

CASE REPORT

Foreign body in the right maxillary sinus cavity: clinical case

Daniela Cernev^{1,2}, Vasile Cabac^{1,2}, Ana-Maria Budu¹, Daniela Tibulac¹, Dan Bragari¹

¹“N. Testemiteanu” SUMPh, Chisinau, Republic of Moldova

²“Sf. Treime” IMPH MCH, Chisinau, Republic of Moldova

ABSTRACT

Foreign bodies in the paranasal sinuses are rare clinical occurrences. In the maxillary sinus, these foreign bodies may include tooth roots, dental impression materials, root-filling materials, and dental implants. This article presents an unusual case of a large foreign body of endodontic origin that was successfully removed from the maxillary sinus. We share our experience with a case involving a foreign body in the left maxillary sinus (a tooth). The removal of paranasal foreign bodies is always a challenging procedure. However, with the advancement of diagnostic techniques and the transnasal approach using functional endoscopic sinus surgery, such procedures can now be performed safely.

KEYWORDS: foreign body, maxillary sinus, functional endoscopic sinus surgery.

INTRODUCTION

The paranasal sinuses are air-filled cavities within the human skull that help protect the body against pathogenic microorganisms. The maxillary sinus is located within the jawbone, near the nasal cavity, above the roots of the premolars and upper molars, and below the floor of the orbit.

The maxillary sinus is the first of the paranasal sinuses to develop during fetal life. It reaches full maturity as the permanent teeth erupt, typically between the ages of 12 and 14, with an average volume of 15–20 ml^{1,2}. The roots of the second upper molars are the closest to the floor of the sinus, followed by the roots of the first molar, third molar, second premolar, and first premolar, respectively. The paranasal sinuses generate between 75 and 150 ml of mucus daily, aiding in humidifying the air we breathe and enhancing alveolar gas exchange. This mucus also captures particles, and the mucociliary clearance mechanism of the respiratory epithelium removes it from the sinuses. The proper functioning of the paranasal sinuses depends on the patency of the sinus ostia and normal mucociliary activity. The natural ostium is situated in the upper part of the medial sinus wall. The ostiomeatal unit plays a cru-

cial role in the drainage and ventilation of the maxillary, anterior ethmoid, and frontal sinuses³.

Factors that compromise the patency of the ostiomeatal unit can affect the neighbouring sinuses and have a significant impact on sinonasal conditions⁴. Odontogenic maxillary sinusitis occurs when the lining of the maxillary sinus becomes inflamed due to an untreated or improperly treated dental infection in the close proximity to the sinus. This can be an inflammatory and/or infectious condition of a bacterial, fungal or viral nature, developed in the maxillary sinus. Microbial infection can be isolated or associated with other processes affecting one or more adjacent sinuses.

The causes of odontogenic maxillary sinusitis include: the existence of communications between the oral cavity and the sinus following tooth extraction, when the bone separating the root from the sinus is very thin or absent, or in the case of a periradicular inflammatory process that destroys the bone in that area; pushing a tooth or root into the sinus during extraction; achieving oro-sinus communication after post-extraction alveolar curettage; incorrect fillings of the sinus dental canals: outdated, incomplete or absent fillings, which contribute to apical periodontitis, granulomas or periapical cysts; apical periodontitis due to dental caries complications; superinfection of radicular or

Corresponding author: Daniela Cernev, PhD, Assistant Lecturer, “N. Testemiteanu” SUMPh, Chisinau, Republic of Moldova

