International Journal of Radiology and Diagnostic Imaging

E-ISSN: 2664-4444
P-ISSN: 2664-4436
www.radiologypaper.com
IJRDI 2024; 7(4): 39-42
Received: 02-11-2024
Accepted: 07-12-2024

Noor Abbas Abdulkhaleq
Diagnostic Radiologist, Ministry of Health, Baghdad, Iraq

Mudhafar Bali Mahdi
Radiology Consultant, X-ray Institute, Baghdad Medical City Compass. Baghdad, Iraq

Corresponding Author:
Noor Abbas Abdulkhaleq
Diagnostic Radiologist, Ministry of Health, Baghdad, Iraq

Computerized tomography scan evaluation of nasal abnormalities including nasal septal deviation angle and turbinate hypertrophy in patients referred for rhinoplasty

Noor Abbas Abdulkhaleq and Mudhafar Bali Mahdi

DOI: https://doi.org/10.33545/26644436.2024.v7.i4a.424

Abstract
Background: The nasal septum is an important physiological and support structure of the nose. Nasal Septal deviation is the most commonly seen deformity of the nose. It is considered to be congenial or trauma- sustained at any time in the life.
Aim of study: To assess the severity of nasal septal deviation angle, size and shape of deviation; it's relation with normal variant.
Patients and methods: Cross- sectional CT scan study conducted in the CT Radiology Department of the X-ray institute in Baghdad Medical City Compass, on patients referred for rhinoplasty.
Results: About 48 patients had nasal septum deviation to the left side, 30 patients had nasal septal deviation to the right side, and 22 patients had normal septum. 49 patients had type II nasal septal deviation angle.
Conclusion: Many patients referred for cosmetic rhinoplasty who's age less than 30 years or patients with nasal obstruction whose age above 30 show nasal septal deviation that required septorhinoplasty.

Keywords: Nasal septal deviation angle, nasal septal deviation, nasal obstruction

Introduction

The nose is a complex three-dimensional structure with critical structural and functional roles, which, by virtue of its position, serves as the central component of the face. Its relationship to surrounding structures is in part responsible for a harmonious, pleasing visage as a whole. Functionally, the nose provides an airway and acts to warm, filter and humidify air passing through it to the lungs [1]. The nasal septum is an important physiological and support structure of the nose [2]. Nasal Septal deviation (NSD) is most commonly seen deformity of the nose but, not necessarily be symptomatic [3]. The NSD is considered to be congenital or due to trauma sustained at any time in life [4]. The septum can be divided into two portions, cartilaginous (quadrangular) portion and a bony portion, the bony portion is composed of the perpendicular plate of ethmoid poster superiorly, the maxillary crest inferiorly and the vomer posteriorly [5]. The Deformities of nasal septum are classified into: (1.) Deviation, and (2.) Dislocation. Normally, the nasal septum lies centrally, so the nasal passages are symmetrical. The nasal septal deviation is the deflection of nasal septum from the center to one side [6]. The common patterns of NSD could be either C-shaped, S-shape or spur [7]. The C-shaped: Here the deviation of upper third (the bony part) to the same side of the whole of cartilaginous septum (middle and lower third) [6]. The S-shaped: Here the deviation of middle third (the upper cartilaginous part) is opposite to that of upper third (the bony part) and/or lower third (lower cartilaginous part) [6]. The Spur is a sharp angulation usually located at the junction of the perpendicular plate of the ethmoid and the vomer; they are usually associated with septal deviation [8, 9]. The largest spurs bridge the nasal cavity and impinge upon and deform the inferior turbinate (IT), occasionally reaching the lateral nasal wall (Figure 1) [10]. The aim of our study is to assess the severity of nasal septal deviation angle, size and shape of deviation, it's relation with concha bullosa, middle and inferior turbinate hypertrophy, in patients referred for rhinoplasty.

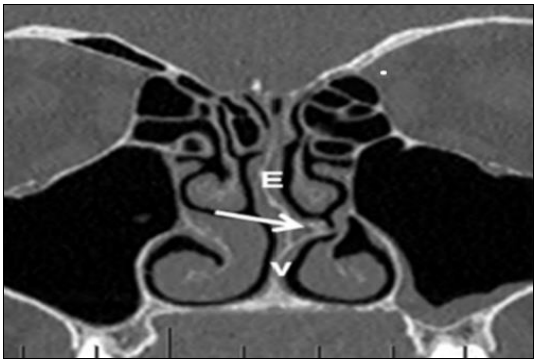

Fig 1: Coronal CT scan show Left-sided septal spur (white arrow) from the junction of the vomer (V) and ethmoid (E) which impinges on the inferior turbinate (IT) in the posterior (bony) nose, mild mucosal thickening of left maxillary sinus and the right inferior turbinate is also enlarged

