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Endoscopic Assessment of The Nasal Anatomical Variations Inadult Patientswith Chronic Rhinosinusitis In Sokoto Nigeria.

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Abstract
Introduction
Chronic rhinosinusitis (CRS) is of varied etiology, anatomic and physiological variations may play significant rolesin its aetiopathogenesis. Use of nasal Endoscopes and Computerised Tomographic scanshave improved both the diagnostic and therapeutic management of CRS. Most centres in sub-Saharan Africa rely on less detailedmethods in clinical evaluation without the use of endoscopes and Computerised Tomographic scans which have been proven to be indispensable tools in CRS management. Several studies in many parts of the world have given different results on the role of the nasal anatomical variations in causing CRS; this study will provide an idea on the role of these variations in CRS in this sub region.
Objectives*: To assess the nasal anatomical variations in adults with CRS using nasal endoscopy and to ascertain if these variations predispose to CRS.*
Materials and Method*: The study was a prospective hospital-based study. Patients with CRS were recruited consecutively from the Ear Nose and Throat (ENT) department and the general outpatient unit of UsmanuDanfodiyo University Teaching Hospital (UDUTH), Sokoto. Controls consisting of individuals without CRS symptoms were matched in a 1:1 ratio. Nasal endoscopy was done for all participants following the standard passes. Data was analysed with SPSS version 20.*
Results*: A total of 132 patients, with an equal number of controls were recruited. Patients age ranged between 18 to 68 (mean of 31.9) years,with male to female ratio of 1.1: 1, with that of controls ranging 18 to 59 (mean of 30.6) years, and a male to female ratio of 1.2:1. Nasal septal deviation/spur was the most common nasal anatomical variation, in 57 (43.2%) patients, followed by concha bullosa, in 24 (18.2%) patients, large bulla ethmoidalis, in 23 (17.4%) patients, and paradoxically curved middle turbinate, in 14 (10.6%) patients. CRS was significantly associated with nasal septal deviation (P=0.01), concha bullosa(P=0.001), and paradoxically curved middle concha (P=0.001). There was no significant association between CRS and large bulla ethmoidalis air cells (P= 1.0).*
Conclusion*: In this study, 43.2% of the study population had nasal septal deviation, 18.2% had concha bullosa, and 10.6% had paradoxically curved middle turbinate which predispose to CRS.*
Keywords*:Nasal Anatomical Variations, Chronic rhinosinusitis, Nasal endoscopy, Sokoto.*

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I. Introduction

Rhinitis and sinusitis usually coexist and are concurrent in most individuals; therefore the terminology 'rhinosinusitis' is better used.[1-5] Rhinosinusitis is the inflammation of the mucosa of the nose and paranasal sinuses. It is a common clinical condition which affects more than 16% of the adult population annually in USA.[6] The diagnosis of rhinosinusitis is made by wide variety of practitioners, including Allergologists, Otolaryngologists, Pulmonologists, Primary Care Physicians, Paediatricians, and many others.Currently, aetiological studies of sinusitis are increasingly focusing on Ostio-meatal Complex (OMC) obstruction, allergy, polyps, occult and subtle immunodeficiency status and dental diseases. Microorganisms are more often recognized as secondary invaders. Any disease process or toxin that affects cilia has a negative effect on CRS.[30]

Variations in the anatomy of the structure of the lateral nasal wall, e.g. oversized bulla ethmoidalis air cells, paradoxically curved middle conchae, concha bullosa of the middle conchae, or so called 'compensatory hypertrophy' of the inferior concha into a congenital concavity of the nasal septum, may all cause nasal obstruction or impair sinus ventilation and drainage.In this study we assessed the nasal anatomical variations amongst participants using rigid nasal endoscopy and related these variations with CRS.

Objective

To assess the nasal anatomical variations in adults with CRS using nasal endoscopy and to ascertain if these variations predispose to CRS.

II. Materials and Method

The study was a prospective hospital-based study. Patients 18 years and abovewith CRS diagnosed according to the European Position Paper on Sinusitis (EP^3OS 2012), were recruited consecutively from the Ear Nose and Throat (ENT) department and the general outpatient unit of UsmanuDanfodiyo University Teaching Hospital (UDUTH), Sokoto. Controls consisting of individuals without CRS symptoms were matched in a 1:1 ratio. Patients not meeting the diagnostic criteria or not willing to be part of the study were excluded, participants with bleeding diathesis or previous nasal surgeries were also excluded. All participants had a full ENT examination after a proper nasal preparation using cotton balls soaked in 2% xylocain with 1: 200,000 dilution of adrenaline solution. These soaked cotton balls were placed in three positions: nasal floor, between nasal septum and inferior turbinate, and towards the middle turbinate and allowed for 10 minutes. Nasal endoscopy was done for all participants following the standard passes. Evidence of CRS and any nasal anatomical variations were documented for each nasal cavity. Data was analysed with SPSS version 20.

III. Results

A total of 132 patients, with an equal number of controls were recruited. The patients' age range was 18 to 68 (mean of 31.9 ± 9.9) years. Control group had age range of 18 to 59 (mean of 30.6± 10.1) years. The age group 18-27 years was in the majority in both study and control groups (Table 1).

TABLE 1: Age Distribution Of Paricipants (Years)

Age group (years)	Frequency (Percentage)	
	Patients	**Controls**
18-27	51 (38.6)	58 (43.9)
28-37	49 (37.1)	43 (32.6)
38-47	20 (15.2)	23 (17.4)
48-57	9 (6.8)	5 (3.8)
58-67	2 (1.5)	3 (2.3)
68-77	1 (0.8)	0 (0.0)
Total	132 (100.0)	132 (100.0)

Mean age 31.9 ± 9.9 30.6 ± 10.1

Nasal endoscopic findings of participants; anatomical variations:

Nasal septal deviation/spur was the most common nasal anatomical variation, in 57 (43.2%) patients, followed by concha bullosa of the middle concha, in 24 (18.2%) patients, large bulla ethmoidalis, in 23 (17.4%) patients, and paradoxically curved middle turbinate, in 14 (10.6%) patients. The nasal anatomical variations were less common among the control group (Fig. 1).