Address: str. Calea Iesilor 67, MD-2069, Chisinau, Republic of Moldova

ORCID: <https://orcid.org/0000-0001-8388-0901>

e-mail: daniela.cernev@usmf.md

Received for publication: November 1, 2024 / **Accepted:** January 8, 2025

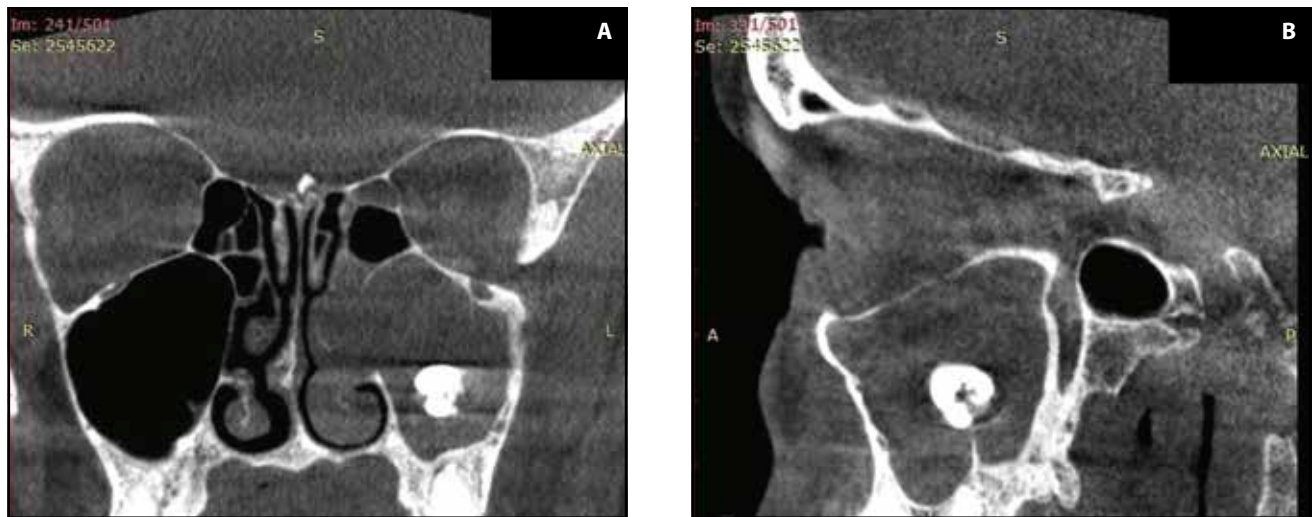


Figure 1. Cranio-facial CT scan (A. coronal slice, B. sagittal slice, C. axial slice) – radiopaque foreign body in the left maxillary sinus (filling material) covered by fungal material.

follicular cysts in the area; marginal periodontitis that allows infections to spread deep into the bone through the periodontal pockets; alveolar bone osteitis; complications caused by incorrect insertion of dental implants; and the complications arising from the inclusion of upper teeth, especially canines and wisdom teeth^{4,5}.

Foreign bodies are commonly encountered in ENT practice, typically found in the nasal cavities, ears, and pharynx. However, the presence of a foreign body in the paranasal sinuses is rare. Among such cases, the majority occur in the maxillary sinuses, accounting for approximately 80% of all instances^{6,7}. There are two primary causes for the foreign bodies in the paranasal sinuses. The most frequent cause is iatrogenic, resulting from dental, ophthalmic, or otorhinolaryngological procedures, and it represents almost 60% of cases^{8,9}. The second cause is trauma, which accounts for 25% of cases¹⁰. Traumatic foreign bodies can enter the sinus through direct injury or indirectly through orbital or palatal trauma. They encompass a wide range of items such as dental implants, tooth roots, wooden sticks, toothpicks, needles, plastic, glass, metal, and bullets. They are often detected when a patient presents with unexplained rhinosinusitis or are found incidentally during radiological imaging. If left untreated, foreign bodies can lead to serious complications, such as sinusitis, fungal infections and inflammatory reactions.

CASE REPORT

A 35-year-old female patient presented with pain in the orbital and periorbital region, in the projection of the left maxillary sinus radiating to the level of the upper left 2nd molar; purulent-haemorrhagic discharge from the level of the same tooth, headache, general asthenia. According to

the anamnesis, the patient underwent a dental extraction at the age of 14 with the aim of correcting the dentition, namely the upper left 3rd molar. At the age of 16, the patient was fitted with braces for definitive correction of the teeth, and the braces were removed at ages 17-18. In the meantime, the patient also underwent other dental extractions, caries treatment, etc. About 2 weeks before the visit to the ENT, a panoramic dental X-ray was performed, revealing the foreign body clearly located in the upper left region of the maxillary sinus.

