

Computed Tomography (CT) Unveils Associated Pathology of Deviated Nasal Septum

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Abstract

Background and Objective: Computed Tomography (CT) is the workhorse in the nose and paranasal sinus imaging and depicts not only the complex three-dimensional anatomy, but also the extent of disease and the wide range of anatomic normal variations that are of great importance to the endoscopic septal and sinus surgery. Nasal obstruction is the most frequent presentation to the otolaryngologist all over the world with septal deviation. Septoplasty is the common surgical procedure performed in nasal septal deviation. Physical examination, anterior rhinoscopy (AR) and nasal endoscopy (NE) are considered the gold standard tools to detect septal deviation. This study aimed to find out septal deviation with associated pathologies of nose and paranasal sinuses by using CT scan.

Patients and Methods: 188 patients of nasal septal deviation were selected from 2015 to 2019. Age ranged in between 10 year to 70 year of age. CT scanning in both coronal, axial and sagittal sections had been done in all patients after proper history taking, physical examination, anterior rhinoscopy and nasal endoscopy. Endoscopic septoplasty alone and/or other ancillary procedures were performed in all 188 patients under general anesthesia.

Results: Amongst 188 patients, male was 126 (67 %) and female was 62 (33 %) with a ratio 2:1. Maximum 63 (34 %) reported in 31 to 40 year and 54 (29 %) was found in 21 to 31 year of age. Hypertrophied inferior turbinate (HIT) 74 (39 %) and 54 (29 %) concha bullosa (CB) were associated with 188 septal deviation. Associated pathologies like maxillary sinusitis 82 (44 %) and maxillary antral cyst 78 (41 %) were documented.

Conclusion: CT scanning detects the abnormal anatomic variants and associated sinonasal pathologies along with nasal septal deviation. Endoscopic septoplasty and complete surgical clearance of the sinonasal pathologies can give the patient a long-term benefit.

Keywords: CT; Nasal septal deviation; Associated pathologies; Endoscopic septoplasty; Benefit

1. Introduction

Computed Tomography (CT) is the workhorse in the nose and paranasal sinus imaging and depicts not only the complex three-dimensional anatomy, but also the extent of disease and the wide range of anatomic normal variations that are of great importance to the endoscopic septal and sinus surgery. Septoplasty is the common surgical procedure performed in nasal septal deviation. Nasal obstruction is the most frequent presentation to the otolaryngologist all over the world with septal deviation. Patients usually presented with headache, facial pain, epistaxis, snoring, obstructive sleep apnea (OSA), ophthalmological, otological, upper and lower respiratory tract infections; and many more.

Coronal CT reveals nasal septal deviation by measuring a distance from the midline above to the nasal floor [1]. There are some anatomical variants of the structures in the nasal cavities responsible for nasal obstruction such as hypertrophied inferior turbinate (HIT), concha bullosa (CB) and other pathologies in the paranasal sinuses namely chronic rhinosinusitis (CRS), nasal polyps, mucocele, mucous retention cyst in the paranasal sinus, tumors, adenoid hypertrophy and many more may be associated with septal deviation. Physical examination, anterior rhinoscopy (AR) and nasal endoscopy (NE) are considered the “gold standard” to evaluate septal deviation [2] and primarily used in the diagnosis of the nose and paranasal sinus diseases. These examination tools have definite limitations to finding the high and posterior deviations as well as the septal pneumatization which contribute for nasal obstruction. Septal deviation is usually associated with compensatory HIT and CB/ paradoxical middle turbinate (PMT). The association of HIT or CB/PMT is not only caused by mucosal hypertrophy, but also by hypertrophy of the inferior and middle turbinate bone [3]. The contribution of preoperative CT scanning helps to detect those anatomical septal and turbinate variants; and is invaluable in the evaluation of nose and paranasal sinus diseases for its subsequent and effective management [4] with a view to achieve a durable or permanent functional outcome. There is a debate in the use of CT in the septal surgery where the costs and radiation hazards of CT is used to be considered as an initial additional burden [5]. In this study it has been shown that correction of other variants and pathologies along with septal surgery at the same sitting give rise to a long-term benefit to the patient that prevent second surgery indeed. With the introduction of CBCT in the Head-neck region and in oral-maxillofacial/dentistry, the costs and harmful effects of radiation has reduced to a great extent [6].

