CMJ, 2024; 46(4): 292-296
DOI: 10.7197/cmj.1581479

Cumhuriyet Medical Journal

| cmj.cumhuriyet.edu.tr | Founded: 2004 Available online, ISSN:1305-0028 Publisher: Sivas Cumhuriyet Üniversitesi

Migration of Dental Implant into The Sinus and Secondary Odontogenic Maxillary Sinusitis: Case Report

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Case Report

History

Received: 08/11/2024
Accepted: 21/12/2024

ABSTRACT

Due to the close relationship between the maxillary sinus and the posterior maxillary tooth apices, oro-antral fistula and maxillary sinusitis may occur after interventional procedures performed in this region. In this case, a 53-year-old male patient placed an implant for his left second premolar tooth 7 months ago, but migration of the implant into the maxillary sinus has been detected. Nasal endoscopic examination revealed edema and hyperemia at the level of the left maxillary sinus ostium, but no foreign body was observed. A hyperdense image was reported on paranasal sinus tomography, narrowing the left maxillary sinus ostium and creating obstruction in the osteomeatal unit. Surgical intervention was planned for the patient, implant material was removed, and the maxillary sinus was cleared of inflamed tissues by the functional endoscopic sinus surgery was performed under general anesthesia. With this case that we present to the literature, we aimed to draw attention to odontogenic factors in the etiology of maxillary sinusitis and to raise awareness for the diagnosis and treatment of the disease.

Keywords: Dental implant, odontogenic maxillary sinusitis, migration of foreign body, endoscopic sinüs surgery

Dental İmplantın Sinüse Migrasyonu ve Sekonder Odontojenik Maksiller Sinüzit: Olgu Sunumu

Olgu Sunumu

Süreç

Geliş: 08/11/2024
Kabul: 21/12/2024

ÖZET

Maksiller sinüs ile posterior maksiller diş apeksleri arasındaki yakın ilişki nedeniyle bu bölgeye yapılan girişimsel işlemler sonrası oro-antral fistül ve maksiller sinüzit gelişebilmektedir. Bu olguda, 53 yaşında bir erkek hastaya 7 ay önce sol 2. premolar dişine implant uygulanmış, ancak implantın maksiller sinüse migrasyonu tespit edilmiştir. Nazal endoskopik incelemede, sol maksiller sinüs ostiumu düzeyinde ödem ve hiperemi saptanmış, ancak yabancı cisim izlenmemiştir. Paranazal sinüs tomografisinde, sol maksiller sinüs ostiumunu daraltan ve osteomeatal ünitede obstrüksiyon yaratan hiperdens bir imaj rapor edilmiştir. Hastaya cerrahi müdehale planlanmış, genel anestezi altında fonksiyonel endoskopik sinüs cerrahisi uygulanarak implant materyali çıkarılmış ve maksiller sinüs enflame dokulardan arındırılmıştır. Literatüre sunduğumuz bu olguyla; maksiller sinüzit etiyolojisindeki odontojenik faktörlere dikkat çekmeyi, hastalık tanı ve tedavisi için farkındalık oluşturmayı amaçladık.

Anahtar Kelimeler: Dental implant, odontojenik maksiller sinüzit, yabancı cisim migrasyonu, endoskopik sinüs cerrahisi

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How to Cite: Aksoy A, Salik KT, Avşar B, Ergül D. Migration of Dental Implant into The Sinus and Secondary Odontogenic Maxillary Sinusitis: Case Report. CMJ, 2024;46(4): 292-296.

Introduction

Approximately 60% of iatrogenic sinusitis, which is included in the etiology of acute, chronic and recurrent sinusitis, can be seen after dental treatments, and at least 45% of these can be seen after surgical treatments (surgical tooth extraction, sinus lift or implant surgery).[1,2] Despite anatomical diversity, posterior maxillary teeth, especially second premolars, first and second molars, are frequently in contact with the maxillary sinus floor. This relationship between the maxillary sinus and the posterior maxillary tooth apices occurs through the cortical bone layer and/or sinus mucosa. Because of this close relationship, sinusitis may develop as a result of oro-antral fistula and migration of prosthetic treatment materials into the maxillary sinus after interventional procedures in this region.[3,4] Foreign bodies in the sinus may cause irritation of the sinus membrane, slowing/stopping of mucociliary activity due to obstruction of the ostium, foreign body reaction and finally maxillary sinusitis.[2-6]

Our aim is to evaluate the endoscopic treatment of odontogenic maxillary sinusitis (OMS), which developed secondary to implant material crossed into the maxillary sinus after prosthetic treatment in the left maxilla posterior region, with the perspective of literature.