Objectively, hyperemia and congestion of the face in the projection of the left maxillary sinus and periorbital region were attested. Rhinoscopy revealed a congested and hyperemic mucous membrane. Oropharyngoscopy showed hyperemia and congestion of the mucous membrane, mainly in the region of the left 1st and 2nd maxillary molars. After the ENT clinical evaluation, the patient underwent a cranio-facial computed tomography which revealed the thickening of the mucous membrane of the left maxillary sinus, with the presence of a foreign body in the homonymous sinus (Figure 1).

The recommendation was to perform antrostomy of

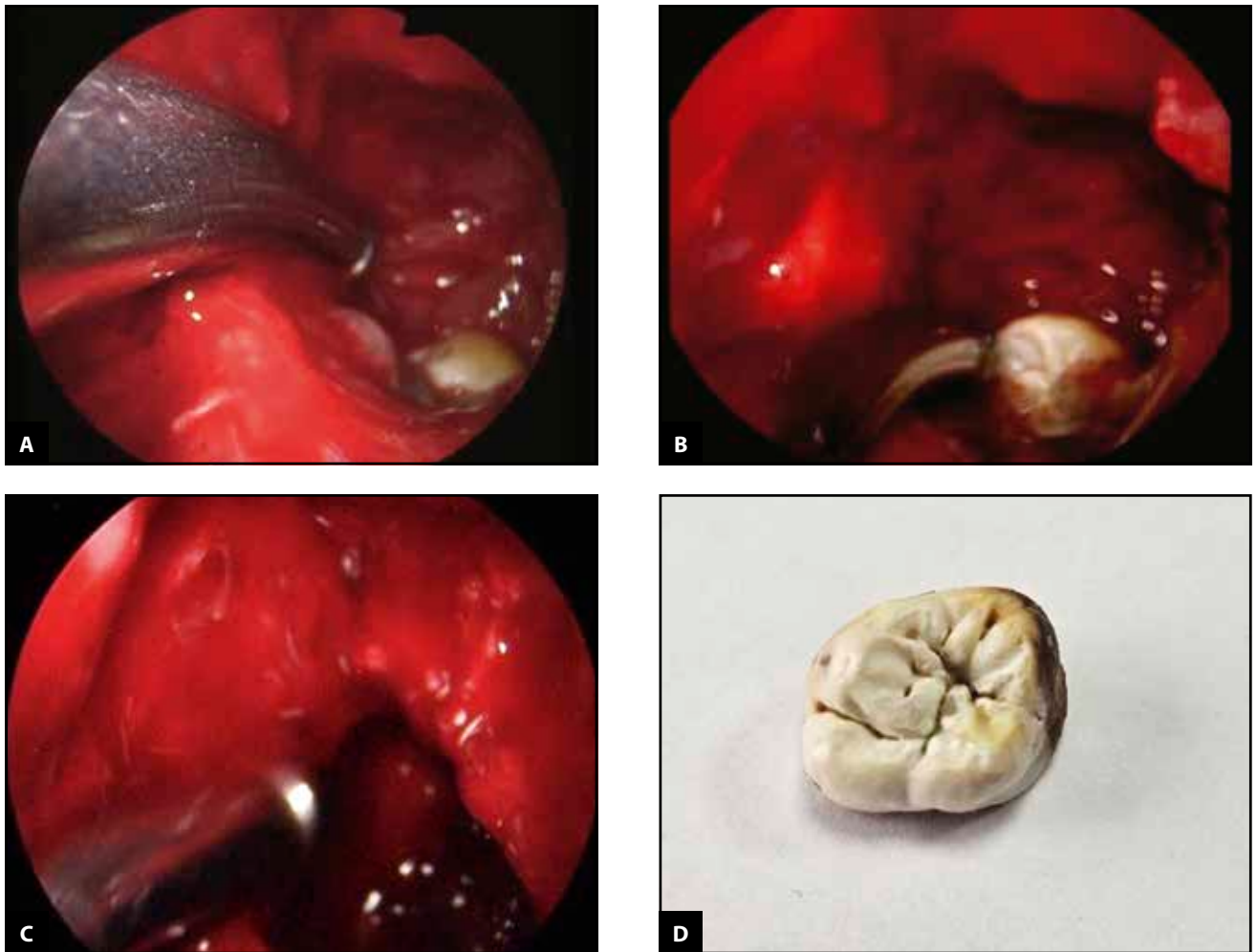


Figure 2. A. and B. Surgical approach – Intraoperative view: after saline irrigation, the foreign body is observed in the area of the maxillary sinus; C. Intraoperative view of the maxillary sinus at the end of the surgery. D. and E. The foreign body in detail.

the left maxillary sinus by transnasal endoscopic approach with evacuation of the pathological contents. The patient agreed, and all the risks and benefits of this procedure were explained to him. The patient was taken to the operating room and the surgery was performed under general anaesthesia with orotracheal intubation. After performing the left maxillary antrostomy, the intranasal granulation tissue and the foreign body were removed. The foreign body found in the sinus cavity turned out to be the left maxillary 3rd molar which was extracted at the age of 14 years (Figure 2). Saline irrigation of the left maxillary sinus was performed, followed by left nostril anterior nasal packing.

Postoperatively, the patient received drug treatment: antihemorrhagic agent for 7 days (Etamsylate injection 12.5 mg/2 ml, intramuscular injection, 2 ml/day), antibiotic for 7 days (Ceftriaxone 2g IV every 24 hours), nonsteroidal anti-inflammatory drug (Analgin® 50% 2 ml N10

IM), antihistamines (Dimedrol® 1% IM), and Fluconazole 150mg, tablets, for three days.

The patient immediately recovered from anaesthesia, initiating physical activity the following day. The haemorrhagic-purulent discharges resolved, and after 7 days, the patient was discharged in satisfactory condition, with clean teguments, clear skin, without hyperaemia or congestion;

the periorbital hyperaemia had resolved and the nasal mucosa appeared pale pink. The patient was subsequently discharged home.

DISCUSSIONS

