

## ORIGINAL ARTICLE

### A STUDY OF CORRELATION BETWEEN NASAL ENDOSCOPY AND CT SCAN IN CASES OF CHRONIC RHINOSINUSITIS

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**ABSTRACT: BACKGROUND:** The accurate diagnosis of Chronic Rhinosinusitis (CRS) is still a challenge therefore, the American Academy of Otorhinolaryngology - Head and Neck Surgery (AAO-HNS)<sup>1</sup> has met in a multidisciplinary encounter and formulated a consensus based on only clinical symptoms. The computed tomography (CT) scan and the nasal endoscopy (NE) were introduced to make an accurate diagnosis of CRS and verify the disease severity. **AIM:** The aim of this study is to make a correlation between nasal endoscopy and CT scan in cases of clinically diagnosed Chronic Rhinosinusitis patients. **METHOD:** A study was carried out on 90 patients at Jhalawar Medical College, Jhalawar (Raj.) during Sept. 2012 to Dec. 2014. Diagnostic Nasal Endoscopy and CT Scan PNS done in patients, suffering from Chronic Rhinosinusitis. As a classification instruments, Metson/Gliklich's classification was used to evaluate the tomographic diagnosis and the Stankiewicz/ Chow's classification to evaluate the endoscopic diagnosis of Chronic Rhinosinusitis. **RESULTS:** Our study showed high specificity of endoscopy in comparison to CT scan though CT scan results are more sensitive. **CONCLUSION:** Endoscopy can confirm a Chronic Rhinosinusitis diagnosis, but cannot rule it out, and that CT should be performed in cases of suspected CRS even if mucopurulence is not noted on endoscopy. The CT scan and the nasal endoscopy making easier the treatment planning and the disease resolution.

**KEYWORDS:** Chronic Rhinosinusitis, Computed Tomography, Paranasal Sinus, Nasal Endoscopy, Ostiomeatal Complex Area.

**INTRODUCTION:** Chronic Rhinosinusitis (CRS) is a chronic inflammation of the nasal and paranasal sinus cavity. However, the patho physiology is poorly described and seems to be multifactorial. Cold light nasal endoscopy in association with computed tomographic scanning (CT Scan) has opened new scope to access the hidden areas and niches of fronto ethmoid complex and sphenoid sinus.

**Nasal Endoscopy in C. R. S.:** Messerklinger (1978)<sup>2</sup> showed that the infundibulum and the middle meatus area are most commonly affected by anatomical variations that compromising ventilation and mucociliary clearance, Messerklinger developed a systemic endoscopic approach for diagnosis and treatment of CRS.

Nasal endoscopy is frequently used in cases of suspected CRS. Endoscopy allows visualization of pathology in the posterior nasal cavity, Nasopharynx and the middle and superior meatus which cannot be visualized on anterior rhinoscopy.

**CT Scan in CRS:** The CT Scan enabled soft tissue discrimination and spatial resolution in sinonasal variations.

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**AIMS and OBJECTIVE:** Aims and objective of our study is to evaluate CRS with the help of nasal endoscopy and CT Scan and to study the usefulness of nasal endoscopy and CT scan in diagnosing nasal pathology in patients presented with CRS symptoms and to define medical and surgical management in patients of CRS.

**MATERIAL AND METHOD:** After taking approval from institutional ethical committee, this study was conducted at Tertiary Hospital, Jhalawar (Raj.) during Sept. 2012 to Dec. 2014. 110 patients were selected for this study has CRS symptoms clinically. A standard protocol of American Academy of Otorhinolaryngology (1997)<sup>3</sup> was used, which covers the CRS criteria.