Case Report

A 53-year-old male patient was accepted as a case with no active complaints, referred to our ear, nose and throat department from the oral, dental and maxillofacial surgery clinic. The patient had an implant applied to the left maxillary second premolar tooth 7 months ago, but during follow-up examinations, it was determined that the implant was not in place. It was determined that the dental implant had migrated into the maxillary sinus in the orthopantomogram (Figure 1).

The patient was informed about the planned procedure and study, and written and verbal consent was obtained.

In the detailed ear, nose and throat examination, anterior rhinoscopic examination revealed that the nasal septum was subluxed in the caudal part and deviated to the right. Additionally, hypertrophy and degeneration of bilateral inferior turbinates, hypertrophy of the left middle turbinate, and increased seromucous secretion in the left nasal cavity were detected. During the oral cavity examination, it was observed that the area of the implant was covered with mucosa. No signs of oroantral fistula were detected.No additional pathological condition was detected other than postnasal discharge during oropharyngeal examination.

In the 0° and 45° nasal endoscopic examination performed using a rigid endoscope, edema and hyperemia were observed at the left maxillary sinus ostium level in addition to the anterior rhinoscopic findings, but no foreign body was detected.

In the coronal, axial and sagittal sections of the paranasal sinus computed tomography (PNSCT) requested by our clinic, a hyperdense image (probable metallic foreign body) at the level of the left maxillary sinus infundibulum, which significantly narrowed the left maxillary sinus ostium, and a soft tissue structure that almost completely filled the left maxillary sinus (probable OMS) secondary to the obstruction caused by this foreign body in the osteomeatal unit were reported (Figures 2,3,4).

Surgical intervention was planned for the patient and the procedure was performed under general anesthesia. Left functional endoscopic sinus surgery, left middle concha bullosa resection, and dental implant removal were performed. During the left uncinectomy performed after the left middle concha bullosa resection, a large amount of purulent material was encountered and an aspirate culture was taken from this material. During the enlargement of the maxillary sinus ostium, a foreign body located in the submucosal region at the level of the infundibulum was detected and successfully removed (Figures 5 and 6). The maxillary sinus was cleared of edematous and inflamed tissues and tissue sampling was performed for histopathological examination. Microscopic examination of the aspirate revealed gram-positive cocci, but no specific microorganism could be identified in the culture. Histopathological evaluation was reported as chronic sinusitis. No complications occurred during the surgical procedure. The patient was referred to the clinic where the implant was placed to complete the remaining dental treatment.

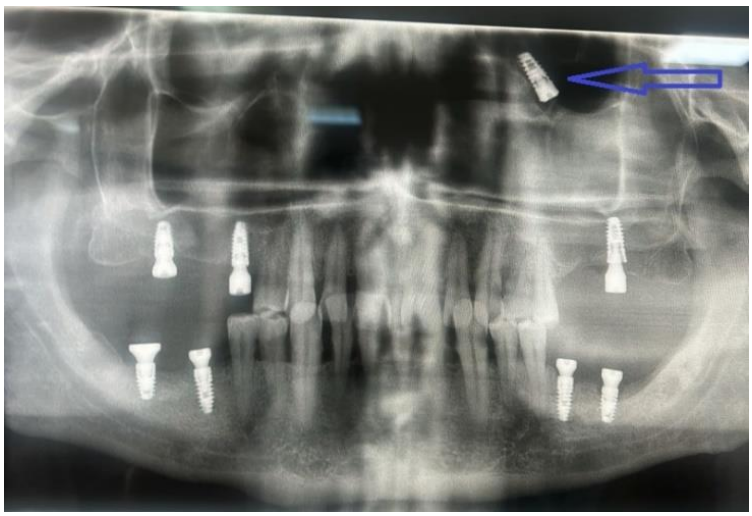

Figure 1. Orthopantomogram showing dental implant (blue arrow) migrating into the left maxillary sinus

