporting the framework.[2] Correction of this deformity presents a challenge because frequently, both a functional problem (airway conduction) and an aesthetic problem must be addressed.[3]

The cause may be congenital or acquired secondary to previous trauma or surgery.[3] The extrinsic forces are either secondary to scar, congenitally asymmetric attachments of the osseocartilaginous skeleton. The intrinsic forces are those acquired or inherent septal cartilaginous abnormalities.[3]

Developmental septal deviation may occur. There are many theories to explain the congenital cause of deviated nasal septum, The Fry principle,[4] Gray in 1972, proposed birth molding theory.[5] Other possible causes include thumb sucking, nose picking and inheritance.[4]

Whenever there is an external deformity of nose, its anatomical basis may be rooted in bony pyramid defect, cartilaginous framework defect, septal deformity or combination of this vectors.[2]

The intrinsic and extrinsic forces influencing septal deviation must be diagnosed accurately and eliminated during the operation.[6,7] Traditional correction of the deviated nose involves septal correction, separation of both upper lateral cartilage from the septum and bony pyramid manipulation after osteotomies.[8]

Literature search has revealed very few publications studying the association of deviated nasal septum with external nose deformity.

This study is undertaken to assess and analyze 100 patients of deviated nasal septum and its association with the external nose deformities.

## METHODS

A total of 100 patients attending the Department of ENT, Vijayanagara Institute of Medical Sciences, Ballari, Karnataka, India were included for this study. This prospective study was carried out from June 2018 to December 2018. Approval from the ethical committee was obtained before starting the study.

### *Inclusion criteria*

All the patients between the age group of 16-65 years attending the Department of ENT, Vijayanagara Institute of Medical Sciences, Ballari presenting with external nose deformity, deviated nasal septum, septal dislocation and septal spur.

### *Exclusion criteria*

External nose deformity was due to other conditions like granulomatous diseases, malignancy, sinonasal mass, previous septal surgery.

These patients with deviated nasal septum with or without external nasal deformity were evaluated clinically, using anterior rhinoscopy without the use of nasal decongestion, topical anaesthesia or an endoscope. The classification of septal deformities was based on the classification system proposed by Mladina, which classifies septal deformities into seven types.[9]

Since we had practical difficulties for getting clinical photographs of deviated nasal septum, we used the computed tomography scan pictures for representing various types of DNS in this study.

**Table 1: Mladina's classification of nasal septal deviation.**

| Types | Description |
|---|---|
| **Type I** | Mild deviation in vertical plane. |
| **Type II** | Moderate anterior vertical deviation of cartilaginous septum in full length. |
| **Type III** | Posterior vertical deviation at level of OM and middle turbinate. |
| **Type IV** | 'S'-shaped, posterior to one side and anterior to other. |
| **Type V** | Horizontal septal crest touching or not touching the lateral nasal wall. |
| **Type VI** | Prominent maxillary crest contralateral to the deviation with a septal crest on the deviated side. |
| **Type VII** | Combination of previously described septal deformity types. |