1.	Beginning of symptoms for more than 12 weeks	Yes.	No.
2.	Previous episodes	Yes.	No.
3.	Use of Antibiotics	Yes.	No.
		(Period.)	
<b>HIGHER CRITERIA:</b>			
4.	Pain or Facial Pressure	Yes.	No.
5.	Nasal Obstruction	Yes.	No.
6.	Hyposmia or Anosmia	Yes.	No.
7.	Purulent nasal or post-nasal secretion	Yes.	No.
<b>MINOR CRITERIA</b>			
8.	Headache	Yes.	No.
9.	Halitosis	Yes.	No.
10.	Fatigue	Yes.	No.
11.	Dental Arch Pain	Yes.	No.
12.	Cough	Yes.	No.
13.	Ear or Pressure in the ear	Yes.	No.
Table 1: Questionnaire			

Inclusion criteria, as laid down by American Academy of Otorhinolaryngology, patients was who presented 2 or more higher criteria or 1 higher criteria and 2 or more minor criteria. 20 patients were excluded from this study who was suffering from acute RS, fungal RS, Post Traumatic Nasal injury, facial neoplasm and those who underwent nasal surgery previously. 90 patients underwent nasal endoscopy and CT scan PNS.

Written and informed consent was taken for the diagnostic nasal endoscopy. 4mm rigid nasal endoscopic of 0° and 30° was used for endoscopy. All endoscopy were done under local anesthesia. A complete examination was successfully accomplished in an organized manner with three mentioned nasal passes of the endoscopy.

Rigid nasal endoscope was used to perform the nasal endoscopy and protocol by Stankiewicz and Chow<sup>4</sup> classification was used (Table- II).

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	Right	Left
Anatomical variations		
Purulent Secretion		
Congested and polypoid mucosa		
Clear Stated Nasal Polyposis		
Oedema/Congestion		

**Table 2: Protocols of nasal endoscopic findings**

CT Scan was done in radiology department of Jhalawar Medical College. Plain CT scan nose and PNS was done in both coronal and axial planes. Thickness of slice was 3mm. CT scan done for both bony and soft tissue windows. The presence of anatomical variations was also documented along with radiological features of CRS. Some anatomical variations like septal deviations, Haller cells, paradoxical curvature of middle turbinate, aggar nasi cells, medialised uncinat process and enlarged bulla have been reported as probable risk factor for obstruction of the ostiomeatal unit and development of CRS. CT scan studies in patients with CRS by Som Pm et al.<sup>5</sup> 1985, Zinreich et al.<sup>6</sup> 1987, Bolger et al.<sup>7</sup> 1991, demonstrated that anterior ethmoid air cells are most frequently affected by the disease.

In 1991, Sonkens<sup>8</sup> classified sinus disease into five radiologically identifiable patterns based on CT Scan PNS (Coronal Section Study).

In CT scan PNS it was used the tomographic classification by Metson and Gliklich's<sup>9</sup> based on the international protocol of (AAO-HNS) (Table -III)

Stage 1	Unilateral anatomical disease or abnormality
Stage 2	Bilateral disease limited to ethmoid or maxillary sinuses.
Stage 3	Bilateral disease involving at least one sphenoid or frontal sinus.
Stage 4	Pansinusoidal Disease

**Table 3: Protocol to tomographic findings. Stage 0: Less than 2mm thickness of mucosa on the wall of any sinus**

In the positive finding of CT it was considered when diseased reached at least the stage-1 of the protocol.

**RESULTS:** Study was done on 90 patients selected from a total of 110 and 20 were excluded for the reasons mentioned above, out of them 54 were males and 36 were females (average age was 34 yrs.) taken for study. The screening test is used for statistical study to find out the sensitivity, specificity, positive predictive value, negative predictive value as shown in Table No. 4.

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		Condition According to Gold Standard		Total
		Positive	Negative	
Test Result	Positive	a=True positives	b=False positives	a+b
	Negative	c=False negatives	d=True negatives	c+d
<b>Total</b>		<b>a+c</b>	<b>b+d</b>	

Table 4

Sensitivity =  $a/(a+c)$ , Specificity =  $d/(b+d)$ .

Positive Predictive Value =  $a/(a+b)$  Negative Predictive Value =  $d/(c+d)$ .

With the use of above mentioned method the results of our study are shown in Table No. 5.