The study of infectious processes shows increasing importance in the last decade due to the variety of clinical aspects and problems raised by sinusitis, both for their morphological and functional rehabilitation. A crucial aspect of maxillary sinus pathology involves periapical issues of the teeth, and the endodontic treatments performed on the upper arch teeth. One of the primary causes of maxillary sinus morbidity of odontogenic origin is the trauma to the floor of the maxillary sinus during or after various dental surgical procedures on the upper teeth.

A number of scientific studies have addressed the diagnosis, treatment, and prevention of odontogenic maxillary sinusitis^{3,4,11}. Unfortunately, the connection between dental and sinus pathologies is not always fully recognized, and odontogenic sinusitis is often misdiagnosed as purulent sinusitis. Failure to identify the underlying dental cause can lead to severe complications. A detailed patient history, a comprehensive clinical examination, and appropriate imaging are essential for making an accurate final diagnosis.

Radiographic examination of the maxillary sinus can be performed using various imaging techniques commonly available in radiology or dental clinics. However, traditional radiographs often fail to capture all the details and extent of structural damage. Computed tomography (CT) has gained growing importance in assessing sinus disease, nearly supplanting traditional radiography methods. This imaging method offers multiple cross-sectional views of the sinuses at different planes, providing a more comprehensive understanding of the condition and helping to determine the extent of the disease. High-resolution axial and coronal CT scans are the most informative non-invasive techniques for visualizing the paranasal sinuses and adjacent structures. Tomographic systems specifically designed for oral surgery enable a three-dimensional assessment of the sinuses. Due to potential artifacts caused by dental fillings, crowns, and metal restorations in coronal sections, axial sectioning is often preferred. Given that three-dimensional imaging techniques, such as conventional tomography and CT, are almost essential for pre-surgical planning in implantology, their use is also highly valuable in conservative dentistry¹¹. These techniques, including periapical, panoramic, occlusal, and facial radiographs, can provide sufficient information to confirm or exclude pathology.

