



## Original Research Article

# A HOSPITAL BASED RETROSPECTIVE STUDY TO EVALUATE ODONTOGENIC SINUSITIS AND TO ASSESS MANAGEMENT FOR REDUCING ITS INCIDENCE AT A TERTIARY CARE CENTER

Rakesh Garg<sup>1</sup>, Amrit Debbarma<sup>2</sup>, Taya Murtem<sup>3</sup>, Jairaj Kumar Vaishnav<sup>4</sup>

<sup>1</sup>Associate Professor, Department of Dentistry, RVRS Medical College, Bhilwara, Rajasthan, India.

<sup>2</sup>Assistant Professor, Department of Otorhinolaryngology, Tomo Riba Institute of Health & Medical Sciences (TRIHMS), Neharlagun, Arunachal Pradesh, India.

<sup>3</sup>Senior Resident, Department of Orthopedics, Tomo Riba Institute of Health & Medical Sciences (TRIHMS), Neharlagun, Arunachal Pradesh, India.

<sup>4</sup>Associate Professor, Department of Otorhinolaryngology, RVRS Medical College, Bhilwara, Rajasthan, India.

Received : 09/02/2024  
Received in revised form : 02/03/2024  
Accepted : 15/03/2024

### Corresponding Author:

**Dr. Jairaj Kumar Vaishnav**  
Associate Professor, Department of  
Otorhinolaryngology, RVRS Medical  
College, Bhilwara, Rajasthan, India.  
Email: jai2016@gmail.com.

DOI: 10.5530/ijmedph.2024.1.96

Source of Support: Nil,  
Conflict of Interest: None declared

**Int J Med Pub Health**  
2024; 14 (1); 522-525

### ABSTRACT

**Background:** Odontogenic sinusitis occurs when the Schneiderian membrane is perforated. This can happen in people with maxillary teeth caries and maxillary dental trauma. We carried out a retrospective study to determine the clinical features, etiologic factors, presenting symptoms, therapeutic tools, and radiological findings. We were looking to find the most appropriate diagnostic methods.

**Materials and Methods:** In this retrospective study, we examined the 50 patients who were diagnosed as odontogenic sinusitis in Department of Otorhinolaryngology in RVRS Medical College, Bhilwara, Rajasthan, India during previous two years. Five cases of pansinusitis with nasal polyps were excluded from this study. Thirty-eight of the 45 patients were initially diagnosed in our department (84.44%). Seven patients (15.55%) were referred from a Dental department. The patients were retrospectively analyzed according to medical records, which include sex, age, presenting symptom, etiologic factors, surgical and medical treatment, cultures, and radiological results which include involved sinus and teeth.

**Results:** In our study, the male to female ratio was 25:20, with a higher incidence in men. The age distribution was 10 to above 70 years, with an average age of 45.3 years. Dental extraction-related complications were the most common cause, found in 30 (66.67%) of the 45 patients. The most common presenting symptom was unilateral purulent nasal discharge. This unilateral nasal discharge was found in 30 patients (66.66%). Bony erosion of the involved maxillary sinus was observed in 20 cases (44.45%). The therapeutic modalities included Functional Endoscopic Sinus Surgery (FESS) in 32 cases (71.12%), a Caldwell-Luc operation in 3 cases (6.67%), 3 cases (6.67%) of dental management including dental extractions and dental implant removal, and 7 cases (15.55%) received only antibiotic treatment.

**Conclusion:** We concluded that there were no significant differences between the symptoms of odontogenic sinusitis and that of other types of sinusitis. Consultation between an otorhinolaryngologist and a dentist before a dental procedure plays a vital role to identify patients who have risk factors for odontogenic sinusitis and should be able to prevent the development of odontogenic sinusitis, because the most common cause of odontogenic sinusitis is iatrogenic.

**Keywords:** Odontogenic sinusitis, Maxillary Sinus, Dental extraction, Dentoalveolar cyst, Dental caries, Radicular cyst.

