Polish Annals of Medicine

journal homepage: https://www.paom.pl

Original article

Anatomical variations of nose causing rhinogenic contact point headache – a study at a tertiary care hospital of eastern India

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ARTICLE INFO

Article history
Received 1 February 2017
Accepted 18 August 2017
Available online 1 March 2018

Keywords
Anatomical variations
Nose
Contact point headache
Computed tomography

Doi
10.29089/2017.17.00022

ABSTRACT

Introduction: Headache is a common complaint presented by the patients in daily clinical practice. Anatomical variation of the nose may lead to headache due to contact of nasal mucosa.

Aim: The aim of this study is to find out the role of different types of anatomical variations of the nose causing contact point headache in a tertiary care hospital.

Material and methods: 108 patients of headache with anatomical variations of nose were studied within period of three years. Careful evaluations of anatomical variations of the nose were done with the help of diagnostic nasal endoscopy and CT scan in chronic headache. These anatomical variations were treated surgically. Data from this group were analyzed.

Results and discussion: Among 108 patient of rhinogenic contact point headache, nine distinct types of anatomical variations were seen. Different anatomical variations like septal deviation (35.18%), septal spur (26.85%), middle turbinate concha bullosa (23.14%), hypertrophied inferior turbinate (10.85%), medialized middle turbinate (0.92%), large bulla ethmoidalis (1.85%) and septal bullosa (0.92%) were found in patients with contact point headache. All were treated surgically. Treatment of each anatomical contact point was personalized for every patient.

Conclusions: Headache is a common clinical entity and is nearly universal in the course of everyone's life. Pressure of two opposing mucosa in the nasal cavity without evidence of inflammation can be a cause of headache or facial pain. There are different anatomical situations leading to rhinogenic contact point headache where each contact point has its own characteristic.

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1. INTRODUCTION

Headache is a common complaint by the patients in day to day clinical practice and creates a distressing situation for both patient and the physician. There are myriads of causes for headache varying from simple tension headache, migraine, refractory errors in eye, brain tumours, temperomandibular joint arthralgia, myofacial spasm. It needs a multidisplinary approach to diagnose the causative factors for headache.

Often the rhinogenic cause of headache is undiagnosed, even this cause is not suspected on preliminary evaluation. Even without presence of sinusitis, the referred headache often due to pressure on the nasal mucosa because of the anatomical variations in the nose.[1]

Contact point headache is a new type of headache in the international classification of headache disorders (ICHD), supported by limited evidence. Rhinogenic contact point headache (RCPH) is defined as intermittent pain localized in the periorbital and medial canthal or temporozygomatic regions; evidence of mucosal contact points with postural movements; cessation of headache within 5 minutes following topical use of local anesthesia at contact area and significantly resolution of headache in less than 7 days following removal of contact points.[2]

Intranasal contact points denotes to a contact between two opposing intranasal mucosal surfaces. Intranasal contact points are present in about 4% of noses.[3] Stammberger and Wolf documented the role of substance P in RCPH. They also described that this kind of headache is not only due to abnormal middle turbinate but by abnormal mucosal contact causing referral pain.[4]

This study demonstrates the role of anatomical variations in nose leading to headache, which is a prudent evaluation with inclusion and exclusion criteria before accurate diagnosis of rhinogenic cause of headache.

2. AIM

The aim of this study is to assess the role of different types of anatomical variations of the nose causing contact point headache in a tertiary care teaching hospital.

3. MATERIAL AND METHODS

A prospective cross sectional study was carried out in the department of otorhinolaryngology in a tertiary care hospital of eastern India from January 2013 to February 2016. During this period, 108 patients with headache were evaluated clinically and radiologically having anatomical variations in the nose. Detailed history taking, clinical and systemic examinations were done to rule out migraine, tension headache, neurologic causes, hypertension, temporomandibular joint disorders, inflammatory causes like sinusitis, ophthalmic causes like refractory errors, glaucoma and gynecological causes like premenstrual syndrome causes of headache.

