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Original Research Article

Prevalence of nasal septum deviation and its association with chronic maxillary sinusitis

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ABSTRACT

Background: The nasal septum deviation causes alteration in airflow, mucociliary clearance and effects on structures of the lateral nasal wall causing various nasal symptoms and other sinonasal diseases. Deviated nasal septum has been associated with chronic sinusitis.
Aims and Objectives: This present study was aimed to investigate the prevalence of nasal septum deviation in Western population of Maharashtra, to compare the rates between gender and to investigate its association with chronic sinusitis.
Materials and Methods: The retrospective study was conducted at Krishna institute of medical sciences, Deemed to be university (KIMSDU) in collaboration with School of dental sciences, Karad. The institutional ethical committee clearance was obtained before start of the study with protocol no. 0200/2018-19. A total of 80 patient's paranasal views (PNS views) were enrolled in this study after fulfillment of Inclusion and Exclusion criteria's.
Results: Out of 80 patients in our study 45 were males accounting for 56% and 35 were females accounting for 44%. In total 80 patients only 50 Patients were having deviated nasal septum accounting for 62.5% and 30 patients were not having DNS accounting for 37.5%.
Conclusion: Based on PNS view in our study the prevalence of DNS was 62.5% and about 88% of patients were having sinusitis associated with DNS and majority of patients were males.

1. Introduction

The nasal septum is an important physiological and support structure of the nose. The nasal septum comprises of bony cartilages that separated the nasal cavity into right and left sides. Septal deviation refers to convexities of the septum to one side with accompanying deformities of the midline structures. Deviation of nasal septum is very common in adults. Morrel Mc Kenzie studied over 2000 skulls and found that 75% of adults had deviated septum.[1] The nasal septum deviation causes alteration in airflow, mucociliary clearance and effects on structures of the lateral nasal wall causing various nasal symptoms and other sinonasal diseases. Deviated nasal septum has been associated with chronic sinusitis.

This present study was aimed to investigate the prevalence of nasal septum deviation in Western population of Maharashtra, to compare the rates between gender and to investigate its association with chronic sinusitis.

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2. Materials and Methods

The retrospective study was conducted at Krishna institute of medical sciences, Deemed to be university (KIMSDU) in collaboration with School of dental sciences, Karad. The institutional ethical committee clearance was obtained before start of the study with protocol no. 0200/2018-19. A total of 80 patient's paranasal views (PNS views) were enrolled in this study after fulfillment of Inclusion and Exclusion criterias. All the PNS views had been exposed using MARS 50 machine using exposure parameters of 60-70 kvp, 35-50 mA.

2.1. Inclusion criteria

PNS radiographic images of patients aged above 18 years.
PNS radiographs of good quality.
Exclusion criteria: PNS radiographic images of poor quality.

Radiographs of patients with previous history of trauma.
The PNS radiographs retriviewed were analyzed for -

1. Prevalence of nasal septum deviation.
2. Comparing the prevalence of rates between gender.
3. Association between deviated nasal septum and maxillary sinusitis.

The data was entered in Ms Excel and subjected to statistical analysis.

3. Result

Out of 80 patients in our study 45 were males accounting for 56% and 35 were females accounting for 44% [Table 1].

Table 1: Genderwise

Gender	Number of Patients	Percentile
Male	45	56%
Female	35	44%
Total	80	100%

In total 80 patients only 50 Patients were having deviated nasal septum accounting for 62.5% and 30 patients were not having DNS accounting for 37.5%. Detailed distribution of age of patients were tabulated [Table 2].

Out of 50 patients with deviated nasal septum 44 patients were having sinusitis accounting for 88% and 12% of patients were not having sinusitis. Total of 94.4% of male patients were having DNS associated with sinusitis and 71.4% of females were having DNS associated with sinusitis [Table 3].

There were 30 patients without DNS but out of those only 36.6% of patients were having sinusitis and 63.3% of patients were not having sinusitis [Table 4].

Table 2: Agewise distribution of patients with or without deviated nasal septum

Age Group	Patients with DNS	Patients Without DNS
19-27 year	11	12
28-37 year	14	5
38-47 year	11	5
48-57 year	7	2
58-67 year	5	3
68-77 year	2	3
Total	50	30

Table 3: Association of DNS patient with sinusitis

Gender	DNS Patient With Sinusitis	DNS Patient Without Sinusitis	Total
Male	34	2	36
Females	10	4	14
Total	44	6	50

Table 4: Association of patients without DNS but with sinusitis

Gender	Patients With DNS With Sinusitis	Patients Without DNS Without Sinusitis
Males	3	6
Females	8	13
Total	11	19

4. Discussion

Nose is situated in the central part of midface. It helps in respiration, olfaction, humidification and phonation. If any part of nasal process is disturbed it results in disease of nose and adjacent paranasal sinuses. Deviated nasal septum is one such condition which leads to chronic sinusitis.
Nasal septal deviation is defined as a deviation of bone or cartilage of the septum (or both) from the midline of the face. DNS are categorized by many authors as follows:
According to Mladina the types of DNS[2]
Type 1: Unilateral vertical septal ridge in the valve region that does not reach the valve itself,
Type 2: Unilateral vertical septal ridge in the valve region touching the nasal valve,
Type 3: Unilateral vertical ridge located more deeply in the nasal cavity, Type 4: S-shaped,
Type 4: Almost horizontal septal spur,
Type 5: massive unilateral bone spur,
Type 6: Variation of these types.
Rao also classified septal deviations into 7 types:[3]
Type 1: Midline septum ormild deviations in vertical or horizontalplane,
Type 2: Anterior vertical deviation,
Type 3: Posterior vertical deviation,
Type 4: S-septum,
Type 5: Horizontal spur on one side,
Type 6: Type V with a deep grove on the concave side,
Type 7: Combination of II–VI