A multidisciplinary approach involving dentists, ophthalmologists, otorhinolaryngologists, neurologists, and other specialists is essential to prevent further complications that could potentially jeopardize the patient's

health and well-being. The diagnosis may seem intuitive, which consists in objectifying sinusitis and confirming the dental source, but it represents a challenge due to the need for interdisciplinary evaluation of patients. Both the medical assessment of rhinosinus involvement and the evaluation of dental pathology are necessary. Since odontogenic sinusitis does not differ significantly in clinical presentation from rhinosinusitis of other etiologies, the dental cause may often be overlooked. Similarly, in cases with pronounced dental pathology, sinus involvement may be downplayed or ignored. Once odontogenic sinusitis is definitively diagnosed, multidisciplinary collaboration must be maintained for the effective treatment of the condition. The therapy addressed to this type of rhinosinusitis involves a polymodal approach, through medicinal, surgical and last but not least, etiological treatment. It is essential to identify and treat the dental source, relieve the sinus inflammation and monitor the disease after treatment to prevent relapses. Effective medical management and timely diagnosis, accurately linked to the underlying dental pathology, are crucial in the treatment of maxillary sinusitis of dental origin and in preventing severe challenges¹².

The resolution of these cases is typically achieved through endoscopic sinus surgery, which provides direct optical assessment of processes of unknown origin in the area of the antral floor. This method is particularly effective for evaluating foreign bodies, such as root filling materials and tooth roots, that have entered the maxillary sinus.

Functional endoscopic sinus surgery (FESS) simplifies interventions on the maxillary sinus wall while preserving the natural drainage of the ostium, leading to minimal surgical trauma and a low complication rate¹³. Nasal endoscopic techniques offer the same effectiveness in foreign body removal as intraoral approaches, and the use of inferior meatal antrostomy can address issues with large or poorly positioned foreign bodies that cannot be retrieved through the natural ostium¹⁴. Another benefit of FESS is the ability to simultaneously treat associated sinonasal pathologies. The Caldwell-Luc surgery should only be considered for foreign body removal when other techniques are unavailable, as it carries a 15-18% risk of postoperative sinusitis. Symptoms such as facial numbness, cheek pain, swelling, tooth numbness, and gum issues associated with bone or infraorbital nerve damage are common in these cases¹⁵.

CONCLUSIONS

Intranasal foreign bodies represent a major problem in ENT practice, considering the increasing trend of these cases due to the growing addressability of the population to dentists and the rise in the number of dental interventions performed.

In order to solve these cases, it is necessary to obtain the most complete anamnesis from the patient and ensure multidisciplinary collaboration with other medical specialties for an early diagnosis and treatment without complications and as little trauma to the patient as possible.

The proximity between the maxillary sinus and the roots of the maxillary molars, premolars, and sometimes canines, can result in a range of endodontic complications. From the information above, we conclude that the penetration of foreign bodies (filling material, dental roots) into the cavity of the maxillary sinuses leads to the development of suppurative inflammatory processes. The resolution of these cases requires prompt diagnosis and treatment.

Due to the advancements in the surgical field, cases of foreign bodies in the maxillary sinus are now addressed through endoscopic rhinosinus surgery. This technique should become the gold standard in managing these cases, offering great advantages: it lasts less, does not leave scars, reduces hospitalization time, is less traumatic for the patient, allows for easier recovery, and can access hard-to-reach areas. It is increasingly in the treatment of ENT pathologies.

Funding: No funding was received for this study.

Contribution of authors: All authors contributed equally to the study design, data collection, and manuscript preparation.

Conflicts of interest: The authors declare no conflicts of interest.