All patients were undergone diagnostic nasal endoscopy using 0° and 30° rigid nasal endoscopes. Diagnostic nasal endoscopy was performed using the standard three pass technique for obtaining information for anatomical variations of the nose. All patients with headache were evaluated with CT scan of nose and sinus and by diagnostic nasal endoscopy. Patients with previous sinonasal surgery, acute sinusitis or nasal allergy or malignant lesions of the nose and sinuses were also excluded from this study by clinical examination and CT scan.

The severity of headache was assessed by using a visual analogue score (VAS) where 0 indicates no pain and 10 for worst imaginable headache. We operated all cases of 108 patients who diagnosed with RCPH.

4. RESULTS

In total, 108 patients of RCPH were studied. All of them had facial pain or headache. The duration of headache was ranging from 6 months to 5 years. A total of 108 patients of headache with anatomical variations in the nose were examined. Presence of various anatomical variations was documented.

Out of 108 patients 62 patients were male and 46 were female with male female ratio being 1.34 : 1.00. By conventional criteria, in T test, it was found $P = 0.58$ and this difference is considered to be not statistically significant (Table 1).

Table 1. Anatomical variations of nose seen in diagnostic nasal endoscopy and CT scan of patients with headache

Anatomical variations	Male *n*(%)	Female *n*(%)	Total
Nasal septal deviation	21(22.68)	17(18.36)	38
Septal spur	15(16.2)	14(15.12)	29
Bilateral concha bullosa of middle turbinate	9(9.72)	6(6.48)	15
Unilateral concha bullosa of middle turbinate	7(7.56)	3(3.24)	10
Hypertrophied inferior turbinate	6(6.48)	5(5.4)	11
Large ethmoidal bulla	2(2.16)	0(0)	2
Hypertrophied superior turbinate	1(1.08)	0(0)	1
Medialized middle turbinate	0(0)	1(1.08)	1
Nasal septal bullosa	1(1.08)	0(0)	1
	62(66.96)	46(49.68)	108

Among all patients 38 (35.18%) patients had deviated nasal septum, 29 (26.85%) had septal spur (Figure 1), 15 (13.88%) had bilateral concha bullosa of middle turbinate (Figure 2), 10 (9.25%) unilateral concha bullosa of middle turbinate (Figures 3a and 3b), 11 (10.85) had hypertrophied inferior turbinates, 2 (1.85%) had large ethmoidal bulla, 1 (0.92%) had hypertrophied superior turbinate, 1 (0.92%) medialized middle turbinate and 1 (0.92%) nasal septal bullosa (Figure 4, Table 1).

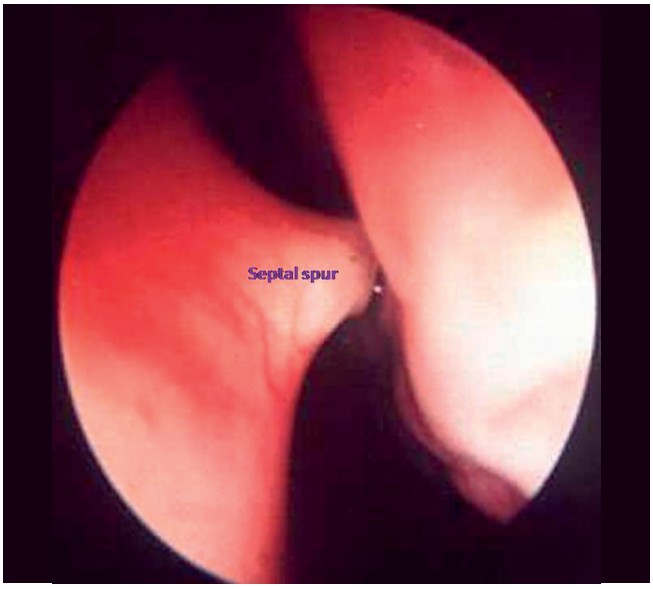


Figure 1. Endoscopic picture showing sharp septal spur touching with the inferior turbinate.