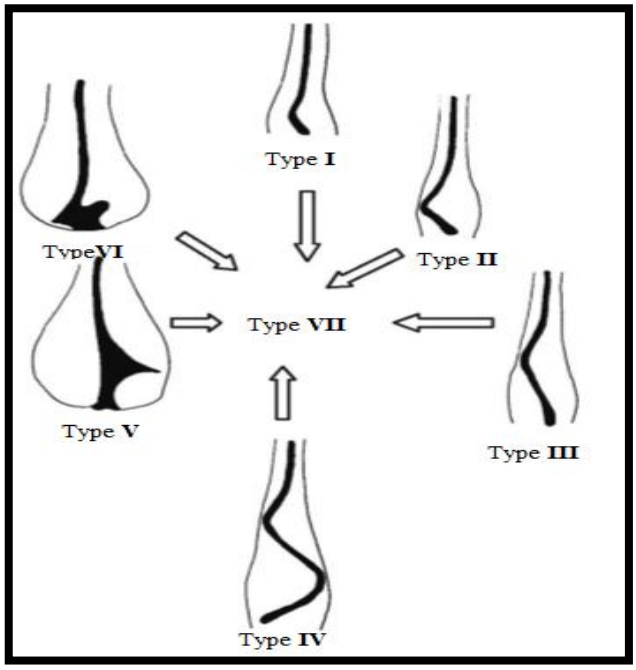


**Figure 1: Mladina's classification of nasal septum.[9]**

The external nose was evaluated using a reference point in AP view i.e., the facial center point lying halfway in between the medial canthi on the nose with the head in Frankfurt position. External nasal deformities were classified employing Yong Jo Jang's classification.[10] As per this classification external nasal deformities are classified into 5 types based on the orientation of bony pyramid and cartilaginous vault to each other.

This data along with the demographic details and photographic documentation was collected and analyzed statistically.

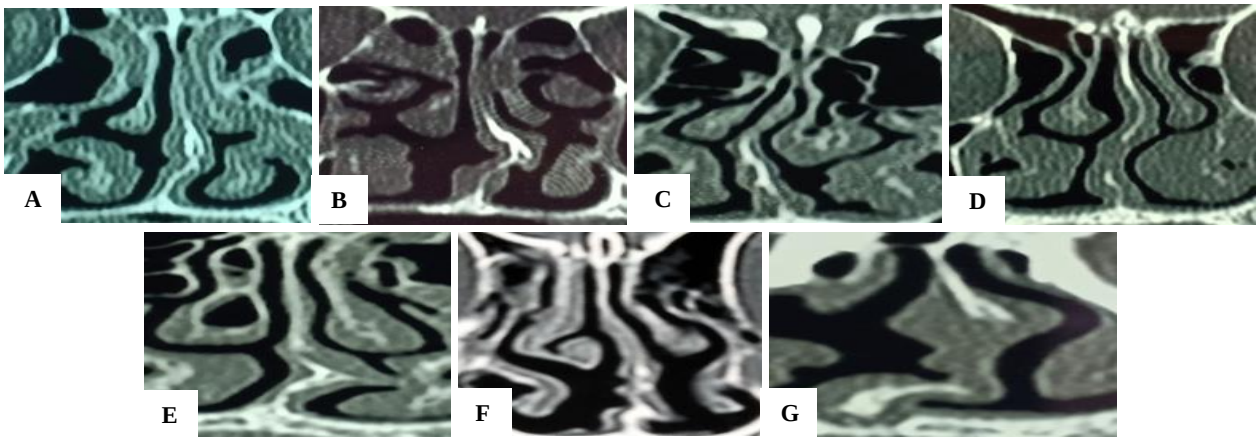


**Figure 2: Computed tomography of paranasal sinuses (coronal section) indicating various types of Mladina's classification of deviated nasal septum (A) type I, (B) type II, (C) type III, (D) type IV, (E) type V, (F) type VI, (G) type VII.**

**Figure 3: Clinical photograph's indicating various types of Yong Jo Jang's classification of external nose deformity (A) type I, (B) type II, (C) type IIII, (D) type IV, (E) type V.**

**Table 2: Yong Jo Jang's classification for external nasal deformity.**

| Types | Description |
|---|---|
| **Type I** | Straight tilted bony pyramid with tilted cartilaginous vault in the opposite direction. |
| **Type II** | Straight tilted bony pyramid with concavely or convexly bent cartilaginous vault. |
| **Type III** | Straight bony pyramid with tilted cartilaginous vault. |
| **Type IV** | Straight bony pyramid with bent cartilaginous vault. |
| **Type V** | Straight tilted bony pyramid and tilted cartilaginous dorsum in the same direction. |