The use of endoscope in septal surgery has significantly changed the concepts of septal surgery. The advent of nasal endoscope has revolutionized the diagnosis and treatment modalities of nose and paranasal sinus diseases and has widened the horizon of rhinology [7,8]. Lanza et al and H. Stammberger initially described the application of endoscopic technique for the correction of septal deformity in 1991 [9]. Nasal endoscope has the advantage to deal in complex deformities particularly high and posterior septal deviation resulting better septal correction and thus is gaining its popularity. Endoscope also aids in limited septal resection and removes ancillary sinonasal abnormalities thus more patient benefit is achieved [10,11]. The aim of this study is to evaluate the contribution of preoperative computed tomography (CT) scanning in endoscopic septoplasty.

2. Patient and Methods

The study was conducted on 188 patients of nasal septal deviation in Bangladesh Medical College and Popular Medical College Specialized Hospitals from 2015 to 2019. Physical examination, anterior rhinoscopic and diagnostic nasal endoscopic examination were done in all patients after taking proper history in the ENT outpatient department. 188 patients were presented with different types of septal deviation. Preoperative CT scanning both coronal, axial and sagittal view with 3 mm section was taken in all 188. Endoscopic septoplasty was done in all 188 patients under general anesthesia. The patient who needed ancillary procedures with endoscopic septoplasty was recorded. Their ages ranged between 10 to 70 years; male was 126 and female 62 respectively.

2.1 Inclusion criteria

- A prospective, longitudinal, non-randomized study.
- Obtained informed consent from all patients prior to their inclusion in the study.
- Nasal septal deviation without sinonasal pathology.
- CT scans of nose and paranasal sinuses with 3 mm cut in coronal, axial and sagittal plane with bone window settings.

2.2 Exclusion criteria

- Patients suffering from rhinosinusitis or nasal polyp, granulomatous diseases of the nose, allergic rhinitis or nasal masses, or with a past history of nasal surgery.

3. Results

In this study maximum patients 35% reported in between 31 to 40 year of age followed by 21 to 31 year (TABLE 1).

TABLE 1. Age Distribution.

Age in Years	No. of Patients	%
10-20	12	07
21-30	54	29
31-40	63	34
41-50	26	15
51-60	18	11
61-70	06	04

Amongst 168 patients 69% belonged to male and female was 31% which is represented in TABLE 2.

TABLE 2. Sex Distribution.

Sex	No. of Patients	%
Male	126	67
Female	62	33

CT scanning was done in all 168, amongst them HIT 32%, CB/PMT 29% and posterior deviation 14% shown in TABLE 3.

TABLE 3. CT Finding - Anatomical Variants with Septal Deviation (No168).

Anatomical variants	No. of Patients	%
Hypertrophied Inferior Turbinate(HIT)	74	39
Concha Bullosa (CB)/Paradoxical Middle Turbinate (PMT)	54	29
High Deviation	08	05
Posterior Deviation	24	14
Septal Pneumatization	16	10

TABLE 4. CT Finding - Associated Sinonasal and other Pathologies.

Pathologies	No. of Patients	%
Maxillary Sinusitis	82	44
Frontal Sinusitis	24	14
Maxillary Cyst	78	41
Otitis Media with Effusion	34	20
Chronic Otitis Media	45	27

4. Discussion

Nasal obstruction is the most frequent presentation to the otolaryngologist all over the world and septoplasty is the commonly performed procedure. The use of endoscope in septal surgery has significantly changed the concepts of septal surgery. Patients usually reported with the complaints of headache, facial pain, snoring, obstructive sleep apnea (OSA), otological and orbital symptoms, upper and lower respiratory tract manifestations; and many more. Physical examination with anterior rhinoscopy and nasal endoscopy was considered the gold standard for detecting septal deviation. Computed tomography (CT) can also be used to evaluate the deviated nasal septum, anatomical variants of the other nasal components and unveils the associated sinonasal diseases [12-14]. The basic objective of endoscopic septoplasty is to alleviate the clinical manifestations caused by septal deviation and its effects off; and to treat other ancillary pathologies.