Patients and methods

This is a cross- sectional study, done in the CT Scan Unit of the X-ray Institute in Bagdad Medical City Compass, during the period from March 2022 to November 2022, on 100 patients referred for rhinoplasty. For every patient, CT scan performed in axial orientation then coronal reformat images were yielded. Any patients above 18 years referred for rhinoplasty for cosmetic and obstructive purpose was included, while any Patient with craniofacial syndromes, facial trauma or previous maxillofacial surgery was excluded. About the equipment and techniques, we used the CT scan system which is (TOSHIBA, Aquilion) 64 slice using bone algorithm with 0.5 mm slice thickness, 5mm interval, 150 mA, 120 KV. The CT scan performed in axial orientation then coronal reformat images were yielded. The Nasal septal deviated angle (NSDA) was measured using Vinodhini-Periyasamy methods by drawing a line from crista galli to maxillary crest and other line from crista galli to the maximum deviation of nasal septum (either in C and S- shape) [11]. NSDA is the angle formed between these two lines in patients with nasal septal spur the spur is involved in the measuring of NSDA (Figure 2) [10, 11]. The aim of our study is to assess the severity of nasal septal deviation angle, side and shape of deviation, it's relation with concha bullosa, middle and inferior turbinate hypertrophy, in patients referred for rhinoplasty. At 2019 Vinodhini-Periyasamy modified the nasal septal deviation angle into four types according to the degree of its deviation (Table 1) [11]. All data were analyzed using the (IBM SPSS) for window statistical package program (version 25; Armonk, NY, USA: IBM Corp.). The results were calculated in term of frequencies and percentages.

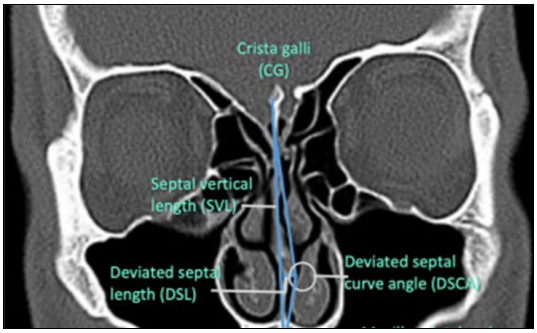

Fig 2: Coronal CT scan shows the methods of measurement of Nasal Septal Deviated Angle

Table 1: Vinodhini-Periyasamy classification of NSDA

Types	Vinodhini-Periyasamy classification of NSDA	
Type I	< 5°	Normal
Type II	From 5° - 10°	Mild
Type III	From 10° - 15°	Moderate
Type IV	> 15°	Severe

Results

In our study,100 patients were involved. Their age located between 18 to 45 years, with a mean of 30 years. 22 patients (22%) have normal nasal septal and 78 patients (78%) have nasal septum deviation (NSD), 48 patients (48%) had NSD to the left side and 30 patients (30%) had NSD to the right side. The values of Nasal Septal Deviated Angle (NSDA) were found to range from 4° to 27°, type I in 22 patients (22%), type II in 49 patients (49%) (Figure: 3, 4), type III in 20 patients (20%), and type IV in 9 patients (9%). It was cleared by our study that the more common type of NSDA was the type II. According to the shape of deviation, normal nasal septum found in 22 patients (22%), the C-shaped was found in 50 patients (50%) and 20 patients of them have nasal spur, the S-shaped NSD was found in 28 patients (28%) patients and 18 patients (18%) of them have nasal spur. It was appeared by this study that the more common was the C-shaped.

Fig 3: Axial PNS CT scan of 25 years old female referred for rhinoplasty showing normal anterior septum and posterior septal spur

Fig 4: coronal PNS CT scan of 25 years old female referred for rhinoplasty showing type II NSDA measured 9.4° with C-shape left side deviation and left septal spur, hypertrophy of the right IT, clear both maxillary and ethmoid sinuses

Discussion

A total of 100 patients were enrolled in the current study who aged between 18 and 45 years old. 78% of them had NSD and 22% had normal nasal septum. The nasal septal deviation may affect the patency of airway and also the overall surface of the nasal cavity, the more severe nasal septal deviation the more is the nasal airway obstruction and smaller nasal cavity. The aim of our study is to measure the nasal septal deviation angle, side of deviation, shape of deviation, any normal variant and lastly turbinates hypertrophy in our radiological reports to detect the severity of nasal obstruction before rhinoplasty, and to decide what is the best type of operation (open vs close method) for rhinoplasty. In our study, 78% of the patients had normal nasal septum and 49% had left side NSD. The type II NSD is the commonest type in about 49% of them, which is in agreement with a study done by Vinodhini-Periyasamy, in which 63.4% of patients had left side NSD, and 23% had type II [11]. Our results show that the C-shaped NSD was more prevalent in 50%, which agrees with a study done by Mahesh Mishra *et al* [12] and found that the C-shaped was more common in 44% of the patients, as seen in Table 2.