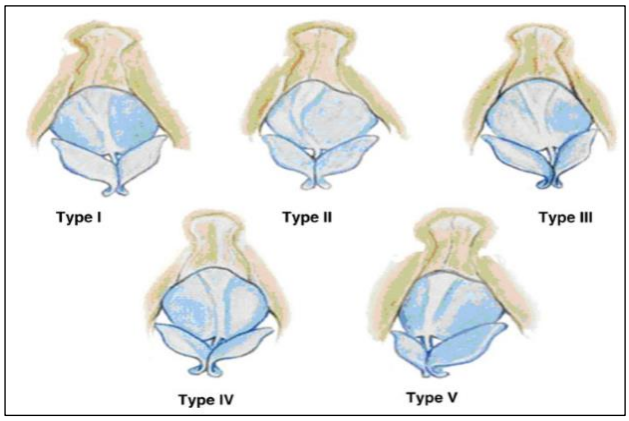


**Figure 4: Yong Jo Jang's classification of external nose deformity.[10]**

## RESULTS

A prospective study was conducted on 100 patients attending the Department of Otorhinolaryngology with external nose deformity, deviated nasal septum, septal dislocation and septal spur. The patient's age ranged from 16-65 year. Mean age of the patient was 31.28 year. Maximum number of patients were in the age group of 21-30 years (33%) followed by 11-20 years (24%). Maximum number of patients in males was in the age group of 21-30 years (37.7%). Maximum number of female patients was in the age group of 11-20 year (28.2%). Among the 100 patients, 61 patients (61%) were males and 39 patients (39%) were females. Male to female ratio was thus 1.56: 1.

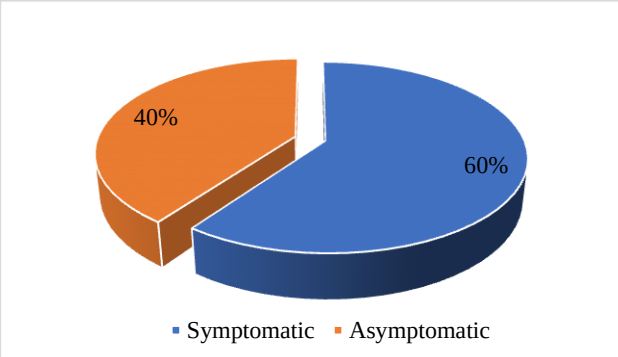


**Figure 5: Distribution of patients as per symptoms.**

60 (60%) patients in the present study were symptomatic while the rest 40 (40%) patients were asymptomatic.

Nasal obstruction (60.6%) was the most common nasal symptom among the symptomatic patients followed by nasal discharge (36.3%).

Deviated nasal septum in the present study was classified into seven types as per classification system described by Mladina. Right sided DNS was present in 38 (38%) of patients and left side in 30 (30%) patients and bilateral in 32 (32%) patients.

External nose deformity is classified into I-V types based on external deviation of horizontal subunits, the bony and cartilaginous vault as described by Jang et al. Among the 100 patients with deviated nasal septum, external nose deformity was present in 61 (61%) patients and in 39 (39%) patients no external deformity was noted.

Among the 100 patients with deviated nasal septum, type II (33%) septal deviation was most common followed by type VII (31%). Types I, III, V, VI deviated nasal septum were not associated with any external nose deformity. Type I external nose deformity was most common followed by type V.

Among the 60 (60%) symptomatic patients of deviated nasal septum, external nose deformity was present in 36 patients. Type II septal deviation was most common followed by type VII. Most common external nose deformity was type I followed by type V.

Among the 40 asymptomatic patients of deviated nasal septum, 25 patients presented with external nose deformity. Type VII was most common type of deviated nasal septum followed by type II. Type I external nose deformity was most common followed by type V.

Among the 37 symptomatic male patients with deviated nasal septum, 24 patients had external nose deformity. Type II nasal septal deviation was most common followed by type VII. Type I external nose deformity was most common followed by type V.

Among the 23 symptomatic female patients with deviated nasal septum, external nose deformity was present in 12 patients. Type VII deviated nasal septum was most common followed by Type II. Type II, III, V external nose deformity all occurred with equal incidence.

