

Frequency and Symptoms of Odontogenic Sinusitis: A Cross-Sectional Study

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Abstract

Background: Occasionally, chronic sinusitis has a dental origin. This Entity is usually resistant to common treatments and high clinical suspicion is necessary for its diagnosis. The symptoms of odontogenic sinusitis are similar to the symptoms caused by other causes of sinusitis, and so far no special symptoms have been introduced for it. In this study, we decided to measure the frequency of this disease and its symptoms.

Aim: The aim of this study was to examine people with dental sinusitis in CT scan (with or without clear signs of sinusitis) and also to examine the prevalence of sinonasal symptoms in all patients as well as the group with odontogenic sinusitis.

Methods: All candidates for septorhinoplasty in 2018 who came to the otorhinolaryngology clinic of Firoozgar Hospital, Tehran, Iran were included in the study. The coronal CT scan of the maxillary sinus of these people were checked for odontogenic sinusitis and at the same time the SNOT-22 sinonasal symptoms questionnaire was completed by the patients. Finally, the prevalence of odontogenic sinusitis and sinonasal symptoms among these patients have been examined.

Results: Twenty-eight of 100 patients had evidence of chronic sinusitis. The prevalence of odontogenic sinusitis in the studied population was 17%. The average score of SNOT-22 was 34.23 ± 8.87 in patients with chronic sinusitis and 38.0 ± 10.45 in patients with odontogenic sinusitis.

Conclusion: Sinonasal symptoms in patients with odontogenic sinusitis had a low prevalence and no special symptom can be considered to differentiate this disease from other causes of sinusitis.

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Introduction

Chronic sinusitis has a dental origin in some patients. Regarding other studies, about 40% of patients with unilateral sinusitis and 6% of patients with bilateral sinusitis had a dental origin (1). This disease can be caused by therapeutic interventions on the teeth of the upper jaw and other causes, including dental lesions and bone loss around the teeth roots (2). People with sinusitis with a dental origin often do not suffer from pain and increased tooth sensitivity and the symptoms are not helpful in differentiating this type of sinusitis

from other types (3). The symptoms caused by sinonasal diseases are categorized into 5 components: intranasal, extranasal, ear and face, sleep and functional problems and emotional problems (4). Computed Topography (CT) scan without Intravenous contrast of the maxillary sinus in coronal sections, as the diagnostic gold standard, can be used to diagnose sinusitis of dental origin. In the CT scan, mucosal thickening, evidence of maxillary sinusitis and retention cyst can be seen (2). This type of sinusitis is usually

resistant to conventional sinusitis treatments, and in many cases it is necessary to use surgical interventions for this purpose (5). However, it is important to note that dental causes are often neglected in radiology reports. Considering the neglect of dental causes in the study of chronic sinusitis, in this study, we investigate the prevalence of sinusitis with dental origin in Iran and extract the symptoms related to it in order to help in its timely diagnosis and treatment.

Methods

All candidates for rhinoplasty who visited the Otorhinolaryngology clinic of Firoozgar Hospital, Tehran, Iran in 2018 were included in this study. The aim of this study was to examine people with dental sinusitis in CT scan (with or without clear signs of sinusitis) and also to examine the prevalence of sinonasal symptoms in all patients as well as the group with odontogenic sinusitis. All patients who are candidates for rhinoplasty undergo a coronal CT scan of the paranasal sinuses due to insurance issues. Patients with CT scan involvement included for further analyze. In the CT scan, maxillary mucosal thickness of more than 2 mm, and evidence of a dental pathology as the causative factor considered as odontogenic sinusitis. Evidences of dental origin were foreign body such as dental filling materials in the sinus, dental manipulation and displaced root, abscess and periapical granulomas, or evidence of previous dental extraction. In this cross-sectional study, we will review the imaging findings of these patients retrospectively. Also, to check the sinonasal symptoms in patients, the SNOT-22 questionnaire was used along with four ancillary questions (feeling a bad smell from inside the nose, smelling a bad smell from the nose after sneezing, pain in the upper teeth and tooth sensitivity when coming in contact with hot and cold food). These questions were not incorporated into questionnaire score analysis.