Table 2: Summery on studies about percentage of the size and shape of NSD and NSDA

Authors	year	Study group	Side of deviation	Shape of deviation	NSDA
This study	2022	100	left	C-shape 50%	II 49%
Vinodhini-Periyasamy	2019	60	left	C- shape	II 76%
Mahesh Mishra *et al*	2022	50	left	C- shape 58%	II 54%

This study found that there is an increased incidence of hypertrophy of the contra lateral middle turbinate in type III and IV NSDA, which agrees with a study done by Mundra *et al*. [13] Our results found that 40.8% of the enrolled patients had a contralateral inferior turbinate hypertrophy in type II and 40% had a contralateral IT hypertrophy in type III NSDA and 55.5% of patients had a contralateral IT hypertrophy in type IV NSDA which is incompatible with another study done by Grymer *et al* [14] who reported that mucosal hypertrophy was not dependent on the degree of nasal septal deviation, and also it is incompatible with a study done by Akoglu *et al* [15] which showed that neither mucosal nor bone hypertrophy was correlated with the angle of deviation, this difference may be due to the races, seasonal variation and the indication of PNS CT scan. Our results show that 27% of the patients had concha bullosa as opposite side of nasal septal deviation, as in a study done by Mundra *et al* [13] which is compatible with this finding.

Limitation

Presence of dental filling in the upper teeth and patient's movements during amination could cause an artifact in the CT scan image.

Conflict of Interest

Not available.

Financial Support

Not available.

Conclusion

1. 78% of the referred patients for cosmetic rhinoplasty showed a nasal sepal deviation that was required septorhinoplasty.
2. It is important to mention the nasal septal deviation angle, turbinate hypertrophy and any anatomical variants in our reports.
3. The nasal septal deviation is a common finding on CT scan of PNS and associated with structural changes in the middle turbinate and inferior turbinate in the opposite side of deviation.
4. The nasal septal deviation angle is well correlated with Osteo Meatal Complex (OMC) obstruction, resulting in airway obstruction.

References

1. Farhadieh R, Bulstrode N, Cugno S. Plastic and reconstructive surgery: Approaches and techniques. 1st ed. John Wiley & Sons; c2015.
2. Keles B, *et al*. Is there any relationship between nasal septal deviation and concha bullosa? Eur. J Gen Med. 2010;7(4):359-364.
3. Negus V. The comparative anatomy and physiology of the nose and paranasal sinuses. E. & S. Livingstone; c1958.
4. Daghistani K. Nasal septal deviation in Saudi patients: a hospital based study. Med Sci. 2002, 10(1).
5. Azizzadeh B. Master techniques in rhinoplasty. 1st ed. Available from: https://books.google.com/books/about/Master_Techniques_in_Rhinoplasty.html?id=2lqyuAAACAAJ. p. 27.
6. Balasubramanian T. Deviated nasal septum and its management. ENT Scholar.
7. Davari R, Behnoud F. Study the effect of nasal obstruction surgery (septoplasty) on Eustachian tube function and middle ear pressure. J Ardabil Univ Med Sci. 2014;14(4):322-330.
8. Shah J, Roxbury CR, Sindwani R. Techniques in septoplasty: traditional versus endoscopic approaches. Otolaryngol Clin North Am. 2018;51(5):909-917.
9. Vaid S, Vaid N. Normal anatomy and anatomic variants of the paranasal sinuses on computed tomography. Neuroimaging Clin. 2015;25(4):527-548.
10. Whyte A, Boeddinghaus R. Imaging of adult nasal obstruction. Clin Radiol. 2020;75(9):688-704.
11. Periyasamy V, Bhat S, Ram S. Classification of naso septal deviation angle and its clinical implications: a CT scan imaging study of Palakkad population, India. Indian J Otolaryngol Head Neck Surg. 2019;71(3):2004-2010.
12. Mishra M, Sharma S. Clinical study of septal deviation and its association with sinusitis. 2022.
13. Mundra R, *et al*. CT scan study of influence of septal angle deviation on lateral nasal wall in patients of chronic rhinosinusitis. Indian J Otolaryngol Head Neck Surg. 2014;66(2):187-190.
14. Grymer L, Illum P, Hilberg O. Septoplasty and compensatory inferior turbinate hypertrophy: A randomized study evaluated by acoustic rhinometry. J Laryngol Otol. 1993;107(5):413-417.
15. Akoglu E, *et al*. Evaluation of the turbinate hypertrophy

by computed tomography in patients with deviated nasal septum. Otolaryngol Head Neck Surg. 2007;136(3):380-384.

How to Cite This Article
Abdulkhaleq NA, Mahdi MB. Computerized tomography scan evaluation of nasal abnormalities including nasal septal deviation angle and turbinate hypertrophy in patients referred for rhinoplasty. International Journal of Radiology and Diagnostic Imaging. 2024;7(4):39-42.