REVIEW ARTICLE

Odontogenic Maxillary Sinusitis: An Underestimated Disease

Henrikas Rusilas[1], Elvinas Juzikis[2]
1& 2- Lithuanian University of Health Sciences [LUHS], Kaunas, Lithuania 50276

Abstract

***Background**: Maxillary sinusitis is often caused by dental pathologies and dentoalveolar surgical interventions. A misdiagnosis of this disease is still common among otolaryngologists and dentists even though very detailed diagnostic imaging is available all across the world. While the chronic maxillary sinusitis isn't a very serious condition, the complications can be nearly fatal. **Objectives:** The objective of this review was to show that the early and correct diagnosis of odontogenic maxillary sinusitis is necessary in order to prevent extremely dangerous complications. **Methods**: A systematic literature review was carried out using PubMed and Google Scholar search engines looking for these keywords: odontogenic, sinusitis, diagnosis, complication. All reviewed publications were published in the English language. We have filtered the articles according to PRISMA criteria. **Results**: We included 20 publications from PubMed e-database and 2 publications were additionally included after conducting a search using Google Scholar search engine. The purpose of this study was to show how modern technologies and a decent knowledge of medicine and dentistry can prevent this serious disease. **Conclusions**: A tight cooperation between otolaryngologist and dentist or maxillofacial surgeon together with modern imaging tools is required in order to prevent serious complications of odontogenic maxillary sinusitis.*

***Keywords**: Edentulous, dental, implant, prosthetics.*

Address for correspondence: Henrikas Rusilas. Lithuanian University of Health Sciences V. Kudirkos 19, Kaunas, Lithuania 50276. Mobile Number: +370 64142041 E-Mail: henrikas.h@gmail.com

Received on: 17/12/2017 Revised: 19/12/2017 Accepted : 20/12/2017

Introduction

Maxillary sinuses are possibly the most important and most vulnerable paranasal sinuses in the fields of dentistry and maxillofacial surgery because of their proximity to the roots of maxillary teeth. [(1)]Sometimes the significance of odontogenic maxillary sinusitis (MS) is not appreciated, but it becomes clearer when it is understood that 2,29% to 40 % of chronic sinusitis is caused by dental pathologies and 10% to 64 % are caused by dentoalveolar surgical interventions [(2,3,13,14)]. Pathology of posterior maxillary teeth can lead to a variety of complications: ranging from mild forms of mucosa thickening in the maxillary sinus, to severe complications like brain abscess, subdural empyema or even orbital infections [(4-7)]. Often MS does not resolve by itself or even respond to medical treatment – in these cases, functional endoscopic sinus surgery is required.

Methods

A systematic literature review was conducted according to PRISMA criteria: out of 226 articles, we included 22 after removing all the duplicates, animal studies, systematic reviews and articles not concerning odontogenic sinusitis. Evaluated studies were published between January 2007 and 2017 December. The search was accomplished using these keywords: odontogenic, sinusitis, complications, diagnosis. All included articles were available in English.

Results

We included 20 publications from PubMed e-database and 2 publications were additionally included after conducting a search using Google Scholar search engine. The purpose of this study was to show how modern technologies and a decent knowledge of medicine and dentistry can prevent this serious disease.

Diagnostic tools and tactics

Odontogenic sinusitis (OS), either chronic or acute, is sometimes underestimated by dental and otolaryngologists– the disease is recognized as common but often misdiagnosed. When the rhinogenic cause of sinusitis is not found or the treatment with antibiotics fail, the patient is referred to see the dentist or maxillofacial surgeon in order to diagnose a suspected dental pathology. While orthopantomogram (OPG) in most cases is trustworthy and reliable diagnostic method for detecting dental caries, periapical lesions, cysts and other pathologies in the mouth, diagnosis of maxillary sinusitis often requires a 3D view of the region. After comparison of conventional CT, dental periapical and panoramic radiographs in identifying the dental cause of MS *Simuntis et al.*[8] sensitivity and specificity of CT were 89.7 and 94.6% while OPG had the lowest values of 68.2 and 77.3%.

Conventional CT is one of the most specific and sensitive diagnostic tools to identify an odontogenic cause of MS – but Cone beam CT (CBCT) has even more advantages comparing to CT. CBCT has lower radiation dose, it's a chairside process and well tolerated by patients, it is more accurate to visualize details like endodontic and periodontal pathologies, due to the larger field of view, it is less likely to create artifacts. These qualities make CBCT a very reliable tool for the evaluation of structures within and adjacent to the maxillary sinuses and diagnosing odontogenic infections.

