

Original article

Role of Diagnostic Nasal Endoscopy in Patients with Chronic Rhinosinusitis and Correlation with CT Findings

¹Dr. Mayur H. Ingale, ²Dr. Tanmay Chaudhari*, ³Dr. Manu Babu, ⁴Dr. Vinod V. Shinde

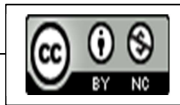
¹Professor & Head, Department of Otorhinolaryngology, Dr. D. Y. Patil Medical college, Hospital and Research centre, Dr. D. Y. Patil Vidyapeeth, Pimpri, Pune, India.

²Assistant Professor, Department of Otorhinolaryngology, Dr. D. Y. Patil Medical college, Hospital and Research centre, Dr. D. Y. Patil Vidyapeeth, Pimpri, Pune, India.

³Associate Professor, Department of Otorhinolaryngology, Dr. D. Y. Patil Medical college, Hospital and Research centre, Dr. D. Y. Patil Vidyapeeth, Pimpri, Pune, India.

⁴Professor, Department of Otorhinolaryngology, Dr. D. Y. Patil Medical college, Hospital and Research centre, Dr. D. Y. Patil Vidyapeeth, Pimpri, Pune, India.

Corresponding author*



Abstract

Background- Chronic rhinosinusitis (CRS) is a common inflammatory disorder of the nose and paranasal sinuses characterized by persistent symptoms lasting more than 12 weeks. Diagnostic Nasal Endoscopy (DNE) and Computed Tomography (CT) of the paranasal sinuses are important modalities for evaluating CRS. Correlation between endoscopic and radiological findings helps optimize diagnosis and management.

Materials and Methods- Our prospective observational study included 42 patients clinically diagnosed with CRS attending the Department of Otorhinolaryngology over a period of one year. All patients underwent detailed clinical evaluation, DNE, and CT scan of the paranasal sinuses. Endoscopic findings including mucosal edema, purulent discharge, nasal polyps, middle meatal abnormalities, and anatomical variations were documented and compared with CT findings. Statistical analysis was performed using Chi-square test and Pearson correlation coefficient.

Results- The study population had a mean age of 36.8 ± 12.4 years, with male predominance (59.5%). Nasal obstruction (88.1%), nasal discharge (78.6%), headache (66.7%), and postnasal drip (52.4%) were common symptoms. DNE identified middle meatal discharge in 71.4%, mucosal edema in 69.0%, deviated nasal septum in 47.6%, and nasal polyps in 23.8%. CT demonstrated maxillary sinus involvement in 78.6%, ethmoid sinus disease in 69.0%, osteomeatal complex obstruction in 73.8%, and polyps in 26.2%. Significant correlation was observed between DNE and CT findings for middle meatal discharge, polyps, and osteomeatal complex disease ($p < 0.001$).

Conclusion- Diagnostic Nasal Endoscopy is a reliable, minimally invasive, and cost-effective tool for evaluating CRS. Strong correlation with CT findings supports its routine use as an initial diagnostic modality. CT remains indispensable for surgical planning and assessment of disease extent.

Keywords- Chronic Rhinosinusitis; Diagnostic Nasal Endoscopy; Computed Tomography

Introduction

Chronic rhinosinusitis (CRS) is one of the most prevalent disorders encountered in otorhinolaryngology practice and significantly affects quality of life, productivity, and healthcare expenditure. The disease is characterized by inflammation of the nasal and paranasal sinus mucosa persisting for more than 12 weeks despite appropriate medical treatment. Patients commonly present with nasal obstruction, nasal discharge, facial pain or pressure, hyposmia, and postnasal drip. The pathophysiology involves multifactorial interactions among infection, allergy, mucociliary dysfunction, anatomical variations, biofilms, and host immune responses.¹

Accurate diagnosis is essential for effective management and prevention of complications. Diagnostic Nasal Endoscopy (DNE) enables direct visualization of the nasal cavity, middle meatus, osteomeatal complex, and sinonasal mucosa. Computed Tomography (CT) of the paranasal sinuses remains the radiological gold standard for evaluating disease extent and anatomical variations.² The present study was undertaken to evaluate the role of DNE in CRS and determine its correlation with CT findings, thereby assessing its diagnostic utility in routine clinical practice.

Materials and Methods

Study Design

Prospective observational study.

Study Setting

Department of Otorhinolaryngology

Study Duration

One year.

Sample Size

42 patients.

Inclusion Criteria

- Patients aged ≥ 18 years.
- Clinical diagnosis of CRS according to EPOS criteria.
- Symptoms persisting for more than 12 weeks.
- Patients willing to provide informed consent.