		Nasal Endoscopic Results		Total
		Positive	Negative	
CT Scan Results	Positive	23 (25.55%)	26 (28.88%)	49 (54.44%)
	Negative	10 (11.11%)	31 (34.44%)	41 (45.55%)
<b>Total</b>		<b>33 (36.66%)</b>	<b>57 (63.66%)</b>	<b>90 (100%)</b>

TABLE 5

**Sensitiveness:**  $23/33 = 69.69\%$  Specificity:  $31/57 = 54.38\%$ .

**Positive predictive value:**  $23/49 = 46.93\%$  Negative predictive value:  $31/41 = 75.6\%$ .

49 (54.44%) patients were with positive CT findings and 41 (45.55%) with negative CT findings. We found 33 (36.66%) patients with positive endoscopic findings and 57 (63.3%) with negative endoscopic results. Out of 33 (36.66%) positive endoscopic findings patients, 23 (25.55%) were CT positive and 10 (11.11%) were with CT negative findings.

Thus we found that there is a correlation between nasal endoscopy and CT scan findings in CRS patients i.e. most of the endoscopic positive findings were having CT positive findings also. We also found that there is a high specificity of endoscopy as compared with CT scan.

**DISCUSSION:** The accurate diagnosis of Chronic Rhinosinusitis is still a challenge for the ENT surgeons. Therefore, the American academy of Otorhinolaryngology- Head and neck surgery came together in 1997 to develop criteria for its diagnosis.

Ostiomeatal complex (OMC) is the key area in which maxillary sinus drains through its ostium inferiorly and frontal sinus through frontal recess superiorly, any anatomical variation or pathology in the narrow area of infundibulum is likely to clog the sinuses and leads to CRS.

With the help of CT scanning and nasal endoscopy it is possible to have an access and visualization of the niches and narrow space in the region.

D.W. Kennedy, Zinreich SJ<sup>6</sup> (1985) found that C.T. Scanning of PNS significantly improves ability to diagnose disease in the anterior ethmoid region.

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In a study of Rosbe et al<sup>10</sup> compared the result of nasal endoscopy with CT scan in CRS patients. They found that the diagnosis of CRS is more specific with symptoms and nasal endoscopy. In 2002 a study done by Stankiewicz and Chow<sup>7</sup> on 78 patients having symptoms of CRS and evaluated the relationship between symptomatology, nasal endoscopy and CT findings they found the 37 patients with positive CT findings, 17 had positive endoscopic findings and 20 had negative endoscopic results. The sensitivity of endoscopy as compared with CT result was 46%, specificity was 86%, Positive Predictive Value (PPV) was 74% and Negative Predictive Value (NPV) was 64%. The study concluded that high specificity of endoscopy as compared with CT results and negative endoscopy had a strong association with CT findings.

Bhattacharya et al<sup>11</sup> in 2010 evaluated 202 patients with CRS symptoms. CT results were used as the gold standard, they found that the addition of endoscopy to the symptoms improved the diagnostic efficacy from 42.8% to 69.1%, raised the PPV from 39.9% to 66.0% and NPV from 62.5% to 70.3%. The most dramatic improvement was in specificity, which increased from 12.3% to 84.1% with the use of endoscopy.

Ritesh Shelkar et al<sup>12</sup> in 2014 evaluated 100 patients of CRS with the help of nasal endoscopy, they are concluded that diagnostic nasal endoscopy is gold standard tool in patients having sinonasal complaints.

In our study all 90 patients with CRS symptomatology underwent for diagnostic nasal endoscopy and CT PNS. In our study nasal endoscopic findings were used as a gold standard method. We found 33 (36.66%) patients with positive nasal endoscopy findings of which 23 (25.55%) had positive CT results and 10 (11.11%) had negative CT results. The sensitivity of CT scan as compared with nasal endoscopy was 69.69%, specificity was 54.38%, PPV was 46.93% and NPV was 75.60%, the sensitivity of CT scan was high as compared with nasal endoscopy, while the specificity of nasal endoscopy was high as compared to CT scan. The results of our study are comparable with the previous studies.

**CONCLUSION:** Nasal endoscopy has high specificity in identifying CRS but does not rule it out. In patients with CRS symptoms (AAO-HNS), nasal endoscopy a precise diagnosis of CRS can be achieved. The CT scan has high sensitivity as compared to nasal endoscopy. Therefore, CT scan is much useful to confirm the CRS prior to any surgical intervention. Thus with the use of high specificity of nasal endoscopy and high sensitivity of CT scan PNS, patients with CRS symptoms can be selected for surgical intervention.

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