The contribution of preoperative CT prior to endoscopic septoplasty proved definitive functional outcome that has been aptly highlighted in this study. Although its role in the deviated nasal septum is debatable; while some studies have shown that it is unnecessary for the diagnosis and management of deviated septum [5]. Another group of study opined that it significantly influences the surgical management. These observations drew different results and opinion observed in the literature review subjecting computed tomography, septal deviation and septoplasty. Although it has been aptly emphasized that CT is the “gold standard” in the diagnosis of sinonasal pathologies but opinion differs in the evaluation of septal deviation [5].

CT possess costs and radiation hazards that would be an initial additional burden in septal surgery but the added advantages were correction of other variants and pathologies at the same sitting which give rise to a long-term benefit that prevent second surgery. With the introduction of CBCT in the Head-neck region and in oral-maxillofacial/dentistry, the costs and harmful effects of radiation has reduced to a great extent [6].

Hypertrophied inferior turbinate (39%) was found in this small series, it become evident that the bony deformity along with the mucosal hypertrophy in the contralateral side of septal deviation which corresponds most of the published literature [14,15]. Preoperative CT was useful as a deciding factor on the surgical technique of turbinate treatment.

Physical examination, anterior rhinoscopy and nasal endoscopy are the hall mark to discover most of the nasal pathologies with certain limitation in the finding of CB/PMT in its entire length and extension of the mucous hypertrophy and bony overgrowth which was clearly evident on coronal and axial CT [16]. The mucosal and bony structures of the middle turbinate and the angle of the septum were assessed using radiological analysis before septoplasty to have good result that was documented in this study.

Over the years, OSA is the burning issue round the globe and nasal septal deviation is one of the major causes. It is responsible only when it is markedly deviated that become found easily on conventional otolaryngological examination. High septal deviation is very difficult to recognize that become the responsible factor for nasal obstructed nasal breathing which was evident in 08 patients on CT scanning. The high deviation of the septum also narrows the frontal recess resulting frontal sinusitis leading to headache [11]. Posterior deviation and septal pneumatization are clearly revealed in computed tomography. Correction of the particular areas with septal surgery alleviated symptoms completely in this series.

Physical examination, AR and NE practically unable to visualize the posterior areas of the nasal cavities in the grossly deviated nasal septum or septal spur. CT scanning is such a modality of investigation which provides details to the otolaryngologists / radiologists that could not be seen on regular physical examination. Thus, CT has the advantages to see the ostiomeatal complex with unveiling of the paranasal sinus condition [17,18]. In this series, maxillary sinusitis was found in 62 patients and showed significant other sinus diseases that needed septoplasty and functional endoscopic sinus surgery (FESS) with septoplasty.

The association of otitis media with nasal septal deviation has been found on CT scanning; and in our series otitis media with effusion and otitis media were ancillary findings. The patients had been treated septal correction and myringotomy with a remarkable result. Chronic otitis media was also given special attention with septoplasty. It has been explained that deviation of the nasal septum interferes Eustachian tube function that changes the middle ear pressure and affects pneumatization of the mastoid [19,20]. CT has the advantages to explore the mastoid, septum and nasopharynx [21,22].

5. Conclusion

CT scanning detects the abnormal anatomic variants and associated sinonasal pathologies along with nasal septal deviation. Endoscopic septoplasty and complete surgical clearance of the sinonasal pathologies can give the patient a long-term benefit. Although it has certain costs and radiation hazards but with the addition of CBCT in the head neck and oral maxillofacial

surgery draws special attention to minimize costs at a very reasonable level and reduce radiation hazards to an extreme low to that of computed tomography.

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