SNOT-22 questionnaire was compiled in 2003 and validated in Persian in 2013 in order to evaluate the quality of life in patients with sinonasal symptoms (6). This questionnaire contains 22 items of the most common symptoms of sinonasal diseases. Each item includes 6 grades ranging from 0 to 5. A score of zero is considered for cases without symptoms, and patients consider scores from 0 to 5 for each item according to the severity of their symptoms. A score of 5 indicates the most severe possible condition of that symptom. Then the scores of all the items are added up and reported as scores between 0 and 110. The higher score shows the worse quality of life. In this study, the prevalence of odontogenic sinusitis and the mean score of the sinonasal symptoms questionnaire and the prevalence of each symptom were reported in addition to examining the CT scans of the patients. SPSS version 16 software was used for statistical analysis. Qualitative data are described as numbers and percentages. The quantitative data are described as mean and standard deviation if the data distribution were normal. In the case of non-normal distribution we used median as the central tendency measure and non-parametric tests in order to analyze the data. To compare mean between two groups student T-test was done. For non-quantitative variables chi-square test used to find out any relation between different subgroups of two variables. In all statistical tests maximum acceptable level of type one error considered 0.05 and p-value less than this cut off considered significant.

Results

During the study, 100 patients (including 75 female) underwent septorhinoplasty for cosmetic purposes. The mean age of them was 26.9 ± 6.36 years. 28 patients (28%) had evidence of chronic sinusitis in CT scan. The mean age of patients with chronic sinusitis was 28.1 ± 7.92 years. 22 of them were female. 18 of 28 had unilateral involvement and 10 had

bilateral sinusitis. Among the 28 patients, 17 patients (60.7%) had evidences of odontogenic sinusitis. 14 of 18 patients with unilateral sinusitis were odontogenic in origin. Chi square test revealed that odontogenic sinusitis presents more unilaterally. (p-value: 0.013). The mean score of the sinonasal questionnaire in this study was 29.12 (Table 1). The average

score of SNOT-22 was 26.55 ± 5.83 in patients without chronic sinusitis, and 35.71 ± 9.52 in patients with chronic sinusitis (two independent samples t-test p-value: <0.001). The mean score of SNOT-22 in odontogenic group was 34.23 ± 8.87 and in non-odontogenic group was 38.0 ± 10.45 (Two independent samples t-test p-value: 0.322).

Table 1. variables and their mean/ frequency

Variable	Subgroups	Mean/frequency (Standard deviation/percent)
Gender	Female	75 (75)*
	Male	25 (25)
CT scan findings	Normal CT scan	72 (72)
	Odontogenic sinusitis	17 (17)
	Other types of sinusitis	11 (11)
SNOT-22 score	Odontogenic sinusitis	34.23 (8.87)
	Sinusitis with Non-odontogenic origin	38.0 (10.45)
Unilateral/Bilateral sinusitis	Unilateral	18 (18)
	Bilateral	10 (10)

Age and gender distribution of patients with chronic sinusitis are present in the text.