Among the 16 asymptomatic female patients with deviated nasal septum, external nose deformity was present in 24 patients. Type VII deviated nasal septum was the most common type followed by type I/IV. Type V was the most common external nose deformity followed by type I.

Among the 24 asymptomatic male patients with deviated nasal septum, external nose deformity was noted in 17 patients. Incidence of type II deviated nasal septum was equal to type VII. Type I was most common external nose deformity.

**Table 3: Correlation of external nose deformity with deviated nasal septum.**

| Deviated nasal septum (Mladina's classification) | | Type I | Type II | Type III | Type IV | Type V | Type VI | Type VII | Total |
|---|---|---|---|---|---|---|---|---|---|
| External nose Deformity (Jang's classification) | Type I | 0 | 7 | 0 | 3 | 0 | 0 | 9 | 19 |
| | Type II | 0 | 4 | 0 | 3 | 0 | 0 | 3 | 10 |
| | Type III | 0 | 7 | 0 | 0 | 0 | 0 | 3 | 10 |
| | Type IV | 0 | 2 | 0 | 1 | 0 | 0 | 2 | 5 |
| | Type V | 0 | 8 | 0 | 1 | 0 | 0 | 8 | 17 |
| | No deformity | 6 | 5 | 4 | 8 | 8 | 2 | 6 | 39 |
| | Total | 6 | 33 | 4 | 16 | 8 | 2 | 31 | 100 |

X2 value: 50.84; p value=0.01(significant).

**Table 4: Correlation of external nose deformity with deviated nasal septum in symptomatic and asymptomatic patients.**

| Deviated nasal septum (Mladina's classification) | | Symptomatic patients | | | | | | | | Asymptomatic patients | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Type I | Type II | Type III | Type IV | Type V | Type VI | Type VII | Total | Type I | Type II | Type III | Type IV | Type V | Type VI | Type VII | Total |
| External nose deformity (Jang's classification) | Type I | 0 | 5 | 0 | 1 | 0 | 0 | 5 | 11 | 0 | 2 | 0 | 2 | 0 | 0 | 4 | 8 |
| | Type II | 0 | 2 | 0 | 3 | 0 | 0 | 1 | 6 | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 4 |
| | Type III | 0 | 4 | 0 | 0 | 0 | 0 | 1 | 5 | 0 | 3 | 0 | 0 | 0 | 0 | 2 | 5 |
| | Type IV | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 4 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| | Type V | 0 | 6 | 0 | 0 | 0 | 0 | 4 | 10 | 0 | 2 | 0 | 1 | 0 | 0 | 4 | 7 |
| | No deformity | 2 | 5 | 2 | 4 | 4 | 1 | 6 | 24 | 4 | 0 | 2 | 4 | 4 | 1 | 0 | 15 |
| | Total | 2 | 24 | 2 | 8 | 4 | 1 | 19 | 60 | 4 | 9 | 2 | 8 | 4 | 1 | 12 | 40 |

Symptomatic patients: $X^2$ value=30.3; p-value=0.4 (Not significant); Asymptomatic patients: $X^2$-value=40.3; p-value=0.09 (Not significant).

**Table 5: Correlation of external nose deformity with deviated nasal septum in symptomatic male patients and symptomatic female patients.**

| Deviated nasal septum (Mladina's classification) | | Symptomatic male patients | | | | | | | | Symptomatic female patients | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Type I | Type II | Type III | Type IV | Type V | Type VI | Type VII | Total | Type I | Type II | Type III | Type IV | Type V | Type VI | Type VII | Total |
| External nose deformity (Jang's classification) | Type I | 0 | 3 | 0 | 1 | 0 | 0 | 5 | 9 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 |
| | Type II | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 3 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 3 |
| | Type III | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 3 |
| | Type IV | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| | Type V | 0 | 4 | 0 | 0 | 0 | 0 | 3 | 7 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 3 |
| | No deformity | 2 | 4 | 2 | 2 | 1 | 0 | 2 | 13 | 0 | 1 | 0 | 2 | 3 | 1 | 4 | 11 |
| | Total | 2 | 16 | 2 | 4 | 1 | 0 | 12 | 37 | 0 | 6 | 0 | 4 | 3 | 1 | 7 | 23 |

Symptomatic male patients: X2-value=18.5; p-value=0.9 (not significant); Symptomatic female patients: $X^2$-value=23.03; P-value=0.8 (not significant).