## INTRODUCTION

Maxillary sinusitis (acute or chronic) is defined as a symptomatic inflammation of the maxillary sinus, usually caused by viral, bacterial, allergic or fungal rhinitis.<sup>[1]</sup> Sinusitis with an odontogenic source account for 10% of all cases of maxillary sinusitis.<sup>[2,3]</sup> Odontogenic sinusitis deserves special consideration because it differs in microbiology, pathophysiology, and management compared to sinus diseases with other origins.<sup>[3]</sup>

The floor of the maxillary sinus extends into the alveolar process between the roots of adjacent teeth, creating elevations and depressions called “extensions,” with narrow cortical areas.<sup>[4,5]</sup> Under normal conditions, the relationship between the tooth and the floor of the maxillary sinus consists of either a thin layer of compact bone that provides support to the apical periodontal ligament fibers, to which it firmly adheres, or there is a direct relationship with the maxillary sinus mucosa. The inner lining of the maxillary sinus cavity is devoid of periosteum; therefore, in the absence of a thin layer of intervening bone, the periodontal tissues are in direct contact with the basal surface of the sinus mucosa.<sup>5</sup>

In apical periodontitis, a periodontal disease,<sup>6,7</sup> treatment with implants and extraction of upper premolars and molars<sup>8</sup> may increase the risk of pathological processes in the adjacent maxillary sinus. Of the odontogenic sinus diseases, apical periodontitis and periodontal disease account for 83% of all cases having dental origin.<sup>[6,9]</sup> The most frequent maxillary sinus pathologies are sinus mucosal thickening and mucous retention cysts, with a prevalence ranging from 8% to 29% and 2% to 36%, respectively.<sup>[9-12]</sup> Another study has reported a prevalence rate of odontogenic maxillary sinusitis ranging from 10% to 86%.<sup>[13]</sup>

Odontogenic sinusitis occurs when the Schneiderian membrane is perforated.<sup>[14]</sup> This can happen in people with maxillary teeth caries and maxillary dental trauma. There are also iatrogenic causes, such as the placement of dental implants and dental extractions.<sup>[14]</sup> The treatment of odontogenic sinusitis often requires management of the sinusitis as well as the odontogenic origin.<sup>[14]</sup> We carried out a retrospective study to determine the clinical features, etiologic factors, presenting symptoms, therapeutic tools, and radiological findings. We were looking to find the most appropriate diagnostic methods.

## MATERIAL AND METHODS

In this retrospective study, we examined the 50 patients who were diagnosed as odontogenic sinusitis in Department of Otorhinolaryngology in RVRS Medical College, Bhilwara, Rajasthan, India during previous two years. Five cases of pansinusitis with nasal polyps were excluded from this study. Thirty-eight of the 45 patients were initially diagnosed in our department (84.44%). Seven

patients (15.55%) were referred from a Dental department. The diagnosis of odontogenic sinusitis is based on a thorough dental and medical examination. This includes an evaluation of the patient's symptoms (according to the American Academy of Otolaryngology-Head and Neck Surgery (AAO-HNS) criteria, a diagnosis of rhinosinusitis requires at least 2 major factors or at least 1 major and 2 minor factors from a series of clinical symptoms and signs), a past dental history, and radiological findings, including a paranasal sinus CT scan. In addition, consultation with the dentistry department supported us in making a diagnosis of odontogenic sinusitis.

The patients were retrospectively analyzed according to medical records, which include sex, age, presenting symptom, etiologic factors, surgical and medical treatment, cultures, and radiological results which include involved sinus and teeth.

## RESULTS

In our study, the male to female ratio was 25:20, with a higher incidence in men. The age distribution was 10 to above 70 years, with an average age of 45.3 years. The incidence was highest in the fourth decade. All patients have no previous history of sinusitis.

Several conditions of odontogenic sinusitis were found. Dental extraction-related complications were the most common cause, found in 30 (66.67%) of the 45 patients. A dentigerous cyst was seen in 8 (17.78%) patients. A radicular cyst was seen in 5 (11.12%) and dental caries were the least common causes, with found in 2 (4.45%) of the 45 patients (table 1).

38 patients out of a total of 45 had been diagnosed directly after admission to otorhinolaryngology without dental treatment. Only seven patients were diagnosed with odontogenic sinusitis via a post dental treatment consultation. 42 of 45 patients did not have a preoperative consultation between a otorhinolaryngologist and a dentist prior to the dental procedure. A preoperative discussion between these two specialties prior to a dental procedure should be able to decrease the risk of developing odontogenic sinusitis.

The most common presenting symptom was unilateral purulent nasal discharge. This unilateral nasal discharge was found in 30 patients (66.66%). This was followed by unilateral facial pain in 5 (33.34%) patients, an offensive odor in 12 patients (26.66%), unilateral nasal congestion in 8 patients (17.78%), postnasal discharge in 7 patients (15.56%), and upper gingiva swelling and discharge in 7 patients (15.56%). No patient had fever. No significant differences were observed between the symptoms of odontogenic sinusitis and those of other types of sinusitis except the unilaterality in odontogenic sinusitis.

