

## STUDY OF CORRELATION BETWEEN COMPUTED TOMOGRAPHY AND NASAL ENDOSCOPY IN CHRONIC HEADACHE

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**ABSTRACT: AIM:** To evaluate the correlation between radiological and endoscopic findings in cases of chronic headache. **METHODOLOGY:** The study includes 300 patients who presented to the OPD of a tertiary level centre with headache. **RESULTS:** Endoscopic and CT abnormalities were detected in 265/300 (88.3%) patients. Most common abnormality was a septal spur impinging on lateral nasal wall seen in 94 cases (35.4%), followed by inferior turbinate hypertrophy, concha bullosa, accessory maxillary sinus ostium, paradoxical curved middle turbinate, polyposis and frontal osteoma. A majority of patients had associated changes in the sinuses as well. **CONCLUSION:** The study highlights the correlation between radiological and endoscopic findings of sinonasal disease as a cause of headache. Abnormalities and variations in endonasal anatomy, functional or anatomical or a combination of these variations caused narrowing of OMU, which predisposed patients to sinonasal disease and headache.

**KEYWORDS:** Endoscopy, Headache.

**INTRODUCTION:** Headache is common with high lifetime prevalence in general population. Headache disorders are generally classified as either primary (migraine, tension type and cluster headache) or secondary (infectious, vascular, drug induced).<sup>[1]</sup> Chronic headache, defined as headache on 15 or more days per month, affects 3% of people worldwide.<sup>[2]</sup> Sinusitis may constitute one of the most commonly confusing clinical presentation of migraine,<sup>[3]</sup> probably because cranial autonomic symptoms are common in migraine<sup>[4]</sup> based on activation of the trigeminal-autonomic reflex.<sup>[5]</sup> Headaches located in the frontal, supraorbital, or infraorbital region are sinus headaches.<sup>[6]</sup> These headaches are usually recurrent, non-seasonal, and unassociated with fever, localized tenderness, or erythema.<sup>[7]</sup>

Fifty years ago, the extracorporeal cold light and its transmission by glass fibers, along with the hopkins rod lens system, were introduced. The development and application of these technologies to upper airways allowed studying, understanding, and improving knowledge of the anatomy, physiology, and diseases of the nasal cavity and sinuses, in particular, some fundamental concepts of modern rhinology are based on endoscopic nasal findings and messerklinger's investigations of the pathophysiology of sinus mucosa. These studies radically changed traditional understanding of sinus inflammation and revolutionized its treatment using endoscopic conservative surgical management [messerklinger, 1966, 1967, AND 1978].

Whether or not nasal obstruction can lead to chronic headache is controversial <sup>[8]</sup>. Paradoxically, sinus disease also tends to be underdiagnosed, as sphenoid sinus infection frequently is missed.<sup>[9]</sup>

# ORIGINAL ARTICLE

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**AIM:** The study was conducted in patients with chronic headache to study the anatomical and pathological abnormalities in nose and paranasal sinuses, to correlate radiological with endoscopic findings and finally to assess type of cases requiring nasal surgery in patients who are not responding to medical treatment.

**METHODOLOGY:** The study includes 300 patients who presented to the OPD of a tertiary level centre during the period July 2010 to July 2014, who had symptoms and signs of chronic headache.

**INCLUSION CRITERIA:** Patients presenting with sinogenic headache. The data is collected on the basis of detailed history, systemic examination, ENT examination and investigations.

**DIAGNOSTIC CRITERIA:**

- A. Frontal headache accompanied by pain in one or more regions of the face, ears, or teeth and fulfilling criteria C and D
- B. Clinical, nasal endoscopic, CT and/or MRI imaging and/or laboratory evidence of acute or acute-on-chronic rhinosinusitis
- C. Headache and facial pain develop simultaneously with onset or acute exacerbation of rhinosinusitis
- D. Headache and/or facial pain resolve within 7 days after remission or successful treatment of acute or acute-on-chronic rhinosinusitis
  1. Clinical evidence may include purulence in the nasal cavity, nasal obstruction, hyposmia/anosmia and/or fever.
  2. Chronic sinusitis not validated as a cause of headache or facial pain unless relapsing into an acute stage

**EXCLUSION CRITERIA:** All patients presenting with clinical features other than sinogenic headache were excluded.

Subsequently all the selected candidates were worked up on the history, general examination, and ENT examination carried out. CT PNS was done in all the patients. Diagnostic Nasal endoscopy under local anesthesia was done to record the condition of nasal mucosa, septum, & turbinates and to assess the condition of the nasopharynx and eustachian tube opening, to look for the presence of mucopus or polyp in the middle meatus/sphenoethmoidal recess/nasopharynx. Also, any co-existing anatomical variations of the lateral wall of the nose were noted. Once the diagnosis and extent of the disease was established, the patients were taken up for FESS.

**RESULTS:** In present study majority of patients were female. 190 were females and 110 were males in a total of 300 patients.