**Table 6: Correlation of external nose deformity with deviated nasal septum in asymptomatic female patients and asymptomatic male patients.**

| Deviated nasal septum (Mladina's classification) | | Asymptomatic female patients | | | | | | | | Asymptomatic male patients | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Type I | Type II | Type III | Type IV | Type V | Type VI | Type VII | Total | Type I | Type II | Type III | Type IV | Type V | Type VI | Type VII | Total |
| External nose deformity (Jang's classification). | Type I | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 2 | 0 | 2 | 0 | 0 | 2 | 6 |
| | Type II | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 3 |
| | Type III | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 4 |
| | Type IV | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Type V | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 3 | 0 | 1 | 0 | 1 | 0 | 0 | 2 | 4 |
| | No deformity | 3 | 0 | 2 | 2 | 1 | 0 | 0 | 8 | 1 | 0 | 0 | 2 | 3 | 1 | 0 | 7 |
| | Total | 3 | 2 | 2 | 3 | 1 | 0 | 5 | 16 | 1 | 7 | 0 | 5 | 3 | 1 | 7 | 24 |

Asymptomatic female patients: $X^2$-value=25.8, p-value=0.68 (not significant). Asymptomatic male patients: $X^2$-value=22.2, p-value=0.84 (not significant).

## DISCUSSION

There are many classification systems for the deviated nasal septum and its associated external nose deformity. If the classifications for both deviated nasal septum and the external nose deformity are standardized, then the treated can be simplified.

Out of 100 patients attending the Department of ENT with external nose deformity, deviated nasal septum, septal dislocation, septal spur, age ranged from 16-65 year. Majority of patients (33%) fell in the age group of 21-30 year followed by (24%) patients in 11-20 year with the mean age of 31.28 year. In various other studies, mean age of 34.7 years, 33.5 years has been reported.[2,10] These findings by different investigators are in keeping with our findings.

Male to female ratio is 1.56:1 in the present study, other studies have 1.7:1, 2.2:1.[2,11] Preponderance in males can be reasoned out by the fact that most common etiology of deviated nasal septum is nasal trauma which occurs more frequently in males.[2]

Symptomatic patients (60%) presented most commonly with nasal obstruction as a common symptom followed by nasal discharge.

Deviation of nasal septum was classified into seven types by adopting the Mladina's classification in our study.[9] Type II (33%) was the most common deviation followed by type VII (31%). In contrast to our findings, Sam et al found type VII (29%) as the most common septal deviation.[2] In another study conducted by Janardhan et al found Type V (45%), as the most common septal deviation.[11] In our study the least common type of deviation was type VI.

In the present study, external nose deformity was classified into I-V types as given by Jang et al.[10] Out of 100 patients with deviated nasal septum, 61% had external nose deformity. In one of the studies 67% of septal deviation coexisted with the external nose deformity and in another study the incidence of external nose deformity was 70% in cases with deviated nasal septum.[2,12]

Type I external nose deformity was the most common (19%) followed by type V (17%) in our study. In one of the study, type I deformity accounted for the maximum external nose deformity and in another study, type I deformity was the most common. Thus, our observations correlate with others.[2,10]

Type I, III, V, VI septal deviations were not associated with the external nose deformity. It is largely because deviations in this type are localized deviations and are not strong enough to pull the nasal dorsum to create external nose deformity.