Figure 2. Coronal section of PNSCT showing the dental implant (blue arrow) obstructing the sinus ostium and causing odontogenic maxillary sinusitis, along with a concha bullosa of the left middle turbinate

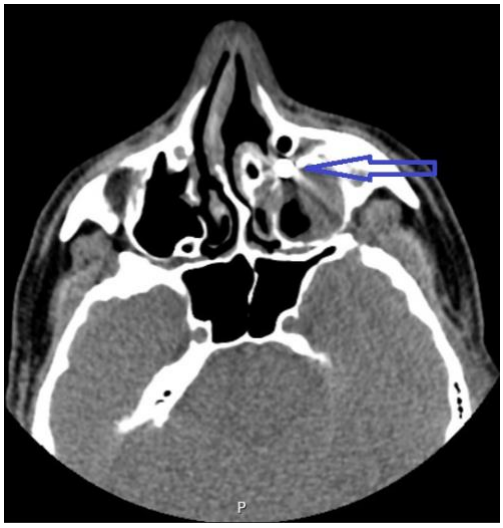

Figure 3. Axial section of PNSCT showing the appearance of the dental implant (blue arrow)

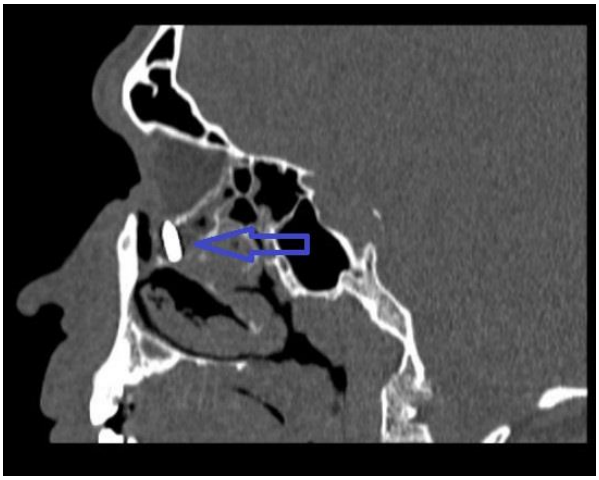

Figure 4. Sagittal section of PNSCT showing the appearance of the dental implant (blue arrow)

Figure 5. Dental implant (approximately 1 cm in length) removed from the left maxillary sinus

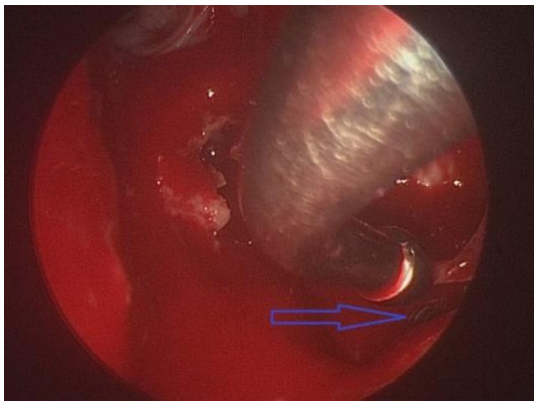

Figure 6. Intraoperative endoscopic view of the dental implant (blue arrow) that fell to the floor of the left maxillary sinus

Discussion

The definition of OMS was first described by Prof. William H. Bauer in 1943, and since then, it has become a widely recognized condition in both dentistry and otolaryngology.[7] OMS is a subtype of sinusitis that accounts for 10-15% of all maxillary sinusitis cases and 30% of unilateral maxillary sinusitis cases. Despite being described nearly 100 years ago, it remains a relatively underexplored etiology in the literature compared to other etiological factors.[8,9,10] The maxillary sinus is the first paranasal sinus to develop during the intrauterine period and has an average volume of 15-20 mL. This sinus reaches full development with the eruption of the permanent teeth between the ages of 12 and 14. The relationship between the maxillary sinus and dental-periodontal structures is a continuous and dynamic process, influenced by both physiological and pathological changes. The thin cortical bone thickness of the maxillary sinus floor and the extension of the roots of the first and second molars, as well as the second premolar teeth into the sinus, are key evidence of the anatomical variability observed in the etiology of OMS.[11]