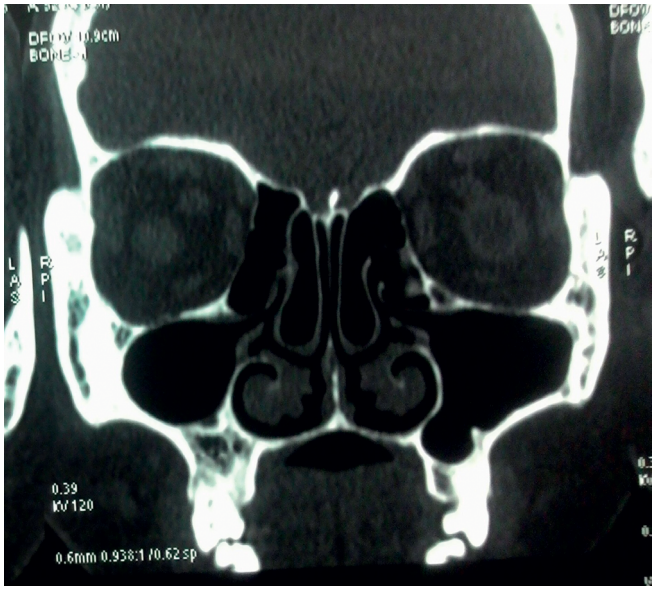
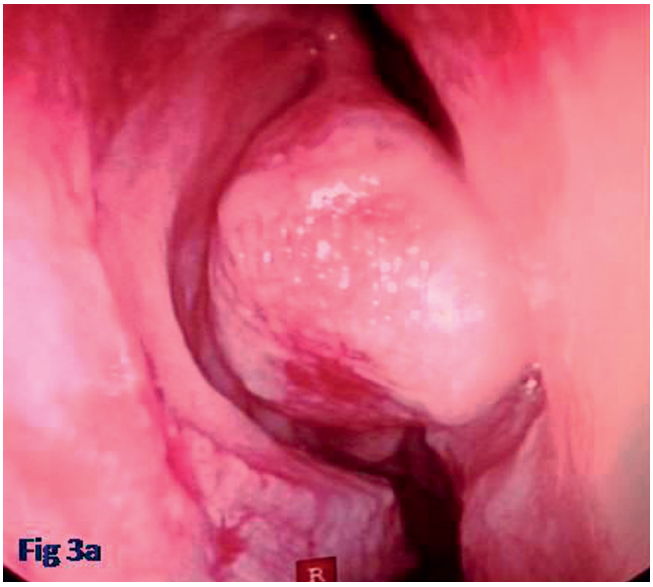


Figure 2. CT scan showing bilateral concha bullosa of middle turbinate.



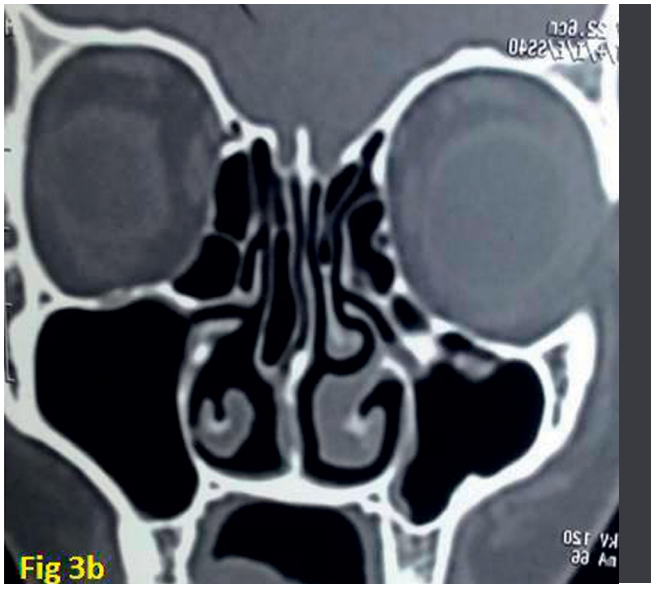


Figure 3A, B. Unilateral concha bullosa of middle turbinate (endoscopic and CT picture).

Figure 4. CT scan showing nasal septal bullosa (star).

Out of 108 patients of anatomical contact points, 44 had right side contact, 36 had left side contact points whereas 28 had bilateral mucosal contact points. Out of 108 patients, 41 had right side contact points were from concha bullosa of middle turbinate (4), nasal septal deviation (22) and septal spurs (15) where as rest 3 contact points were from large ethmoidal bulla (2) and medialized middle turbinate (1). Out of 36 left side contact points, all are from concha bullosa (6; Table 2), septal deviations (16) and septal spurs (14; Table 3). Out of total 28 bilateral contact points, 15 are from bilateral concha bullosa of middle turbinates, 11 are from inferior turbinate hypertrophy, 1 from nasal septal bullosa and 1 from superior turbinate hypertrophy. Concha bullosa of middle turbinate could be very large or small, unilateral or bilateral and multichambered or unichambered.