Authors tend to strongly recommend using CBCT in cases where dental pathology may be involved in the development of MS[9-12], the CBCT results should be evaluated both by an otolaryngologist and oral or maxillofacial surgeon in order to find the right diagnosis. If CBCT is not available then either OPG or conventional CT should be carried out. In terms of imaging characteristics [9] authors considered that a normal sinus is found when no MT can be detected or an uniform MT <2 mm is observed and that, OS can be defined when there is a soft tissue density mass within the sinus, where the MT is limited to the area of a tooth presenting one or more of the following conditions: caries, defective restoration, periapical lesion or an extraction site. It is crucial to differentiate an odontogenic sinusitis (CRS) from a chronic rhinosinusitis, which frequently affects both sinuses. Unilateral imaging of sinus alterations usually tells us that a local cause is present and that dental evaluation is necessary. If unilateral pathology of the sinus is detected together with ipsilateral foul-smelling nasal discharge or other symptoms (nasal blockage/ loss or reduction of smell/ nasal obstruction) it is very likely that the cause of pathology is odontogenic. Whenever there is a suspicion that more serious condition is present (i.e. tumors, mucous cysts, retention cysts etc.) the patient should be referred to a specialist in order to confirm or deny the diagnosis.

Complications of chronic sinusitis

While chronic maxillary sinusitis might not be a life-threatening condition itself, under certain circumstances it might become an extremely severe condition. We have gathered a series of case reports in order to show how dangerous misdiagnosis or mismanagement of chronic odontogenic sinusitis can be.

Akashi et al. [15] have described three clinical cases of brain abscess deriving from odontogenic source since other sources of intracranial infection such as endocarditis and maxillary sinusitis were not found. The authors report the cases of brain abscesses: a 64-year-old man, a 68-year-old man, and a 64-year-old woman. All three patients were successfully treated with surgical drainage of abscess, antibiotics, and sanitation of oral cavity.

Procacci et al. [16] presented a case of the orbital abscess with periorbital cellulitis, in a 35-year-old man with positive recent dental history of a periapical dental infection arising from the second upper left premolar spread into the maxillary sinus. The man showed facial edema, ocular pain, ophthalmoplegia, and proptosis. CT finding included bilateral opacification of ethmoidal and maxillary sinuses, with an erosion of the left orbital floor and spreading of logistic process into the orbit, and opacification of the left frontal sinus. A surgical intervention to drain the abscess and a revision of the dental lesion and maxillary sinus were required – the 26th tooth was extracted and the left maxillary sinus revision was executed according to Caldwell-Luc technique. Sinus disease was highlighted as the most common predisposing factor for the development of orbital infections. [17]

Dental infections in conjunction with maxillary sinusitis are especially dangerous for children because of their thin anatomical structures and undeveloped immune system. Arunkumar[22] presented a case of 10-year-old boy with acute orbital cellulitis which derived from carious primary molars with a periapical abscess. After emergency surgical drainage in infraorbital area, extraction of carious deciduous molars, sinus lavage, and antibiotic therapy the patient showed a good recovery with a return of vision and reduction of proptosis. Three months after, a patient had recovered his lost vision and eye ball movements completely without any residual ophthalmological complications.

Another life-threatening complication of sinusitis is subdural empyema as it is seen in case of report by Stevens and others [18]. A 45-year-old man was admitted to the ophthalmological department with a periorbital swelling so severe it disabled him to open his left eye. The swelling and a headache had been building up for 4 days upon admission. No previous history of sinusitis was known. Intraoral examination showed a normal mucosa and no dental abnormalities were noted. After CT scan examination left functional endoscopic sinus surgery and canthotomy in an effort to save the patient‘s vision in the left eye. A large amount of pus was evacuated from the left ethmoidal, frontal, and maxillary sinuses. Twoteeth(22and26) were after periodontal abscesses were detected. A variety of different antibiotics and antifungal medication was prescribed for the patient in order to eliminate infection (cefuroxime, metronidazole, voriconazole, meropenem, linezolid). 44 days after admission the patient was discharged from the hospital – He still had neurological sequelae from the infection, such as loss of vision on the left eye and speech impairment as well as loss of short-term memory. It is noted that subdural empyema is a neurosurgical emergency associated with a high mortality. The sinusitis is believed to infect the subdural space either through osteomyelitis of the skull or by retrograde movement of septic thrombi via the small veins of the involved sinus. In this case the rapid progression of the infection is possibly caused by treatment of rheumatoid arthritis by methotrexate tablets. Similar complications are observed in other authors publications as well. [19-21]

Discussion & Conclusion

With the current technology in dentistry and medicine, in general, it is easier than ever to diagnose maxillary sinusitis. If a patient presents with unilateral nose blockage or foul-smelling nasal discharge and periodontal anomalies are suspected intraorally, a CBCT or CT scans should be always performed in order to confirm the diagnosis of odontogenic maxillary sinusitis. Although the risk of complications is rather low but the previously described complications are anywhere from long-time damaging to fatal. A special care of immunocompromised patients or children is required since the infection from maxillary sinus spreads extremely fast.

We believe that cooperation of otolaryngologist and dentists, maxillofacial surgeons is necessary in order to manage odontogenic maxillary sinusitis efficiently. Misdiagnosis or undervaluation of this disease is extremely dangerous and too frequent having in mind the possibilities of diagnostic tools we have nowadays.