The etiology is primarily attributed to iatrogenic causes such as periodontal diseases, dental abscesses, or implant complications.[7-9] It is often an underdiagnosed condition due to the presence of classic sinusitis symptoms that overlap with other forms of sinusitis. Suspected cases require a thorough patient history and appropriate radiological imaging for diagnosis.[12] Unlike non-odontogenic sinusitis, OMS is typically characterized by unilateral involvement and foul-smelling discharge. Additionally, other differences include its predominantly anaerobic polymicrobial nature in terms of microbiology, as well as the resistance of rhinosinusitis to traditional medical treatments due to the ongoing dental pathology.[8] Diagnosis requires multidisciplinary collaboration, and paranasal computed tomography scans are the gold standard.[13] OMS typically involves anaerobic polymicrobial infections and resistant biofilms.[8] Because oral antibiotics alone are inadequate, treatment involves a combination of dental interventions and sinus surgery.[13] When dental and sinus issues are addressed together, the success rate can reach 90-100%.[14] However, OMS is often misdiagnosed and underreported, which necessitates increased awareness among both otolaryngologists and dentists.[8] Our patient received both parenteral antibiotic therapy (amoxicillin + sulbactam and metronidazole), endoscopic sinus surgery with nasal passage irrigation, and extraction of the dental implant. Antibiotic therapy was completed over 14 days. With the appropriate treatment approach, the risk of potential sinusitis complications was reduced in our patient. Serious infections, including fungal sinusitis, may arise in the long term as a result of dental implant migration.[15] No fungal lesions were observed either among the PNCT findings or as a significant lesion during the intraoperative examination in our patient. In the differential diagnosis of OMS, factors such as dental impaction and dental implant migration can lead to significant changes in the anatomy and function of the sinuses. However, this condition does not always cause symptoms; some impacted teeth may remain asymptomatic. Therefore, patient-specific evaluation and treatment strategies are required. A personalized approach ensures the effective management of OMS and the prevention of complications.[16] Treatment approaches vary depending on the cause and severity, but generally involve addressing the dental source and managing the sinusitis. Surgical options include functional endoscopic sinus surgery, the Caldwell-Luc approach, and intraoral techniques.[17] Antibiotic therapy and sinus irrigation are commonly used as adjunctive treatments.[18] A multidisciplinary approach involving dentists and otolaryngologists is crucial for the successful management and prevention of OMS.[10]

Conclusion

With the case we present in the literature, we aim to draw attention to the odontogenic factors in the etiology of maxillary sinusitis and to increase awareness about the diagnosis and treatment of the condition.

The Acknowledgements

This case report abstract was presented as an e-poster at the 45th National ENT Congress between 23-27 October 2024.

Authorship Contribution

The concept was developed by A.A. The design was carried out by A.A and K.T.S. Supervision was provided by D.E. Resources were managed by A.A. Materials were prepared by K.T.S. Data collection was conducted by B.A and D.E. Analysis was performed by K.T.S and B.A. Literature review was carried out by A.A and K.T.S. Writing was done by A.A and B.A. Critical review was provided by A.A.

Conflicts Of Interest Statement

The authors declare no conflict of interest.

