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Research Article

### STUDY OF ANATOMICAL VARIATIONS OF LATERAL WALL OF NOSE BY ENDOSCOPE

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#### ABSTRACT

Endoscopic examination of lateral wall of nose is usually required prior to endoscopic surgery on lateral wall of nose & paranasal sinuses. It demonstrates both the extent of disease(s) & anatomical variations that predispose to diseases & iatrogenic damage of nearby vital structure can be avoided. We conducted this study at Department of anatomy, Al-Ameen Medical College, Bijapur between March 2013 to December 2013. Adult 75 patients suffering with disease of sinuses & lateral wall of nose were included. Our study showed middle turbinate variation in 49.32% of lateral wall of nose [concha bullosa 30.66%, paradoxically curved middle turbinate 18.66%], large bulla ethmoidalis in 17.33% & accessory maxillary sinus ostium in 13.33% of lateral wall of nose. We came across concha bullosa as common variation. 82.62% of concha bullosa & 53% paradoxically curved middle turbinate gave rise to disease of sinuses which were statistically significant & 6 1% of large bulla & 50% of accessory ostia presented with diseases of sinuses which is statistically non significant.

**Keywords:** Lateral wall of nose, Nasal Endoscopy, Anatomical variations, Clinical significance.

#### INTRODUCTION

Chronic sinusitis with its classical symptoms of nasal obstruction, nasal discharge (anterior or posterior), headache, facial pains and abnormalities of smell is the most common disease for which consultation of otolaryngologist is sought. The approach to the evaluation and management of chronic sinusitis changed after Messerklinger published the first comprehensive account of technique of nasal endoscopy and its application to the diagnosis & treatment of sinonasal disease. Disruption of the mucociliary clearance due to anatomical variation & mucosal disease of osteo-meatal complex is considered to be prime factor for chronicity of sinusitis. Endoscopic surgery addresses these anatomical variations & mucosal diseases & restores normal physiology of para-nasal sinuses. Subtle anatomical variations of middle turbinate, bulla ethmoidalis & maxillary sinus ostium can now be better visualised with clarity along with mucosal & polypoidal changes in sinuses. It correlates closely with surgical orientation for the valuation for sino nasal tract in all patients with inflammatory disease who are endoscopic surgical candidates.

The two cardinal factors in the maintenance of normal physiology of sinuses & their mucus membrane are ventilation & drainage. Normal drainage of sinuses depends, on the condition of sinus ostium<sup>1</sup>. Mucus transport from the sinuses to nose is greatly enhanced by unimpeded nasal air flow creating negative pressure in the nasal cavity during inspiration. The secretions of various sinuses don't reach their respective ostia randomly, but by definite pathway which seems to be genetically determined<sup>2</sup>. The two of the largest sinuses, the frontal & maxillary communicate with middle meatus via narrow & delicate prechamber. In each of these prechamber, mucosal surfaces are closely apposed, such that mucus can be readily cleared away by an effective ciliary action. However when surfaces become more closely apposed due to mucosal swelling, the ciliary action is immobilised. This impairs the ventilation & drainage of sinuses, results in mucus stasis & infection<sup>2</sup>.

There are numerous narrow cleft in lateral wall of nose, many anatomical variations that can easily narrow these clefts & thus predispose to recurring infection<sup>3</sup>. Incidence with which the anatomical variations are seen in a normal population is less frequent than in those individuals with chronic sinusitis<sup>6</sup>.

Keeping these things in mind, the present study in patient with chronic diseases of nose & para nasal sinuses was conducted.

**MATERIALS AND METHODS**

The present study was conducted at Dept of anatomy, Al-Ameen Medical College Bijapur. The data was collected from the Dept of ENT, Al- Ameen Medical College & Hospital. Patients included in study were suffering from at least three of five symptoms mentioned below for more than three months & not responding to medical line of treatment. Treatment failures were those who were receiving treatments for past six months & suffering from following symptoms.

1. Nasal obstruction
2. Headache & facial pain
3. Running nose
4. Nasal bleeding
5. Smell disorder

All patients underwent diagnostic nasal endoscopy under topical anaesthesia (10% Xylocaine spray) after informed written consent. Nasal endoscopes used for procedure were, KARL-STORZ Germany, 0 and 30 degree with 4mm diameter with cold light source.