Table 2. Mean score of each symptom among different groups of patients

SNOT-22 questionnaire symptoms (plus four ancillary symptoms in four last rows)	Sinusitis with non-odontogenic origin	Odontogenic sinusitis group	Chronic sinusitis patients	Healthy individuals
Need for frequent nasal drainage	1.09±0.70	1.5±0.87	1.39±0.83	1.45±0.71
Nasal obstruction	2.18±1.7	1.29±0.58	1.62±1.2	1.19±0.72
Sneezing	1.72±1.27	1.29±0.58	1.46±0.9	1.06±0.61
Rhinorrhea	2.09±1.44	1.52±0.62	1.75±1.04	1.37±0.56
Cough	1.36±0.67	1.58±0.71	1.5±0.69	1.5±0.88
Post nasal discharge	1.5±1.03	1.35±0.7	1.42±0.83	1.5±0.74
Thick nasal discharge	1.45±1.29	1.47±0.94	1.46±1.07	1.5±0.69
Aural fullness	1.00±0.77	1.64±1.16	1.39±1.06	1.23±0.72
Vertigo	1.54±1.29	1.82±0.8	1.71±1.01	1.4±0.85
Earache	1.45±1.03	1.7±0.91	1.60±0.95	1.04±0.73
Facial pain	1.63±0.8	1.58±0.79	1.60±0.78	1.16±0.83
Taste and smell dysfunction	1.58±0.71	2.36±1.28	1.89±1.03	1.09±0.87
Sleep disorder	2.09±1.30	1.88±0.99	1.96±1.1	1.66±1.03
Daytime fatigue	3.18±1.77	1.64±0.86	2.25±1.48	1.41±0.78
Concentration difficulty	2.6±1.43	1.82±0.88	2.14±1.17	1.51±0.83
Irritability	1.63±0.92	1.82±0.8	1.75±0.84	1.16±0.82
Blushing	1.63±0.67	1.94±0.82	1.82±0.77	1.02±0.83
Sleep onset disorder	1.00±0.89	1.11±0.85	1.07±0.85	0.61±0.77
Sleep quality	1.54±1.12	1.17±0.80	1.32±0.94	0.79±0.55
Waking up tired	1.72±1.00	1.52±0.87	1.60±0.91	0.84±0.68
Decreased efficacy	2.00±0.89	1.76±0.56	1.85±0.7	1.13±0.86
Discomfort	1.09±0.3	1.05±0.74	1.07±0.6	0.75±0.64
Bad smell in the nose	2.00±1.00	1.88±0.99	1.92±0.97	1.26±0.83
Bad smell after sneezing	2.00±0.77	1.7±0.58	1.82±0.66	1.4±0.72
Tooth sensitivity	1.54±1.03	1.58±0.71	1.57±0.83	1.11±0.77
Toothache	1.18±1.07	1.64±0.7	1.46±0.88	1.2±0.67

Mean score for each item are shown in Table 2. In the comparison of the mean scores of sinonasal symptoms between two groups with and without chronic sinusitis symptoms of sneezing, earache, facial pain, taste and smell disorders, daytime sleepiness, concentration disorders, irritability, sleep disorders, decreased sleep quality, decreased efficacy and waking up tired were more common in patients with chronic sinusitis than others. Among patients with chronic sinusitis, the only symptom which was different in odontogenic group comparing with chronic

sinusitis with non-odontogenic origin was "daytime sleepiness". This symptom was more common in odontogenic group. P-values of Tests are shown in Table 3.

In the next step the symptoms were scored as positive and negative. (1 and 0 respectively) And the prevalence of each type of symptom was investigated (chi-square test). In none of the 26 symptoms, there was significant difference between people with odontogenic and non-odontogenic sinusitis (p-value>0.05 in all tests).

Table 3. P-value of T-test for each symptom

SNOT-22 questionnaire symptoms (plus four ancillary symptoms in four last rows)	P- value of Two independent samples T between Odontogenic group and non-odontogenic group	P- value of Two independent samples T between Healthy individuals and chronic sinusitis patients
Need for frequent nasal drainage	0.1	0.6
Nasal obstruction	0.2	0.1
Sneezing	0.4	0.04
Rhinorrhea	0.4	0.08
Cough	0.3	0.7
Post nasal discharge	0.8	0.4
Thick nasal discharge	0.7	0.6
Aural fullness	0.09	0.8
Vertigo	0.1	0.2
Earache	0.5	0.005
Facial pain	0.9	0.024
Taste and smell dysfunction	0.07	0.001
Sleep disorder	0.6	0.06
Daytime fatigue	0.019	0.009
Concentration difficulty	0.09	0.014
Irritability	0.4	0.008
Blushing	0.2	0.001
Sleep onset disorder	0.6	0.009
Sleep quality	0.43	0.006
Waking up tired	0.7	0.001
Decreased efficacy	0.5	0.001
Discomfort	0.9	0.017
Bad smell in the nose	0.85	0.002
Bad smell after sneezing	0.4	0.013
Toothache	0.2	0.06
Tooth sensitivity	0.8	0.012