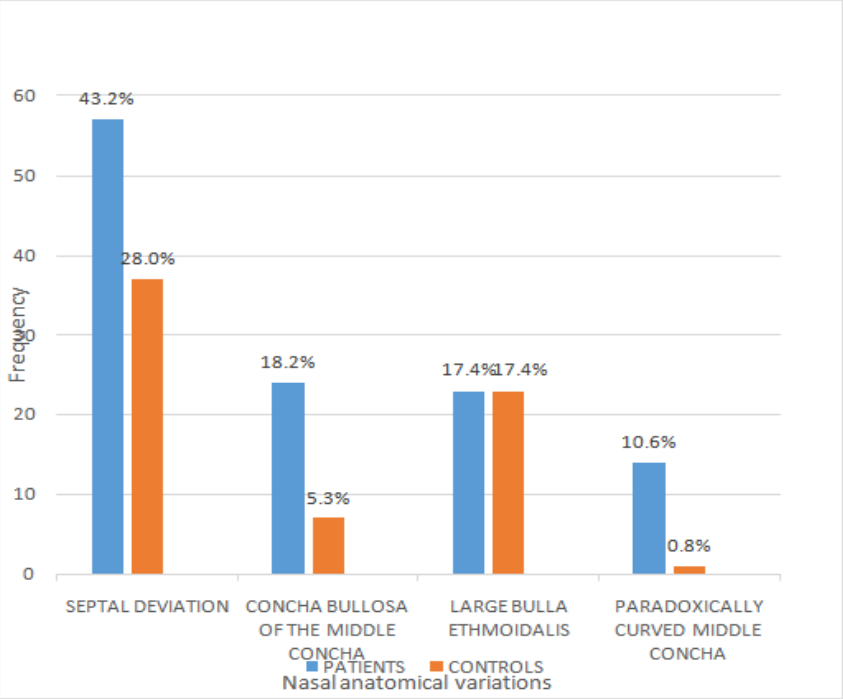

FIGURE 1: NASAL ANATOMICAL VARIATIONS IN PARTICIPANTS

CRS had statistically significant association with nasal septal deviation (P= 0.01), concha bullosa of the middle concha (P= 0.001), and paradoxically curved middle concha (P= 0.001). No significant association was noted between CRS and large bulla ethmoidalis air cells (P= 1.0) (Tables 2).

TABLE 2: Association Between Crs And Nasal Anatomical Variations

Variables	Patients	Controls	X^2	P- Value
Nasal septal deviation	57	37	6.608	0.010*
Concha bullosa of middle concha	24	7	10.563	0.001*
Large bulla ethmoidalis air cells	23	23	0.000	1.000
Paradoxically curved middle concha	14	1	11.945	0.001*

*Significant

IV. Discussion

Anatomical variations of the nasal andparanasal sinus structures may predispose patients to CRS.[42] However, the relative importance of anatomical variations has been a matter of discussion and variable results have been reported.[60]The role of nasal anatomical variations in the pathogenesis of CRS can be evaluated by comparing the prevalence of the variations between CRS patients and individuals without CRS.In this study, there were statistically significant associations between CRS and nasal septal deviation (P= 0.01), concha bullosa of the middle concha (P= 0.001), and paradoxically curved middle concha (P= 0.001). No statistically significant association was noted with large bulla ethmoidalis air cells (P= 1.000). A similar result was seen in a study by Shelkaret al.that showed that septal spur/deviation was the commonest nasal anatomical variation seen on nasal endoscopy in CRS patients, with a 45.5% prevalence, followed by concha bullosa, 31.8%.[61] Srivastava et al. in their study, revealed the most common nasal anatomical variation seen on nasal endoscopy to be deviated nasal septum (83.5%), followed by paradoxically curved middle turbinate (42.5%), and concha bullosa of the middle concha (26.5%). They also reported accessory middle turbinate in 3.5% of the patients with CRS.[62]Bist et al. found that the nasal anatomical variations in the CRS group were significantly higher than in the control group. They noted the most common atypical anatomical presentation to be atypical aggernasi (P= 0.0001), concha bullosa of the middle concha (P= 0.0809), medially projected uncinated process (P= 0.0001), and sausage shaped ethmoidal bulla (P= 0.0001).[63]

Though Functional Endoscopic Sinus Surgery (FESS) is a standard procedure in CRS patients with failed medical treatment, the established statistically significant relationship between some nasal anatomical variations and CRS may allow for some other surgical interventions to prevent recurrence after successful treatment. Septoplasty (for significant septal deviation), turbinoplasty or conchotomy for concha bullosa of the middle concha and paradoxically curved middle concha, may be considered alongside with FESS in patients having significant nasal anatomical variations, and having failed medical treatment for CRS.

Several other studies however did not show any statistically significant association between CRS and nasal anatomical variations, and suggested that local, systemic, environmental factors or intrinsic mucosal disease were more significant in the pathogenesis of CRS.[64-66] Therefore, more studies to establish the role of nasal anatomical variations as risk factors for CRS should be encouraged in this sub region.

V. Conclusion

In this study, it was found that 43.2% of the study population had nasal septal deviation, 18.2% had concha bullosa, and 10.6% had paradoxically curved middle turbinate which predispose to CRS.

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Conflict of interest
No conflict of interest.

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