**RESULTS**

Average age at time of examination was 32.10 yrs. Nasal obstruction was main symptom (42.66%), headache & facial pain (34.66%), running nose (29.33%) and nasal bleeding (4%). Among the various anatomical variations seen (Table No 1), concha bullosa was the commonest 46 (30.66%) of total 150 lateral walls [U/L 28 (18.66%) & B/L 18 (12%) ], Bulla ethmoidalis were seen in 26 (17.33%) of total lateral walls [ U/L 16 (10.66%) & B/L 10 (6.66%) ], Paradoxical middle turbinate were seen in 28 (18.66%) of total lateral walls [ U/L 14 (9.33%) & B/L 14 (9.33%) ] and Accessory maxillary sinus ostium in 20 (13.33%) of total lateral walls [ U/L 16 (10.66%) &B/L 04 (2.66%) ], 38 concha bullosa (82.60%) presented with nasal obstruction [U/L 26 (56.52%) and B/L 12 (26.08%) ]. 15 paradoxically curved middle turbinate (53%) presented with disease of maxillary sinus [U/L (13 (46.42%) and B/L 02 (7.14%) ], 16 (61%) of enlarged bulla ethmoidalis presented with headache and facial pains [ U/L (10 (38.46%) and B/L 06 (23.7%) ]. 10 (50%) of accessory maxillary sinus ostia presented with diseases of maxillary sinus [U/L 08 (40%) and B/L 02 (10%) ]

**Table 1: Incidence of Anatomical Variations**

Anatomical variations	Total lateral walls of nasal cavity 150	Percentage	Unilateral		Bilateral	
			Number	%	Number	%
CB	46	30.66	28	18.66	18	12
PA	28	18.66	14	9.33	14	9.33
BE	26	17.33	16	10.66	10	6.66
AMO	20	13.33	16	10.66	4	2.66
ST	-	-	-	-	-	-

CB –concha bullosa, PA-paradoxical middle turbinate, BE-enlarged bulla ethmoidalis, AMO- accessory maxillary sinus ostium, ST-supreme turbinate

**Table 2: Correlation Between Variation & Symptoms**

Variation & symptoms	Number	Percentage	Unilateral		Bilateral	
			Number	Percentage	Number	Percentage
CB with symptoms	38/46	82.60	26	56.52	12	26.08
CB without symptoms	08/46	17.40	---	---	---	---
PA with symptoms	15/28	53	13	46.42	02	7.14
PA without symptoms	13/28	47	---	---	---	---
BE with symptoms	16/26	61	10	38.46	6	23.03
BE without symptoms	10/26	31	---	---	---	---
AMSO with symptoms	10/20	50	8	40	2	10
AMSO without symptoms	10/20	50	---	---	---	---

**DISCUSSION**

Even though nasal anatomy varies significantly from patients to patients, there are some variation that occur repeatedly within the population. Certain variations are thought to be predisposing factor for sino-nasal disease and operative complications. Keeping this fact in mind, the present study was conducted in the Department of Anatomy at Al- Ameen Medical College, Bijapur. Typical middle turbinate is said to have convex medial surface and concave lateral surface with

smooth curvature with no obstruction to middle meatus and adequate space between turbinate & septum. Commonest variation seen in our study was variation of middle Turbinate being 49.32%.

**CONCHA BULLOSA**

In the variations of middle turbinate, concha bullosa is the commonest variation we came across in our study, being 30.66% [U/L 18.66% & B/L 12%]. Presence of concha bullosa is normal variation and does not suggest a pathological

finding. However against the backdrop of chronic sinus disease, resection of it is considered to improve the access of sinuses. Many factors are responsible for wide range of prevalence concha bullosa. Attempts to determine general prevalence of this variation have been characterised by use of

diverse study population, different criteria of pneumatization and analytic methods. In our study majority of concha bullosa 38 out of 46 (82.60%) presented with nasal obstruction, headache, facial pain due to sinusitis [U/L (56.52%) and B/L (26.08)] with **p value <0.05** which is statistically significant.