According to I. Baumann and H. Baumann there are 6 types of nasal septal deviations where each type has several additional

Features:[4]
Type 1: Septal crest,
Type 2: Cartilaginous deviated nose,
Type 3: High septal crest deviation,
Type 4: Caudally inclined septum,
Type 5: Septal crest,
Type 6: Caudally inclined septumJin et al. followed a very similar

Format to Rao and Mladina and classified in to 4 types:[5]

Type 1: Localized deviation including spur (spine), crest or caudal dislocation,
Type 2: Curved/angulated deviation without localized deviation,
Type 3: Curved/angulated deviationwith localized deviation

Type 4: Curved/angulated deviation with associated external nasal deformity.

Three theories explains the pathophysiological relation between the deviated nasal septum and chronic sinusitis. The first theory is mechanical theory which states that as a result of narrowing of the ostiomeatal complex the secretions accumulates in the sinus and thus infections ensues in the retained secretions and causes chronic rhinosinusitis. The second theory is the aerodynamic theory. According to this theory, the mucociliary activity decreases following the nasal flow rate increase and mucosal dryness in relation with the nasal septal deviation and consequently, chronic rhinosinusitis develops. The third theory is the Bachert"s pressure theory. According to this theory, deviation of the posterior nasal septum causes chronic rhinosinusitis by creating pressure and air flow changes within the maxillary sinuses.[6,7] Several radiographic imaging techniques are used to study the DNS and its association with maxillary sinusitis. Panoramic radiography, PNS view, Computed tomography, Cone beam computed tomography are some of the radiographs used to analyze the DNS.[8,9]

Out of all panoramic radiography is the most common two-dimensional imaging technique used to evaluate the maxillary sinuses by dentist. In panoramic radiography limitations like unequal magnification, geometric distortion across the whole image layer leads to incorrect anatomical and pathological evaluations of maxillary sinus pathologies. The pathology of the internal wall of the maxillary sinus is often not shown on a panoramic radiograph. Because of this limitation panoramic radiography cannot be considered as a predictive tool for evaluating the presence of sinus pathology. To assess the 3D view of maxillary sinus, CT is the choice method but high cost, radiation dose, and availability issues have limited its use in general dentistry. So to over come with this CBCT technique is a relatively new imaging technology that uses a cone-shaped divergent source, ionizing radiation and a two-dimensional detector called the spinning gantry to record multiple images during a thorough scan around the desired area. Compared to CT, CBCT provided a relatively low-cost and high-resolution alternative for orofacial imaging. In this study we used PNS view to analyze DNS and its association with maxillary sinusitis.

The prevalence rates of deviated nasal septum varies from neonates to adults. Many studies of nasal septal deviation have reported a wide range of prevalence.[10,11] In 1978, Gray[12] reported a prevalence of 48%-60% in neonates. Later on, the prevalence in newborns ranged from 0.93% to 22%.[13] In the present study the total prevalence of DNS was 62.5%. In males there was 72% of DNS and in females there was 28 % of DNS. The percentage of male patients with DNS were more than the females. In a study by Madani et al., there were 68.3% male and 31.7% female with a mean age of 29.13±15.21 years.[14] Ozkurt et al. also observed that incidence was more in male as compared to females.[15] The results of the study were also in accordanace with Nayak et al. studies and Syed Mohammed Shoib et al. studies.[16,17] Pires de Oliveira and colleagues invited 534 volunteers to participate in a study and found the nasal septum deviation condition in 322 (60.3%) of the subjects, the DNS was more in men than in women.[18] In a study conducted by Min and colleagues found DNS in 22.38% of the 9284 people included in their study, with more men than women with this condition.[19] In our study the prevalence of DNS was more in age group between 28-37 years and least was found in age group of 68-77 years. Subaric and Mladina have found the nasal septum deviation condition in 21% of children aged 7-14 and 41.8% of adults.[20] Out of 50 DNS patients 44 were having sinusitis accounting for 88% in our study where as 6 were not having sinusitis even though there was a deviated nasal septum. Majority of patients were males accounting for 94.4% suffering from sinusitis and 71.4% of females were suffering from sinusitis due to DNS. The results of our study were in agreement to a study done by Nayak et al.[16] In our study there were 30 patients without DNS but out of those only 36.6% of patients were having sinusitis and 63.3% of patients were not having sinusitis. Sinusitis without DNS might be due to other causes like allergy, asthma, dental disease, nasal polyps, immunodeficiency, mucociliary disorders, trauma, medications, surgery, noxious chemicals and micro-organisms (viral, bacterial and fungal).

5. Conclusion

Based on PNS view in our study the prevalence of DNS was 62.5% and about 88% of patients were having sinusitis associated with DNS and majority of patients were males.

6. Source of Funding

None.

7. Conflict of Interest

None.

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