

FACTORS ASSOCIATED WITH SEVERE CHRONIC SINUSITIS USING COMPUTED TOMOGRAPHY

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Abstract

Aim: Nasal septal deviation (NSD) is a well-known risk factor for chronic sinusitis (CS). In this study, we will look for a link between severe chronic sinusitis and osteomeatal complex involvement with septal deviation presence, and septal deviation degree.

Method: Patients with chronic sinusitis or nasal obstruction were included in this cross-sectional study. The patients' CT images were re-examined to assess the presence of NSD and the degree of deviation. The Lund-Mackay criteria were used to assess the severity of CS. The number of patients with various degrees of NSD and NSD presence was investigated.

Results: Of 150 cases, 82.7% had septal deviation, and of them, 32.0% had a moderate degree of NSD. Moderate CS was the most prevalent severity. Moreover, a nonsignificant association was observed between severe CS sinusitis with osteomeatal complex involvement and the presence and degree of septal deviation.

Conclusion: No link was found between severe sinusitis, OMC involvement, and the existence and degree of NSD.

Introduction

CS is an inflammation of the sinuses or nasal passages that lasts more than 12 weeks. CS without nasal polyps, CS with nasal polyps, and allergic fungal rhinosinusitis are all possible symptoms. Patients present with purulent nasal discharge, facial or dental pain, and nasal blockage, which are the three fundamental symptoms of sinusitis⁽¹⁾.

CS is multifactorial, with infectious, inflammatory, and structural causes all playing a role. Other etiologies that should be considered include allergic rhinitis (dust mites, molds), exposures (airborne irritants, cigarette smoke, or other toxins), structural reasons (nasal polyps, deviated nasal septum), ciliary dysfunction, immunodeficiencies, and fungal infections⁽²⁾.

The Lund-Mackay score is a popular radiologic staging approach for chronic rhinosinusitis. When reading a CT scan of the paranasal sinuses and ostiomeatal complex, the reader awards a score to each sinus based on whether there is no abnormality, partial opacification, or complete opacification⁽³⁾.

NSD is described as the deviation of either the bony or cartilaginous septum or both, from the midline, resulting in respiratory illness caused by nasal cavity volume reduction. In up to 80% of healthy adults, it is the most prevalent anatomic variant⁽⁴⁾. NSD has been linked to the etiology of CRS by obstructing sinus outflow or interfering with mucociliary activity⁽⁵⁾.

The presence and degree of nasal NSD were linked to severe CS in this study. The findings of the study could aid in the development of therapeutic techniques. If there is a link between NSD existence, NSD degree, and CS, surgery (septoplasty) for NSD correction can minimize the occurrence of CS and, hence, related complications.

Method

Ethical clearance

This retrospective cross-sectional study was conducted in partnership with otolaryngologists and radiologists at Princess Haya Military Hospital/ Jordan's Royal Medical Services from May 2021 to December 2022. Jordan's Royal Medical Services Ethics Committee approved this study.

Design

Patients who visited an ENT clinic between May 2021 and December 2022 with nasal blockage or CS symptoms for more than 3 months, who were not responding to medical treatment, and who underwent a sinus computed tomography (CT) scan were included in the study. CT images were also used to assess the existence and severity of NSD. Patients having a recent history of nasal injuries and excessive smoking (>10 packs per year) were excluded.

The Lund-Mackay staging system was used to classify the severity of sinusitis ⁽⁶⁾. A fully engaged sinus received a score of 2 to indicate severe sinusitis, a partially engaged sinus received a score of 1 to represent moderate sinusitis, and an intact sinus received a score of 0 to represent mild sinusitis. The severity of sinusitis was calculated by calculating the most inflamed paranasal sinus.

The patients were classified into four categories based on their NSD degree: normal ($0 < \text{NSD} \leq 5$ [degree of the center]), mild ($5 < \text{NSD} \leq 10$), moderate ($10 < \text{NSD} \leq 15$), and severe ($\text{NSD} > 15$). ⁽⁷⁾ An NSD was defined as the most distorted angle to the right or left with an S-shaped deviation. Patients with no indications of chronic sinus inflammation on CT scans were excluded.

Statistical investigation

SPSS software was used for statistical analysis. To describe the qualitative elements, the percentage was employed as the descriptive indicator.

Ordinal logistic regression was used to assess the relationship between the existence and severity of NSD and CS severity.