Discussion

Maxillary sinus infection with dental origin accounts for about 10-12% of all maxillary sinusitis cases. This type of infection is pathophysiologically different from other

maxillary sinus infections and usually does not respond to common sinusitis treatments, and in many cases treatment of tooth infection alone or together with other treatments leads to its resolution (4).

In the present study, one hundred candidates for rhinoplasty surgery were examined by sinus imaging and also completed the sinonasal symptoms questionnaire. About two third of patients with chronic sinusitis were odontogenic in origin. In Turfe's study, where 134 patients with unilateral maxillary sinus involvement were examined, unilateral sinusitis of odontogenic origin was reported in 45% of cases, which is a lower percentage than the current study (7).

The overall average score of SNOT among people was 29.12 ± 8.13 . Statistical analysis showed that the average score of SNOT in people with maxillary sinusitis is higher than non-afflicted people. However, there was no significant difference between odontogenic and non-odontogenic sinusitis. In another study, there was no significant difference between the SNOT score in the odontogenic and rhinogenic groups. (8) In another study conducted by Oreski, there was no significant difference between the SNOT score in odontogenic and non-odontogenic sinusitis. (9) Result of different studies shows that SNOT-22 questionnaire score cannot differentiate between odontogenic and non-odontogenic sinusitis.

The results of our study indicate that sinonasal symptoms do not have a high prevalence in odontogenic sinusitis, and these symptoms cannot be relied on to diagnose this disease. In a study including 21 patients with dental sinusitis, toothache was present in only 29% of patients. (10) In a retrospective study by Lee (11), it was determined that unilateral purulent rhinorrhea with a prevalence of 66.7% is the most common symptom in patients with odontogenic sinusitis. Also, in this study, one-third of the patients in this study had unilateral cheek pain. A bad sense of smell or taste was also reported in 26% of Lee's study patients.

In another study conducted by Longhini (10) unilateral nasal obstruction was reported to be the most common symptom in odontogenic sinusitis. Bad smell and taste were present in

48% of patients and toothache was reported in 29% of patients. As a result, in past studies, bad smell and taste along with unilateral sinusitis were the most common sinonasal symptoms related to odontogenic sinusitis.

In the present study, the only symptom that had a higher score in odontogenic sinusitis than non-odontogenic sinusitis was daytime sleepiness. In the study of Simuntis (8) and the study of Goyal (12), the most common characteristic symptom of odontogenic sinusitis was the feeling of bad smell in the nose.

Regarding the heterogeneity of results in different studies, it is still recommended to in case of clinical doubt and chronic sinusitis resistant to treatment, this disease should be taken into consideration and investigated with imaging modalities. Since many individuals who are candidate for rhinoplasty, consider any symptoms related to the nose and sinuses as a complication of the surgery. Preoperative diagnosis of these disorders, in addition to the possibility of treatment and increasing the breathing quality of patients, protects the doctor and prevents the occurrence of disagreements and damage of trust between the doctor and the patient. Our study limitation was relatively small sample size and to more precise evaluation of this group of patients larger studies will be informative.

Conclusion

The relatively high prevalence of sinusitis in asymptomatic patients applying for nose surgery shows that it is necessary to pay attention to this finding before surgery. In addition, it is important to consider odontogenic etiology for a high percentage of these sinusitis. Odontogenic sinusitis does not have a characteristic symptom for the clinical diagnosis, and therefore a high clinical suspicion is needed for this purpose.