CT scan of the nose and paranasal sinuses were done in all cases. Bony erosion of the involved maxillary sinus was observed in 20 cases (44.45%). An oroantral fistula was observed in 12 cases (26.67%). The distribution of paranasal sinuses showing a soft tissue density is as follows: the maxillary sinus in 32 cases (71.12%), the maxillary and ethmoid sinuses in 8 cases (17.77%), the maxillary, ethmoid, and frontal sinuses in 3 cases (6.67%), and the maxillary, ethmoid, and sphenoid sinuses in 2 cases (4.44%). No cases of pansinusitis in CT scan were recorded.

The therapeutic modalities included Functional Endoscopic Sinus Surgery (FESS) in 32 cases (71.12%), a Caldwell-Luc operation in 3 cases (6.67%), 3 cases (6.67%) of dental management

including dental extractions and dental implant removal, and 7 cases (15.55%) received only antibiotic treatment (Table 2). Caldwell-Luc operation was done for the removal of a large radicular cyst and a supernumerary tooth that was located laterally in the sinus, making the endoscopic approach impossible. No recurrences were observed during the follow-up period for all patients. Seven patients who declined surgical treatment were treated only with antibiotics. Antibiotics (cefditoren pivoxil 300 mg/day or amoxicillin-clavulanic acid 1,875 mg/day) were used routinely for 3 weeks after the surgery. The follow-up period was between 2 months and 6 months, with an average of 4.5 months.

**Table 1: Presenting Symptoms of Odontogenic Sinusitis (n = 45)\***

	Dental extraction	Dentigerous Cyst	Radicular Cyst	Dental caries	Total
Rhinorrhea	12	8	5	5	30
Facial pain	8	4	2	1	15
Offensive odor	10	0	0	2	12
Nasal congestion	2	2	0	4	8
Post-nasal discharge	3	1	1	2	7
Gingival swelling	1	3	1	2	7

\*One or more findings are detected in one patient.

**Table 2: Therapeutic Modality of Odontogenic Sinusitis (n = 45)\***

	Dental extraction	Dentigerous Cyst	Radicular Cyst	Dental caries	Total
Functional endoscopic sinus surgery	16	8	6	2	32
Caldwell Luc operation	0	1	2	0	3
Dental treatment	0	1	0	2	3
Only antibiotic	2	1	1	3	7

## DISCUSSION

The close anatomic proximity of the root apices of the teeth (mainly second molar) to the maxillary sinuses makes dental disease a potential source for spread of this infection into the maxillary sinuses.

Previous studies have reported that the incidence is higher in women,<sup>3</sup> but in our study the male to female ratio was 1.25: 1. There was no significant difference in the incidence between sexes. Kaneko reported that younger individuals (third and fourth decade) appear to be more susceptible.<sup>15</sup> The incidence of sinusitis associated with odontogenic infections is very low despite the high frequency of dental infections.<sup>15</sup> However, this incidence is gradually increasing. In our study, the most common cause (30 cases) was dental extraction-related complications.

In our study, 30 (66.67%) of the 45 patients complained of unilateral purulent nasal discharge as the main symptom. There were no significant differences between the symptoms of odontogenic sinusitis and that of other types of sinusitis (AAO-HNS criteria for rhinosinusitis). In this study, diagnosis of odontogenic sinusitis could not make only on the presenting symptoms. However, almost all of the patients with odontogenic sinusitis had

unilateral symptoms. The possibility of odontogenic sinusitis should always be considered when a patient has unilateral symptoms. The appropriate work-up includes a history of dental treatment, radiological examination, and dental examinations. CT scan is very useful for diagnosing odontogenic sinusitis. It can show the relationship of the odontogenic origin to the maxillary sinus floor defect and the diseased tissues. It can also determine the exact location of a foreign body within the maxillary sinus.<sup>16,17</sup>

Both medical and surgical treatment is generally required for odontogenic sinusitis. The source of the infection must be eliminated to prevent a recurrence of sinusitis.

In our study, removal of a foreign tooth root from the maxillary sinus, extraction of infected tooth or root canal therapy were required to eliminate the source of infection. Dental infections are usually mixed polymicrobial aerobic and anaerobic bacterial infections caused by the same families of oral microorganisms made of obligate anaerobes and gram-positive aerobes.<sup>18</sup> Oral administration of antibiotics are effective against oral flora and sinus pathogens for 21 to 28 days. 3 More recently, less invasive functional endoscopic sinus surgery has been advocated for the treatment of odontogenic sinusitis.