Results

A total of 150 patients were enrolled in the study, with an average age of 34.4 ± 13.9 years old, and males formed 59.3% of the sample.

NSD has a high prevalence of 82.7%. The most common NSD degree was moderate ($10 \geq \text{NSD} > 15$) with 32% of patients, 15.3% having a normal NSD degree, see Table (1). Moderate chronic sinusitis (partial opacification) was the most prevalent severity with 42.67%, see figure (1).

Severe chronic sinusitis was most prevalent in the anterior ethmoidal sinus at 20.7%, while it was the least prevalent in the left sphenoid sinus at 4.0%, see Table (2).

Table (3) showed that neither presence of NSD nor NSD degree was associated with severe CS.

Discussion

The prevalence of NSD varies, and the explanation for this variation is most likely due to the classification criteria utilized ⁽⁸⁾. According to the findings in this study, we found that NSD was quite common in patients, with moderate NSD degree being the most prevalent. The most prevalent severity level of CS was found to be moderate, as compared to other severity levels. Numerous studies have attempted to examine the relationship between NSD and CS, but the results of these studies have been inconclusive and controversial. As a result of a review paper based on 25 publications published in 2001, it has been unable to conclusively prove that the NSD plays a role in the pathophysiology or genesis of CS ⁽⁹⁾. A review of five publications published in 2010 suggested, however, that there was an important relationship between sinusitis and NSD ⁽¹⁰⁾. Moreover, a systematic study conducted in 2022 has found that NSD is frequently occurring but is not in any way related to CS ⁽¹¹⁾. We found no significant correlation between severe sinusitis or osteomeatal complex involvement and the presence of NSD in our study.

Previous research has not found a link between the location of chronic sinusitis and the degree of nasal septum deviation⁽¹²⁾. These conclusions were corroborated by our findings. We found no significant correlation between severe sinusitis or osteomeatal complex involvement and the degree of NSD or the presence of NSD in our study.

We investigated how severe sinusitis is related to the presence and degree of NSD by looking at the relationship between the two. Furthermore, neither the presence nor the degree of NSD affected severe sinusitis. We recommend more studies to confirm these findings.

Limitations

The following three limitations apply to this study:

1. A cross-sectional descriptive approach was utilized, which only reflected the experiences of the participants during the investigation.
2. There was no comparative group included.
3. The period of this investigation was limited.

Conclusion

There was no link found between severe sinusitis, OMC involvement, and the existence and degree of NSD, which contradicts some researches but is consistent with others

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Tables

Table (1): Prevalence of nasal septal deviation and nasal septal deviation degree

Degree of NSD	
	Percent
Normal	15.3
Mild	26.0
Moderate	32.0
Severe	26.7
NSD presence	
	Percent
Absent	17.3
Present	82.7

NSD: Nasal septum deviation

Table (2): Prevalence of CS severity among paranasal sinuses

Paranasal sinus	Severity		
	Mild	Moderate	Severe
R.MS	36.7%	54.7%	8.6%
L.MS	41.3%	45.3%	13.4%
R.AES	53.3%	30.0%	16.7%
L.AES	56.0%	23.3%	20.7%
R.PES	60.0%	26.0%	14.0%
L.PES	58.0%	22.7%	19.3%
R.FS	68.7%	19.3%	12.0%
L.FS	62.7%	23.3%	14.0%
R.SS	70.7%	22.7%	6.6%
L.SS	71.3%	24.7%	4.0%
R.OMC	65.3%	20.7%	14.0%
L.OMC	60.7%	16.7%	22.6%

R: right, L: left, A: anterior, P: posterior, M: maxillary sinus, E: ethmoid sinus, F: frontal sinus, S: sphenoid sinus, OMC: osteomeatal complex

Table (3): Severe chronic sinusitis association with NSD presence and NSD degree

Severe chronic sinusitis	Degree of nasal septal deviation				
	Degree	p-value	Odds ratio	Lower bound	Upper bound
	Severe	0.56	0.70	0.21	2.30
	Moderate	0.95	1.03	0.41	2.60
	Mild	0.97	1.02	0.39	2.66
	Normal	Reference			
	Nasal septal deviation presence				
Present	0.84	0.89	0.29	2.76	
Absent	Reference				

Figures

Figure (1): Chronic sinusitis severity prevalence