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Conflicts of Interest

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Ethics

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References

1. estin Fredriksson M, Öhman A, Flygare L, Tano K. When Maxillary Sinusitis Does Not Heal: Findings on CBCT Scans of the Sinuses With a Particular Focus on the Occurrence of Odontogenic Causes of Maxillary Sinusitis. *Laryngoscope Investig Otolaryngol.* 2017 Dec 11;2(6):442-446. doi: 10.1002/lio2.130. PMID: 29299521; PMCID: PMC5743152.
- 2 Nascimento EH, Pontual ML, Pontual AA, Freitas DQ, Perez DE, Ramos-Perez FM. Association between Odontogenic Conditions and Maxillary Sinus Disease: A Study Using Cone-beam Computed Tomography. *J Endod.* 2016 Oct;42(10):1509-15. doi: 10.1016/j.joen.2016.07.003. Epub 2016 Aug 10. PMID: 27522456.
3. Workman AD, Granquist EJ, Adappa ND. Odontogenic sinusitis: developments in diagnosis, microbiology, and treatment. *Current opinion in otolaryngology & head and neck surgery.* 2018 Feb 1;26(1):27-33. doi: 10.1097/MOO.0000000000000430
4. Simuntis R, Vaitkus J, Kubilius R, Padervinskis E, Tušas P, Leketas M, Šiupšinskienė N, Vaitkus S. Comparison of sino-nasal outcome test 22 symptom scores in rhinogenic and odontogenic sinusitis. *American Journal of Rhinology & Allergy.* 2019 Jan;33(1):44-50. doi: 10.1177/1945892418804975
5. Brook I. Sinusitis of odontogenic origin. *Otolaryngology—Head and Neck Surgery.* 2006 Sep;135(3):349-55. doi: 10.1016/j.otohns.2005.10.059
6. Jaleesi M, Farhadi M, Kamrava SK, Amintehran E, Asghari A, Hemami MR, Mobasseri A, Masroorchehr M. The reliability and validity of the persian version of sinonasal outcome test 22 (snot 22) questionnaires.

Iranian Red Crescent Medical Journal. 2013 May;15(5):404. PMCID: PMC3838650

7. Turfe Z, Ahmad A, Peterson EI, Craig JR. Odontogenic sinusitis is a common cause of unilateral sinus disease with maxillary sinus opacification. *International Forum of Allergy & Rhinology* 2019 Dec (Vol. 9, No. 12, pp. 1515-1520). Doi: 10.1002/alr.22434

8. Simuntis R, Vaitkus J, Kubilius R, Padervinskis E, Tušas P, Leketas M, Šiupšinskienė N, Vaitkus S. Comparison of sino-nasal outcome test 22 symptom scores in rhinogenic and odontogenic sinusitis. *American Journal of Rhinology & Allergy.* 2019 Jan;33(1):44-50. doi: 10.1177/1945892418804975

9. Oreški I, Gregurić T, Gulinić P, Oreški NP, Brajdić D, Vagić D. Differences in self-reported symptoms in patients with chronic odontogenic and non-odontogenic rhinosinusitis. *American Journal of Otolaryngology.* 2020 Mar 1;41(2):102388. doi: 10.1016/j.amjoto.2020.102388

10. Longhini AB, Ferguson BJ. Clinical aspects of odontogenic maxillary sinusitis: a case series. *International forum of allergy & rhinology* 2011 Sep (Vol. 1, No. 5, pp. 409-415). Hoboken: Wiley Subscription Services, Inc., A Wiley Company. doi: 10.1002/alr.20058

11. Lee KC, Lee SJ. Clinical features and treatments of odontogenic sinusitis. *Yonsei medical journal.* 2010 Nov 1;51(6):932-7. doi: 10.3349/ymj.2010.51.6.932

12. Goyal VK, Ahmad A, Turfe Z, Peterson EI, Craig JR. Predicting odontogenic sinusitis in unilateral sinus disease: a prospective, multivariate analysis. *American Journal of Rhinology & Allergy.* 2021 Mar;35(2):164-71. doi: 10.1177/1945892420941702