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

References

1. Taschieri S, Torretta S, Corbella S, et al. Pathophysiology of sinusitis of odontogenic origin. J Investig Clin Dent. 2017;8(2) http://sci-hub.io/10.1111/jicd.12202
2. Troeltzsch M, Pache C, Troeltzsch M, et al. Etiology and clinical characteristics of symptomatic unilateral maxillary sinusitis: A review of 174 cases. J Craniomaxillofac Surg. 2015;43(8):1522-9.
3. Drumond JP, Allegro BB, Novo NF, De miranda SL, Sendyk WR. Evaluation of the Prevalence of Maxillary Sinuses Abnormalities through Spiral Computed Tomography (CT). Int Arch Otorhinolaryngol. 2017;21(2):126-133.
4. Palomolópez N, Freire aragón MD, Rivera fernández V. Subdural empyema as a complication of odontogenic maxillary sinusitis. Med Intensiva. 2017;
5. Akashi M, Tanaka K, Kusumoto J, Furudoi S, Hosoda K, Komori T. Brain Abscess

Potentially Resulting from Odontogenic Focus: Report of Three Cases and a Literature Review. J Maxillofac Oral Surg. 2017;16(1):58-64.
6. Arunkumar KV. Orbital Infection Threatening Blindness Due to Carious Primary Molars: An Interesting Case Report. J Maxillofac Oral Surg. 2016;15(1):72-5.
7. Procacci P, Zangani A, Rossetto A, Rizzini A, Zanette G, Albanese M. Odontogenic orbital abscess: a case report and review of literature. Oral Maxillofac Surg. 2017;21(2):271-279.
8. Simuntis R, Kubilius R, Padervinskis E, Ryškienė S, Tušas P, Vaitkus S. Clinical efficacy of main radiological diagnostic methods for odontogenic maxillary sinusitis. European Archives of Oto-Rhino-Laryngology 2017;274:3651–8.
9. Vidal, F., Coutinho, T. M., Ferreira, D. D., Souza, R. C., &Gonçalves, L. S. (2017). Odontogenic sinusitis: a comprehensive review. *ActaOdontologicaScandinavica,75*(8), 623-633.
10. Lofthag-Hansen S, HuumonenS, GröndahlK, et al. Limited conebeam CT and intraoral radiography for the diagnosis of periapical pathology. Oral Surg Oral Med Oral Pathol Oral RadiolEndod. 2007;103:114–119.
11. 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;42(10):1509-15.
12. Demidova E, Khurdzidze G. [CONE BEAM COMPUTED TOMOGRAPHY IN DIAGNOSTICS OF ODONTOGENIC MAXILLARY SINUSITIS (CASE REPORTS)]. Georgian Med News. 2017;(267):19-27.
13. Ferguson M. Rhinosinusitis in oral medicine and dentistry. Aust Dent J. 2014;59(3):289-95.
14. Akhlaghi F, Esmaeelinejad M, Safai P. Etiologies and Treatments of Odontogenic Maxillary Sinusitis: A Systematic Review. Iran Red Crescent Med J. 2015;17(12):e25536.
15. Akashi M, Tanaka K, Kusumoto J, Furudoi S, Hosoda K, Komori T. Brain Abscess Potentially Resulting from Odontogenic Focus: Report of Three Cases and a Literature Review. J Maxillofac Oral Surg. 2017;16(1):58-64.
16. Procacci P, Zangani A, Rossetto A, Rizzini A, Zanette G, Albanese M. Odontogenic orbital abscess: a case report and review of literature. Oral Maxillofac Surg. 2017;21(2):271-279.
17. Caruso PA, Watkins LM, Suwansaard P, Yamamoto M, Durand ML, Romo LV, Rincon SP, Curtin HD (2006) Odonthogenic orbital inflammation: clinical an CT findings-initial observations. Radiology 239:187–194
18. Stevens EM, Frendø M, Von buchwald C. Late diagnosis of odontogenic sinusitis with near-fatal outcome - a case report. Clin Case Rep. 2016;4(3):261-4.
19. Palomolópez N, Freire aragón MD, Rivera fernández V. Subdural empyema as a complication of odontogenic maxillary sinusitis. Med Intensiva. 2017;
20. Martines F, Salvago P, Ferrara S, Mucia M, Gambino A, Sireci F. Parietal subdural empyema as complication of acute odontogenic sinusitis: a case report. J Med Case Rep. 2014;8:282.
21. Pajor A, Durko T, Maciaszczyk K. [Subdural abscess in course of chronic sinusitis--a case report]. Otolaryngol Pol. 2009;63(3):274-8.
22. Arunkumar KV. Orbital Infection Threatening Blindness Due to Carious Primary Molars: An Interesting Case Report. J Maxillofac Oral Surg. 2016;15(1):72-5.