Table 2. Distributions of contact points of concha bullosa of middle turbinate

Concha Bullosa	Contact point	Total
Right concha bullosa	Nasal septum-3 Lateral nasal wall-1	4
Left concha bullosa	Nasal septum-4 Lateral nasal wall-2	6
Bilateral concha bullosa	Nasal septum-11 Lateral nasal wall-4	15

Table 3. Distribution of contact points by septal deviation/Spur

Contact points	Total
Septal deviation touching to right inferior turbinate	22
Septal deviation touching to left inferior turbinate	16
Septal spur touching to right inferior turbinate	15
Septal spur touching to left inferior turbinate	14

The headache due to concha bullosa of middle turbinate is usually felt in medial canthus and forehead area.

The anatomical variations of nose with headache are divided into different age groups. Maximum number patients are seen in the age group of 18–32 followed by age group of 8–17 years, and least in age group above 50 years.

Deviated nasal septum was most common anatomical variations causing headache (35.18%). Second most common variation causing headache was septal spur followed by concha bullosa, hypertrophied inferior turbinates, large ethmoidal bulla, hypertrophied superior turbinate, medialized middle turbinate and nasal septal bullosa.

The commonest site of referred headache was the frontal area (81%) followed by nose/glabellar (29%) area. None was seen over occipital area. Contact point headache due to septal spur has the highest severity in comparison to other variety.

The average headache severity in our patients was 5.9.

The endoscopic nasal surgeries were done for all cases in our study which significantly reduced the headache. Out of 108 patients in our study, 11 (10.18%) patients showed partial improvement of the headache. Out of the patients who had improvement, they all had concomitant clinical improvement of nasal obstruction, whereas 8 out of 11 patients who did not experience headache improvement did not have relief of nasal obstruction.

5. DISCUSSION

Headache is a very commonly encountered clinical symptom seen in everyone's life. Headache may be classified into primary and secondary where primary headache does not have specific etiology and include migraine, tension headache and cluster headache. Secondary headache are due to infections, trauma, tumour, vascular lesions and metabolic diseases.[5] Most relevant etiology concerned for otolaryngologists are anatomical variations of nose causing secondary headache which include septal deviation, septal spur and concha bullosa.[6]

There are different types of septal deviations including cartilaginous deviation, bony deviation, bony spur and high septal deviation. The significant RCPH is seen in septal spur. Concha bullosa is hypertrophied pneumatized middle turbinate and rarely seen in superior and inferior turbinate. The cause of RCPH is multifactorial. RCPH may result from nociceptors in the nasal mucosa, which ends up in the sensory neucleus of the trigeminal nerve.

Pressure effect on the nasal mucosa is associated with changes in microvascular supply, followed by release of biologic substances, induces pain or decreasing the pain threshold. The contact between mucosal lining of concha bullosa and nasal septum or the lateral wall of nose result in release of substance P, calcitonin gene related peptide (CGRP)[7] and neurokinin A.[8] These chemicals are found in nociceptive fibers in the central nervous system and trigeminovascular system. So the contact point between intranasal mucosa may be a cause of secondary headache or triggering factor to primary headache.[9] This phenomenon is also called as middle turbinate syndrome.[10] Substance P has a known role in pathophysiology of contact point headache.[4] Substance P is a neuropeptide that can be identified in the mucosa of the nasal cavity. When it is released around vascular area, vasodilatation, plasma extravasations and perivascular inflammation, causing headache similar to clinical manifestations of migraine without aura.[11] Normal nasal mucosa has a higher concentration of substance P than chronic hyperplastic mucosa or polypoidal tissue. This explains why contact point headache are almost always seen in patients without rhinosinusitis. RCPH is frequently seen in septal deviations/spur followed by concha bullosa of middle turbinates in our study. Hypertrophied superior turbinate is rarely seen and often mistaken with a posterior ethmoidal cell. The contact point between upper septum and medial lamella of hypertrophied superior turbinate leads to headache. The contact point headache due to superior turbinate concha bullosa usually causes pain over forehead, medial and lateral canthus. One case of superior turbinate concha bullosa causing contact point headache was seen in our study. Sometimes medialized middle turbinate cause mucosal contact with nasal septum. Creating a space between middle turbinate and septum is needed for reversing this situation. This is done by trimming the parts of middle turbinate. One case of medialized middle turbinate was seen in our study. Bulla ethmoidalis is the large anterior ethmoidal air cells and when it is larger than normal; its medial surface may push the middle turbinate and cause a contact with nasal septum. To reverse this situation, anterior ethmoidectomy and lateralization of middle turbinate is needed. In our study we had two cases of hypertrophied bulla ethmoidalis pushing the middle turbinate leading to contact between nasal septum and middle turbinate causing contact point headache. One case of nasal septal bullosa was found in our study. Nasal septum bullosa is an abnormal aeration of bony septum which involves perpendicular plate of ethmoid bone. In this case, dissecting