References

1. Manchisi M.;Bianchi I.;Bernardi S.; Varvara G.;Pinchi V.,(2022),' Maxillary Sinusitis Caused by Retained Dental Impression Material: An Unusual Case Report and Literature Review', Nigerian Journal of Clinical Practice 25:4
2. Seigneur M.; Hascoët E ; Chaux A.-G.; Lesclous P.; Hoornaert A.; Cloitre A., (2023), 'Characteristics and management of dental implants displaced into the maxillary sinus: a systematic review', Int. J. Oral Maxillofac. Surg. 52: 245–254. International Association of Oral and Maxillofacial Surgeons. Published by Elsevier Inc.
3. Efeoğlu C, Seçkin T. Sinus maksillariste yabancı cisim. EÜ Dişhek Fak Derg. 2011;32(1):51-54.
4. Altan A, Çolak S, Akbulut N. Endodontik tedavi sonrası maksiller sinüste yabancı Cisim: iki olgu sunumu. ENTCase. 2018
5. Chang P.-H. ;Chen Y.-W.;Huang C.-C.; Fu C.-H; Huang C.-C.;Lee T.-J.,(2020),' Removal of Displaced Dental Implants in the Maxillary Sinus Using Endoscopic Approaches', Ear, Nose & Throat Journal 1–4 The Author(s)
6. Bennardo F.; Barone S.; Buffone C.; Colangeli W.; Antonelli A.; Giudice A.,(2022), 'Removal of dental implants displaced into the

maxillary sinus: a retrospective single-center study', Head & Face Medicine 18:34
7. Zhu, J., Lin, W., Yuan, W., & Chen, L. (2021). New insight on pathophysiology, diagnosis, and treatment of odontogenic maxillary sinusitis. Journal of Nanomaterials, 2021(1), 9997180.
8. Simuntis R, Kubilius R, Vaitkus S. Odontogenic maxillary sinusitis: a review. Stomatologija. 2014;16(2):39-43.
9. Grygorov S, Poberezhnik G, Grygorova A. Actual Issues of Odontogenıc Maxıllary Sınusıtıs (Revıew). Georgian Med News. 2018;(276):46-50.
10. Psillas G, Papaioannou D, Petsali S, Dimas GG, Constantinidis J. Odontogenic maxillary sinusitis: A comprehensive review. J Dent Sci. 2021;16(1):474-481. doi:10.1016/j.jds.2020.08.001
11. Scholfield, D.W., Tan, N.CW. (2023). Embryology of the Nose and Paranasal Sinuses. In: Swift, A.C., Carrie, S., de Souza, C. (eds) Contemporary Rhinology: Science and Practice. Springer, Cham. https://doi.org/10.1007/978-3-031-28690-2_1
12. G., Kranthipraveen, Raj., M, V, Raj., J., S., P., Loh. Pathophysiology and clinical presentation of odontogenic maxillary sinusitis.. Dentistry review, (2022). doi: 10.1016/j.dentre.2022.100044
13. Craig JR, Poetker DM, Aksoy U, et al. Diagnosing odontogenic sinusitis: An international multidisciplinary consensus statement. Int Forum Allergy Rhinol. 2021;11(8):1235-1248. doi:10.1002/alr.22777
14. Craig JR. Odontogenic sinusitis: A state-of-the-art review. World J Otorhinolaryngol Head Neck Surg. 2022;8(1):8-15. Published 2022 Mar 22. doi:10.1002/wjo2.9
15. woo Ahn, H., Baek, M. J., Kim, M. R., Lee, S. H., Kim, B. S., An, T. L., ... & Kim, Y. W. Relationship Between Maxillary Fungal Sinusitis and Odontogenic Infection, Dental Implant. Korean Journal of Otorhinolaryngology-Head and Neck Surgery. 2023;66(8), 526-531.
16. Bjørndal L, Amaloo C, Markvart M, et al. Maxillary Sinus Impaction of a Core Carrier Causing Sustained Apical Periodontitis, Sinusitis, and Nasal Stenosis: A 3-year Follow-up. J Endod. 2016;42(12):1851-1858. doi:10.1016/j.joen.2016.07.027
17. Gnigou M, Goutzanis L, Sarivalasis S, Petsinis V. Retrieval of displaced implants inside the maxillary sinus: two case reports and a short review. Int J Implant Dent. 2019;5(1):24. Published 2019 Jun 4. doi:10.1186/s40729-019-0173-7
18. Kim SG, Baik SM. Diagnosis and treatment of maxillary sinusitis after implant placement. Implant Dent. 2010;19(2):115-121. doi:10.1097/ID.0b013e3181d43a76