Type II deviated nasal septum was associated most commonly with type V external nose deformity followed by type I and type III. Reason behind most common association of type II deviated nasal septum with type V external nose deformity being the cause of deflection, as mentioned in one of the previous studies anterior cartilage deviation is typically localized to the anterior quadrilateral cartilage and frequently associated with asymmetry of external bony pyramid and dislocation of cartilage off the anterior nasal spine.[5] This deformity is common in new born delivered vaginally. In one of the previous studies, type II deviated nasal septum was associated most commonly with type III external nose deformity.[2]

Type IV DNS was associated with type I/II external nose deformity with equal frequency. This is because 'S' shaped septal deviation pull the bony pyramid in the direction of posterior bony septal deviation and cartilaginous vault is pulled on the opposite direction along with anterior septal deviation. The findings of association of type IV deviated nasal septum with Type I is correlating with one of the previous studies.[2]

Type VII DNS was associated most commonly with type I external nose deformity followed by type V.

On applying Chi-square test significant correlation is found between deviated nasal septum and external nose deformity (x2=50.84; p=0.01; significant).

Thus, there was a significant association between the deviated nasal septum and the external nose deformity. The correction of both deviated nasal septum and external nose deformity is required for aesthetically pleasing and functional improvement.

## CONCLUSION

In the present study conducted on 100 patients with deviated nasal septum spanning over 6 months, patients age ranging from 16-65 year, majority of the patients were in the age group of 21-30 year, with the male to female ratio being 1.56:1. Type II was the most common type of deviated nasal septum which accounted for 33%. External nose deformity was present in 61% of patients, Type I was the most common type of external nose deformity in 19%. Type I, III, V, VI septal deviations were not associated with external nose deformity. Type II septal deviation was most commonly associated with type V external deformity followed by type I. Type VII septal deviation was associated with type I external deformity followed by type V. Type IV septal deviation was associated with Type I, II in equal proportion.

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## REFERENCES


1. Ellis DA, Gilbert RW. Analysis and correction of crooked nose. J Otolaryngol. 1991;20(1):14-8.
2. Sam A, Deshmukh PT, Patil C, Jain S, Patil P. Nasal septal deviation and external nasal deformity: a correlative study of 100 cases. Indian J Otolaryngol Head Neck Surg. 2012;64(4):312-8.
3. Rohrich RJ, Gunter JP, Deuber MA, Adams WP. The deviated nose: optimizing results using a simplified classification and algorithmic approach. Plast Reconstruct Surg. 2002;110(6):1509-23.
4. Etigadda Y, Majeed J. Clinical and radiological evaluation of deviated nasal septum in classifying and surgical management of the deviated septum. IOSR J Dent Med Sci. 2017;16(2):13-20.
5. Gray LP. Deviated nasal septum, incidence and etiology. Ann Otol Rhinol Laryngol. 1978;87(50):3-20.
6. Pontius AT, Joseph L. Leach. New techniques for management of the crooked nose. Arch Facial Plast Surg. 2004;6:263-6.
7. Cerkes N. The crooked nose: Principles of treatment. Aesth Surg J. 2004;31(2):241-57.
8. Vuyk H D. A review of practical guidelines for correction of deviated, asymmetric nose. Rhinol. 2000;38:72-8.
9. Mladina R, Cujic E, Subaric M, Vukovic K. Nasal septal deformities in ear nose and throat patients: an international study. Am J Otol. 2008;29(2):75-82.
10. Jang JY, Wang JH, Lee BJ. Classification of the deviated nose and its treatment. Arch Otolaryngol Head Neck Surg. 2008;134(3):311-5.
11. Rao JJ, Kumar VEC, Babu RK, Chowdary VS, Singh J, Rangamani VS. Classification of nasal septal deviation—Relation to sinonasal pathology. Indian J Otolaryngol Head Neck surg. 2005;57(3):199– 201.
12. Goldman IB. New technique in surgeries of deviated nasal septum. Arch Otolaryngol. 1956;64(3):183-9.


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