We recommend preoperative evaluations for patients who suffer from previous symptoms of sinusitis or have predisposing factors in order to rule out structural drainage problems of the paranasal sinuses by intranasal observation and radiological examination. This could help identify patients with an increased risk of developing odontogenic sinusitis.

## CONCLUSION

It is concluded that there were no significant differences between the symptoms of odontogenic sinusitis and that of other types of sinusitis. However, most of the odontogenic sinusitis patients had unilateral symptoms. Consultation between an otorhinolaryngologist and a dentist before a dental procedure plays a vital role to identify patients who have risk factors for odontogenic sinusitis and should be able to prevent the development of odontogenic sinusitis, because the most common cause of odontogenic sinusitis is iatrogenic.

## REFERENCES

1. Ferguson M. Rhinosinusitis in oral medicine and dentistry. *Aust Dent J* 2014; 59:289e95.
2. Lopatin AS, Sysolyatin SP, Sysolyatin PG, Melnikov MN. Chronic maxillary sinusitis of dental origin: is external surgical approach mandatory? *Laryngoscope* 2002; 112:1056-9.
3. Mehra P, Murad H. Maxillary sinus disease of odontogenic origin. *Otolaryngol Clin North Am* 2004; 37:347-64.
4. Waite DE. Maxillary sinus. *Dent Clin North Am*. 1971; 15:349-68.
5. McGrowan DA, Baxter PW, James J. The maxillary sinus and its dental implications. 1st ed. London: Wright; 1993. p. 1-25.
6. Melen I, Lindahl L, Andreasson L, Rundcrantz H. Chronic maxillary sinusitis. Definition, diagnosis and relation to dental infections and nasal polyposis. *Acta Otolaryngol*. 1986; 101:320-7.
7. Abrahams JJ, Glassberg RM. Dental disease: a frequently unrecognized cause of maxillary sinus abnormalities. *AJR Am J Roentgenol*. 1996; 166:1219-23.
8. Doud-Galli SK, Lebowitz RA, Giacchi RJ. Chronic sinusitis complicating sinus lift surgery. *Am J Rhinol*. 2001; 15:181-6.
9. Engström H, Chamberlain D, Kiger R, Egelberg J. Radiographic evaluation of the effect of initial periodontal therapy on thickness of the maxillary sinus mucosa. *J Periodontol*. 1988;59:604-8.
10. Bhattacharyya N. Do maxillary sinus retention cysts reflect obstructive sinus phenomena? *Arch Otolaryngol Head Neck Surg*. 2000; 126:1369-71.
11. Mathew AL, Pai KM, Sholapurkar A. Maxillary sinus findings in the elderly: a panoramic radiographic study. *J Contemp Dent Pract*. 2009;10: E041-48.
12. Vallo J, Suominen-Taipale L, Huuononen S, Soikkonen K, Norblad A. Prevalence of mucosal abnormalities of the maxillary sinus and their relationship to dental disease in panoramic radiography: results from the Health 2000 Health Examination Survey. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2010;109: e80-7.
13. Ritter L, Lutz J, Neugebauer J. Prevalence of pathologic findings in the maxillary sinus in cone-beam computerized tomography. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2011;111:634-40.
14. Kretzschmar DP, Kretzschmar JL. Rhinosinusitis: review from a dental perspective. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2003; 96:128-35.
15. Kaneko I, Harada K, Ishii T, Furukawa K, Yao K, Takahashi H, et al. [Clinical feature of odontogenic maxillary sinusitis—symptomatology and the grade in development of the maxillary sinus in cases of dental maxillary sinusitis]. *Nippon Jibiinkoka Gakkai Kaiho* 1990; 93:1034-40.
16. Yoshiura K, Ban S, Hijiya T, Yuasa K, Miwa K, Arijii E, et al. Analysis of maxillary sinusitis using computed tomography. *Dentomaxillofac Radiol* 1993; 22:86-92.
17. Konen E, Faibel M, Kleinbaum Y, Wolf M, Lusky A, Hoffman C, et al. The value of the occipitomeatal (Water's) view in diagnosis of sinusitis: A comparative study with computed tomography. *Clin Radiol* 2000; 55:856-60.
18. Ugincius P, Kubilius R, Gervickas A, Vaitkus S. Chronic odontogenic maxillary sinusitis. *Stomatologija* 2006; 8:44-8.