# ORIGINAL ARTICLE

AGE	SEX	
	Male	Female
15-30	50	95
30-45	38	55
55-65	22	40
<b>TOTAL</b>	<b>110</b>	<b>190</b>

Table 1

Abnormalities		Endoscopic	CT	Number of abnormalities	Total Percentage (n = 300)
Dns with spur		+	+	120	40
Abnormal middle turbinate		+	++	44	14.67
Enlarged ethmoid bulla		+	++	33	11
Polyps		++	++	26	8.67
Inferior turbinate hypertrophy		+	+	80	26.67
Large aggenasi cell		+	++	21	7
Frontal Osteoma		-	++	2	0.67
Sinus involvement	maxillary	+	++	100	33.34
	Anterior ethmoid	+	++	78	26
	Posterior ethmoid	-	++	59	19.67
	frontal	+	++	40	13.34
	sphenoid	-	++	55	18.34

**TABLE 2: ABNORMALITIES ON ENDOSCOPIC AND CT EXAMINATION**

Endoscopic abnormalities were found in 265/300 patients. Majority of patients had deviated nasal septum with spur impinging on lateral nasal wall, as a most common endoscopic abnormality. Other conditions identified were abnormal middle turbinate, enlarged ethmoid bulla, polyps, inferior turbinate hypertrophy, prominent aggenasi cells and frontal osteoma. Sinus involvement of varying severity was seen in 70% of patients.

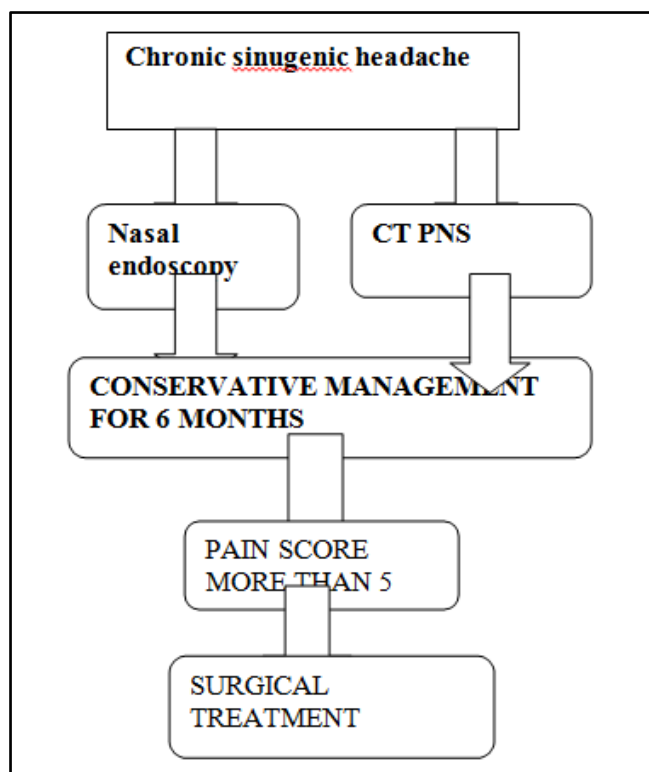
# ORIGINAL ARTICLE

Endoscopic abnormalities	RADIOLOGICAL ABNORMALITY		
	Yes	No	Total
Positive	260	0	260
Negative	5	35	40
<b>Total</b>			<b>300</b>

**TABLE 3: COMPARISON OF RADIOLOGICAL & ENDOSCOPIC ABNORMALITIES**

**TREATMENT:** In present study of 300 patients, all patients underwent medical treatment. The medical treatment included nasal decongestants, steroid sprays, antibiotic therapy and steam inhalation. The minimum duration of medical treatment was 6 months. The end point of medical treatment was a score of more than 5 on pain scale. 265 patients were taken up for surgery. The most common surgical procedure done was septoplasty with turbinoplasty under LA followed by FESS in cases with sinus involvement. The pain score was evaluated 3 months following surgery.

We found that majority of patients who had pain score more than 5 at end of 6 months of medical treatment were treated with surgery and had a pain score less than 5 at 3 months post op.



**Figure 1**

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**DISCUSSION:** Standard radiography is inadequate for the clinical evaluation of sinusitis because it does not evaluate the anterior ethmoid air cells, the upper two thirds of the nasal cavity, or the infundibular, middle meatus, or frontal recess air passages.<sup>[11]</sup>

CT is the optimal radiographic study to assess the paranasal sinuses for evidence of disease. The mucosa of the normal, non-infected sinus approximates the bone so closely that it cannot be visualized CT scan. Therefore, any soft tissue seen within a sinus is abnormal.<sup>[12]</sup> CT may demonstrate mucosal thickening, sclerosis, clouding, or air-fluid levels. Imaging must be performed in the coronal plane to adequately demonstrate the ethmoid complex. It can reveal the extent of mucosal disease in the ostio meatal complex.