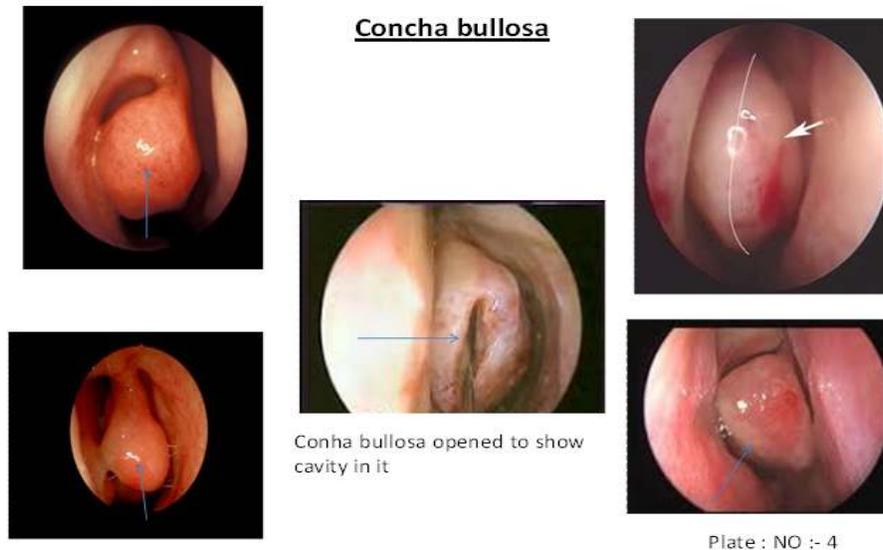


Figure 1: Concha bullosa

**PARADOXICAL MIDDLE TURBINATE**

A middle turbinate which is distorted such that convex surface faces towards meatus, is in itself is not pathological. But can contribute to sever narrowing of middle meatus if associated mucosal derangement is also present. We found paradoxical turbinate in 18, 66% of total lateral walls [U/L 14 (9.33%) and B/L 14 (9.33%)] 15 (53%) of paradoxical middle turbinate

presented with diseases of maxillary sinuses [U/L 13(46.72%) and B/L 2 (7.14%)] with **p value, 0.01** which is statistically significant. However Llyod<sup>5</sup> reported no correlation between variant and increased incidence of asymptomatic sinusitis and Colhoun<sup>6</sup> found no statistical correlation between variant and sinusitis.

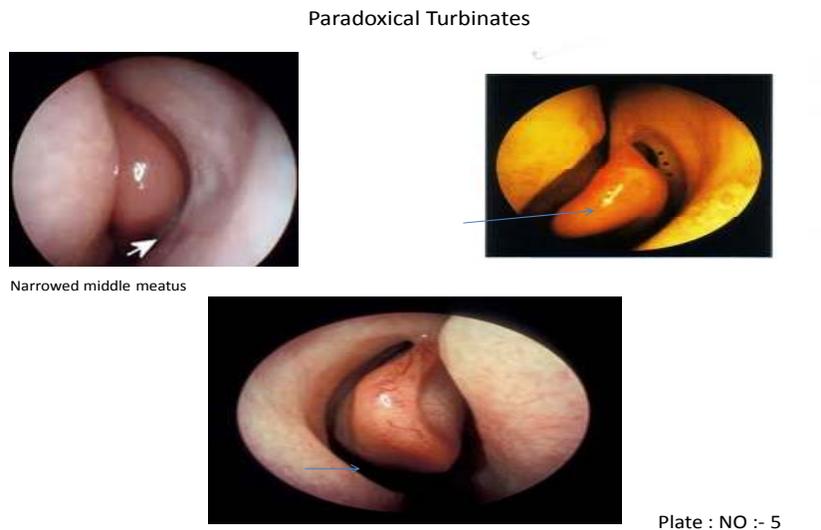


Figure 2: Paradoxical turbinate

**BULLA ETHAMOIDALIS**

Enlarged bulla ethamoidalis is defined as one that contacts or extends beyond the free margin of uncinat process and middle turbinate. This can result in narrowing of middle meatus and initiates the disease in middle meatus. In our

observation 16 out of 26 presented with diseases of paranasal sinuses [U/L 10 (38.46%) and B/L 6 (23.07%)] in the form of nasal polyps an mucopus in middle meatus with **p value >0.1** which is statistically non significant.