the mucoperichondrium of both sides of septum and removal of septal bullosa was done with its central chamber and mucus linings. RCPH is a referred pain which arises from contact point between the mucosa of nasal septum and lateral nasal wall. Exact mechanism for different characteristic pain in various anatomical variations is not known. It is thought that large contact point as in lamella bullosa and tight contact as in sharp spur may cause severe contact point headache. Diagnostic nasal endoscopy in conjunction with CT scan has proven to be ideal combination for diagnosis of sinonasal pathology. Anatomical variations like septal deviation, spurs, concha bullosa, hypertrophied inferior turbinate, medialized middle turbinate, uncinate bulla, medially or laterally bent uncinate process, paradoxically middle turbinate, large ethmoidal bulla are often cause for headache. However, there is limitations exists in diagnosis as characteristic headache should be relieved after application of local anesthetics which was not done in all cases of our study. In one study of 30 patients with applications of local anesthetic agents, 43% showed complete recovery, 47% showed slight improvement and 10% showed no improvement.[1]

This is why contact point with headache are properly diagnosed by endoscopic examination and CT scan to rule out differential diagnosis. Few authors described treatment of contact point headaches using transaction of fifth cranial nerve or injection of Gasserian ganglion by alcohol or novocaine.[2] Before era of endoscopic sinus surgery, complete removal of middle turbinate was done to manage concha bullosa. After evolution of endoscopic sinus surgery, techniques like partial turbinectomy and turbinoplasty are practiced aiming to relieve the contact point headaches.[12] Wolf and Tosum et al. documented that nasal septal deviation/spur are causing referred headache in the absence of inflammation.[1]

Our study significantly supported these correlation. Different types of septal deviations like cartilaginous deviation, bony deviation, high septal deviation and septal spurs were found in around 62% cases of contact point headache patients in this study. Septal spur had a significant relation with headache in this group. Hypertrophied inferior turbinate (10%) was another cause of RCPH in our study. Other than septal spur and hypertrophied middle turbinate, contact point headache may also caused by the contact between the septum and superior turbinate or medial wall of the ethmoidal sinus.[13] After identification of contact points, RCPH can be treated with surgical management.[14] Nose has a diverse anatomical variation. Relation between these anatomical variations and contact point headache was confirmed in septal spur, septal deviations, concha bullosa and large ethmoidal bulla. So above lesions should not be ignored from mind during evaluation of headache and their respective treatment helps to relief the symptoms.

6. CONCLUSIONS

Headache due to contact of nasal mucosa is often considered as an exclusion of diagnosis. The outcome of this study highlights that diagnostic nasal endoscopy and CT scan are important tools in the diagnosis RCPH. DNS or septal spur are common anatomical variations of the nose in our study for causing contact point headache followed by concha bullosa and enlarged bulla ethmoidalis. Relation of anatomical variations with headache should not be ignored during decision making for headache management.

Conflicts of interest

None of the authors has any conflict of interest, financial or otherwise.

Acknowledgements

Authors are thankful to President, Siksha 'O' Anusandhan University for extended facility in research.

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