Exclusion Criteria

- Acute rhinosinusitis.
- Previous sinonasal surgery.
- Sinonasal malignancy.
- Facial trauma.
- Immunocompromised patients.

Methodology

A total of 42 patients fulfilling inclusion criteria were enrolled. Detailed history regarding symptoms and duration was obtained. Complete ENT examination was performed.

Diagnostic Nasal Endoscopy

DNE was carried out using 0° and 30° rigid nasal endoscopes after topical decongestion and anesthesia. The following findings were documented:

- Mucosal edema
- Purulent discharge
- Nasal polyps
- Middle meatal pathology
- Deviated nasal septum
- Concha bullosa
- Paradoxical middle turbinate

Computed Tomography

All patients underwent CT scan of paranasal sinuses in coronal and axial planes. Findings recorded included:

- Maxillary sinus involvement
- Ethmoid sinus involvement
- Frontal sinus disease
- Sphenoid sinus disease
- Osteomeatal complex obstruction
- Polyps
- Anatomical variations

Statistical Analysis

Data were entered in Microsoft Excel and analyzed using SPSS version 26. Continuous variables were expressed as mean $\pm$ standard deviation. Categorical variables were expressed as percentages. Chi-square test was used to assess association between DNE and CT findings. Pearson correlation coefficient was applied to evaluate correlation. A p-value < 0.05 was considered statistically significant.

Results

Table 1. Demographic Characteristics (n=42)

Variable	Number of patients	Percentage (%)
Male	25	59.5
Female	17	40.5
Total	42	100

Mean age = 36.8 ± 12.4 years

Table 2. Clinical Presentation

Symptom	Number of patients	Percentage (%)
Nasal obstruction	37	88.1
Nasal discharge	33	78.6
Headache	28	66.7
Postnasal drip	22	52.4
Hyposmia	18	42.9
Facial pain	16	38.1

Table 3. Diagnostic Nasal Endoscopy Findings

Finding	Number of patients	Percentage (%)
Middle meatal discharge	30	71.4
Mucosal edema	29	69.0
Deviated nasal septum	20	47.6
Concha bullosa	11	26.2
Nasal polyps	10	23.8
Paradoxical middle turbinate	6	14.3

Table 4. CT Scan Findings

CT Finding	Number of patients	Percentage (%)
Maxillary sinus disease	33	78.6
Ethmoid sinus disease	29	69.0
OMC obstruction	31	73.8
Frontal sinus disease	15	35.7
Sphenoid sinus disease	10	23.8
Nasal polyps	11	26.2

Table 5. Correlation Between DNE and CT Findings

Parameter	DNE Positive	CT Positive	p-value
Middle meatal disease	30	31	<0.001
Nasal polyps	10	11	<0.001
OMC obstruction	28	31	<0.001
Anatomical variations	24	26	0.002

Strong positive correlation was observed between DNE and CT findings ($r = 0.84$, $p < 0.001$).

Discussion

Chronic rhinosinusitis remains a significant healthcare burden due to its chronic nature and recurrent symptoms. Accurate diagnosis requires both clinical assessment and objective evidence of sinonasal inflammation. The present study evaluated the utility of Diagnostic Nasal Endoscopy and its correlation with CT findings among 42 patients with CRS.

The majority of patients belonged to the third and fourth decades of life, with a slight male predominance. Similar demographic trends have been reported by Kennedy et al.³ and Stammberger et al.⁴ Nasal obstruction was the most common presenting symptom followed by nasal discharge and headache. These findings are consistent with international literature indicating obstruction as the hallmark symptom of CRS.⁵

Diagnostic Nasal Endoscopy demonstrated middle meatal discharge and mucosal edema as the most frequent findings. The middle meatus represents the drainage pathway for the maxillary, frontal, and anterior ethmoid sinuses and is considered the key anatomical site in CRS pathogenesis. Persistent inflammation causes mucosal swelling, impaired mucociliary clearance, and blockage of sinus ostia, resulting in secretion retention and chronic infection.⁶

CT scan revealed maxillary and ethmoid sinus involvement as the predominant radiological findings. This observation is explained by the anatomical dependence of these sinuses on a patent osteomeatal complex. Obstruction at this critical area initiates a cascade of hypoxia, mucosal edema, impaired ciliary function, bacterial colonization, and chronic inflammation.⁷