Incidental anatomic abnormalities within the paranasal sinuses are common. Incidental anatomic abnormalities on CT scans occur in 27% to 45% of asymptomatic individuals.<sup>[13]</sup> Patients undergoing endoscopic sinus surgery for chronic rhinosinusitis were evaluated with CT and staged according to the Lund system. (Each paranasal sinus: anterior ethmoid, posterior ethmoid, maxillary, frontal, and sphenoid sinus for each side was given a score of 0 for no opacification, 1 for partial opacification, or 2 for total opacification) The ostiomeatal complex was assigned a score of 0 for Patent or 2 for obstructed. The Lund score ranged from 0 to 24.

Wolff<sup>[14]</sup> showed that the sinuses themselves are relatively insensitive to pain. The pain associated with sinusitis comes from engorged and inflamed nasal structures: nasofrontal ducts, turbinates, ostia, and superior nasal spaces. Headache associated with paranasal sinus disease usually has a deeper, dull, aching quality combined with a heaviness and fullness. It seldom is associated with nausea and vomiting

A severe, intractable, new-onset headache that interferes with sleep and is not relieved by simple analgesics should alert one to the diagnosis of sphenoid sinusitis. The headache increases in severity and has no specific location. Pain or paraesthesias in the facial distribution of the fifth nerve and photophobia or eye tearing are suggestive of sphenoid sinusitis.<sup>[15-19]</sup>

Mcauliffe et al<sup>[20]</sup> studied the sensitivity of the nasal cavities and paranasal sinuses using touch, pressure, and faradic stimulation. The nasal turbinates and sinus ostia were much more sensitive than the mucosal lining of the septum and the paranasal sinuses. Most of the pain elicited was referred pain. It was of increased intensity, longer duration, and referred to larger areas in subjects who had swelling and engorgement of the nasal turbinates and the sinus ostia. Sschønsted-madsen et al<sup>[21]</sup> followed up 444 patients who had nasal obstruction, 157 of whom had headache. Treatment consisted of septo-plastic surgery, reconstruction of the nasal pyramids, or submucosal conchotomy. The headache usually was localized to the forehead, glabella, or above and around the eyes.

Headache can be arising from the paranasal sinuses, which may be missed even after careful history. Nasal endoscopy plays an important role in recognizing pathological changes following radiographic investigations. The IHS has established new criteria for acute sinus headache.<sup>[22]</sup>

# ORIGINAL ARTICLE

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## RHINOSINUSITIS HEADACHE:

Diagnostic criteria: pain in one or more regions of the head, face, ears, or teeth
Clinical, laboratory, or imaging evidence of an acute rhinosinusitis (eg, purulence in the nasal cavity, nasal obstruction, fever, hypo-osmia/anosmia, CT, MRI, or fiberoptic nasal endoscopy findings)
Simultaneous onset of headache and rhinosinusitis.
Headache lasts 7 days after remission or successful treatment of acute rhinosinusitis.

Good nasal endoscopic examination, with CT PNS wherever necessary, has proved best modality for comprehensive diagnosis of chronic inflammatory disease of PNS. Following these definitive reliable techniques with adequate diagnostic information, to determine which treatment modality is required or necessary and also can avoid radical surgery in majority of instances.

Jakobsen and Svendstrup (2000)<sup>(23)</sup> conducted a prospective study on 237 consecutive patients suffering from chronic sinusitis and or nasal polyposis. Nasal obstruction was the most frequent symptom (61%) followed by purulent nasal discharge, anosmia, frontal pain, headache and maxillary pain. Duration of symptoms averaged 9.3 years. At the end of 1 year follow up 45% were totally satisfied with the results and were symptom free and 44% were definitely feeling better.

Damm et al (2002)<sup>(24)</sup> conducted a study on patients with CRS to assess impact of FESS on the symptoms profile. Leading symptoms of CRS were nasal obstruction (92%) and postnasal drip (87%). Furthermore, patients reported dry upper respiratory tract syndrome in 68%, hyposmia in 66%, and headache in 64% and asthmatic complaints in 34%. After a mean postoperative follow up of 31.7 months, an improvement in quality of life was achieved in 85%, no change in 12% deterioration in 3% mainly responsible for this improvement was the postoperative decrease of nasal obstruction (84%), headache (82%) and postnasal drip (74%) (All symptoms;  $p < 0.01$ ). Hence it was concluded that symptoms improved in excellent fashion by FESS in majority of the patients, achieving better quality of life in the long term.

**CONCLUSION:** In present study 265 patients were found to have abnormal pathological findings, and 5 patients had typical structure of lateral nasal wall. Among anatomic variants, deviated nasal septum with mucopurulent discharge followed by abnormal uncinat process, abnormal middle turbinate resulted in significant narrowing of OMC. Most of these patients were not relieved with medical treatment had anatomical variations and such patients were posted for surgical treatment.

To conclude, combination of thorough nasal endoscopic examination and CT of PNS for diagnosis of functional status of nasal and PNS as well as surgical treatment of functional and anatomical variations including postoperative follow up minimal conservative resection of anatomical abnormalities or small pathological lesions in intricate lateral wall of nose may only be required to alleviate nagging chronic intractable headache.

# ORIGINAL ARTICLE

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