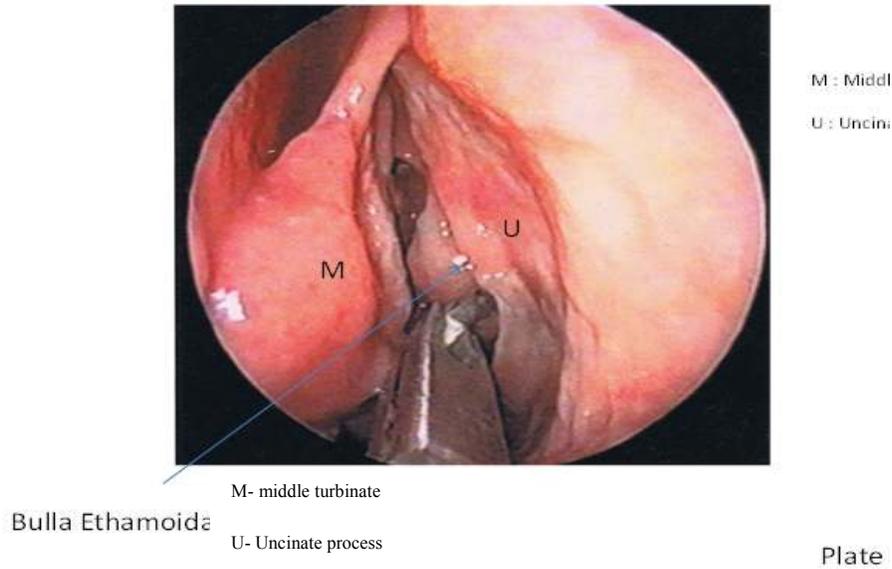


Figure 3: Bulla Ethmoidalis

**ACCESSORY MAXILLARY OSTIUM:**

It is present in anterior and posterior nasal fontanellae. In our study accessory maxillary ostia seen in 20 (13.33%) out of 150 lateral walls [U/L 16(10.66%) and B/L 04 (2.66%). 50% of maxillary sinuses were still diseased, in spite of having accessory ostia with **p value >0.05** which is statistically not significant. It proves that accessory ostia may not have prophylactic role in maxillary sinus disease is concerned.

Although some authors claim that accessory ostia develop following acute maxillary sinusitis, it is not clear whether they are congenital or acquired<sup>7</sup>. The frequency of accessory sinus ostia has been estimated between 4 to 50 percent in the findings of studies designed for other purposes<sup>8</sup>. The accessory ostia when present are more advantageously placed than natural ostium. Little drainage that occurs in such cases is due to effect of gravity and not due to ciliary effect<sup>9</sup>.

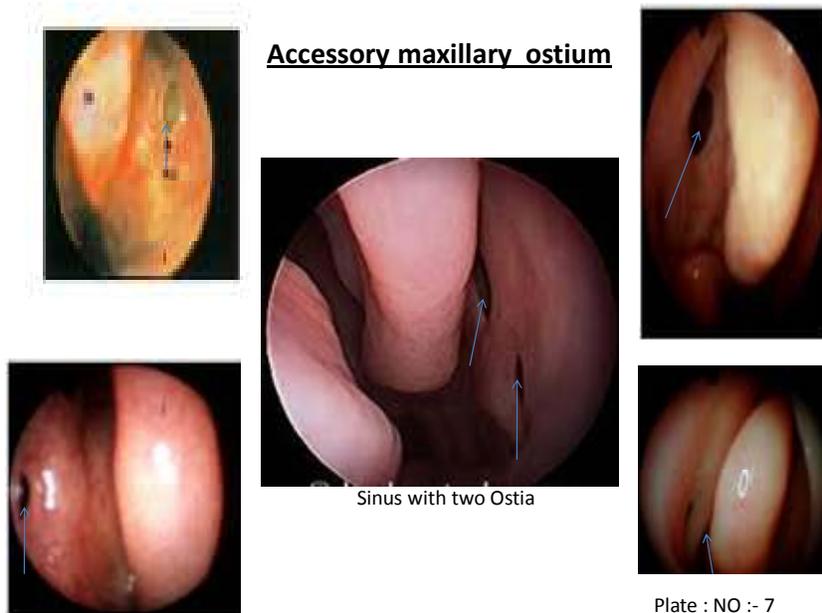


Figure 4: Accessory maxillary ostium

**CONCLUSION**

Most of patients in our study presented with nasal obstruction and had enlarged middle turbinate (concha bullosa). Concha

bullosa and bulla ethmoidalis are more prone for predisposing the diseases of paranasal sinuses, as compared to paradoxically curved middle turbinate and accessory maxillary sinus ostium.

Preoperative detection of various anatomical variations is essential as it significantly influences the selection of surgical technique and also helps in avoiding complications. Radiologists also should be aware of accessory maxillary sinus ostium as it can appear as communication between maxillary sinus and nasal cavity on sinus imaging examination.

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