A highly significant correlation between DNE and CT findings was observed in our study. Endoscopic identification of middle meatal discharge showed excellent agreement with CT evidence of sinus disease. Likewise, endoscopically detected polyps strongly correlated with radiological findings. Similar observations have been reported by Bolger et al.,⁸ Zinreich et al.,⁹ and Bhattacharyya et al.¹⁰

The strong correlation coefficient ($r = 0.84$) emphasizes that DNE accurately reflects underlying sinonasal pathology. Endoscopy provides dynamic assessment of mucosal status, secretion patterns, and anatomical abnormalities that may not be clinically visible through anterior rhinoscopy alone. Furthermore, DNE facilitates targeted microbiological sampling and postoperative surveillance.¹¹

The pathophysiological basis for this correlation lies in the inflammatory remodeling of sinonasal mucosa. Chronic exposure to allergens, infectious agents, pollutants, and biofilms induces epithelial barrier dysfunction and cytokine-mediated inflammation. Elevated levels of interleukins, eosinophilic mediators, and matrix metalloproteinases contribute to mucosal edema, polyp formation, and osteomeatal obstruction, which are readily identified on both DNE and CT imaging.¹²

Despite its advantages, DNE cannot completely replace CT scanning. CT provides comprehensive evaluation of disease extent, hidden sinus involvement, bony anatomy, anatomical variants, and potential complications. It remains indispensable before Functional Endoscopic Sinus Surgery (FESS).^{13,14} Nevertheless, DNE offers a cost-effective and office-based method for initial diagnosis and follow-up.

The findings of the present study support the combined use of DNE and CT in CRS evaluation. DNE should be considered the first-line objective diagnostic modality, while CT should be reserved for confirmation, complicated disease, and surgical planning. This approach reduces unnecessary radiation exposure and healthcare costs while maintaining diagnostic accuracy.

Conclusion

Diagnostic Nasal Endoscopy is a highly effective and reliable diagnostic tool in patients with chronic rhinosinusitis. Significant correlation with CT findings confirms its value in detecting middle meatal pathology, nasal polyps, and osteomeatal complex obstruction. Although CT remains the gold standard for defining disease extent and preoperative planning, DNE serves as an excellent first-line investigative modality. Combined use of both techniques provides comprehensive evaluation and facilitates optimal management of CRS.

References -

1. Fokkens WJ, Lund VJ, Mullol J, Bachert C, Alobid I, Baroody F, et al. European Position Paper on Rhinosinusitis and Nasal Polyps 2012. *Rhinology*. 2012;50(Suppl 23):1-298.
2. Lund VJ, Kennedy DW. Staging for rhinosinusitis. *Otolaryngol Head Neck Surg*. 1997;117(3):S35-S40.

3. Kennedy DW. Functional endoscopic sinus surgery. Arch Otolaryngol. 1985;111(10):643-649.
4. Stammberger H. Functional endoscopic sinus surgery. Eur Arch Otorhinolaryngol. 1986;243(2):63-76.
5. Benninger MS, Ferguson BJ, Hadley JA, Hamilos DL, Jacobs M, Kennedy DW, et al. Adult chronic rhinosinusitis definitions. Otolaryngol Head Neck Surg. 2003;129(3):S1-S32.
6. Messerklinger W. Endoscopy of the nose. Baltimore: Urban & Schwarzenberg; 1978.
7. Kennedy DW, Zinreich SJ, Rosenbaum AE, Johns ME. Functional endoscopic sinus surgery. Arch Otolaryngol. 1985;111:576-582.
8. Bolger WE, Butzin CA, Parsons DS. Paranasal sinus bony anatomic variations. Laryngoscope. 1991;101(1):56-64.
9. Zinreich SJ. Imaging of inflammatory sinus disease. Otolaryngol Clin North Am. 1993;26(4):535-547.
10. Bhattacharyya N. Clinical and symptom criteria for chronic rhinosinusitis. Otolaryngol Head Neck Surg. 2006;134(3):373-377.
11. Levine HL. Functional endoscopic sinus surgery: Evaluation and follow-up. Otolaryngol Clin North Am. 1989;22(4):749-756.
12. Bachert C, Zhang N, Holtappels G, De Lobel L, Van Cauwenberge P, Liu S, et al. Presence of IL-5 protein and IgE antibodies in nasal polyps. J Allergy Clin Immunol. 2001;108(4):593-600.
13. Kennedy DW, Senior BA. Endoscopic sinus surgery: A review. Otolaryngol Clin North Am. 1997;30(3):313-330.
14. Hamilos DL. Chronic rhinosinusitis: Epidemiology and medical management. J Allergy Clin Immunol. 2011;128(4):693-707.