Financial disclosure: The authors declare no financial interests related to the research.

Authors' information

Daniela Cernev, MD, PhD, Assistant Lecturer, "N. Testemiteanu" SUMPh, "Sf. Treime" IMPH MCH, Chisinau, Republic of Moldova. E-mail: daniela.cernev@usmf.md. ORCID: <https://orcid.org/0000-0001-8388-0901>.

Vasile Cabac, MD, PhD, Associate Professor, "N. Testemiteanu" SUMPh, "Sf. Treime" IMPH MCH, Chisinau, Republic of Moldova. E-mail: vasile.cabac@usmf.md. ORCID: <https://orcid.org/0000-0003-4899-7375>.

Ana-Maria Budu, MD, Resident-Doctor, "Sf. Treime" IMPH MCH, Chisinau, Republic of Moldova. E-mail: buduanamaria22@gmail.com.

Daniela Tibulac, Resident-Doctor, "Sf. Treime" IMPH MCH, Chisinau, Republic of Moldova. E-mail: turcan.daniela26@gmail.com.

Dan Bragari, Resident-Doctor, "Sf. Treime" IMPH MCH, Chisinau, Republic of Moldova. E-mail: danybragary@gmail.com.

REFERENCES

- Psillas G, Papaioannou D, Petsali S, Dimas GG, Constantinidis J. Odontogenic maxillary sinusitis: A comprehensive review. *J Dent Sci.* 2021;16(1):474-81. DOI: 10.1016/j.jds.2020.08.001.
- Little RE, Long CM, Lochrl TA, Poetker DM. Odontogenic sinusitis: A review of the current literature. *Laryngoscope Investig Otolaryngol.* 2018;3(2):110-4. DOI: 10.1002/liv.2.147.
- Hitu D, Procopenco O, Chele N, Cucereavii N, Lunin C, Cabac V. Diagnostical comunicarii oro-antrale. In: *Medicina stomatologica.* 2023, nr. 4(65), pp. 15-25. ISSN 1857-1328. DOI: <https://doi.org/10.53530/1857-1328.23.4.02>. Available from: <https://repository.usmf.md/handle/20.500.12710/27193>.
- Erkmen N, Olmez S, Onerci M. Supernumerary tooth in the maxillary sinus: case report. *Aust Dent J.* 1998;43(6):385-6. DOI: 10.1111/j.1834-7819.1998.tb00196.x.
- Sandul A, Vetrician S, Bajureanu A, Antohi A, Cernolev E, Iacubitchi A, et al. Corp strain in cavitata sinusului maxilar drept complicata cu sinusita maxilara odontogena - caz clinic. *Anale stiintifice USMF "Nicolae Testemitanu", Editia a XIII-a.* 2012;4(ORL). [Internet]. Available from: <https://repository.usmf.md/xmlui/handle/20.500.12710/5019>.
- García B, Penarrocha M, Penarrocha MA, Von Arx T. Apical surgery of a maxillary molar creating a maxillary sinus window using ultrasonics: a clinical case. *Int Endod J.* 2010;43(11):1054-61. DOI: 10.1111/j.1365-2591.2010.01776.x.
- Hauman CHJ, Chandler NP, Tong DC. Endodontic implications of the maxillary sinus: a review. *Int Endod J.* 2002;35(2):127-41. DOI: 10.1046/j.0143-2885.2001.00524.x.
- Wojtera B, Wozna A, Komisarek O. The management of foreign body displacement into the maxillary sinus as a complication of maxillofacial interventions: Systematic review. *Indian J Otolaryngol Head Neck Surg.* 2022;74(Suppl 2):1088-93. DOI: 10.1007/s12070-020-02153-9.
- Sgaramella N, Tartaro G, D'Amato S, Santagata M, Colella G. Displacement of dental implants into the maxillary sinus: a retrospective study of twenty-one patients. *Clin Implant Dent Relat Res.* 2016;18(1):62-72. DOI: 10.1111/cid.12244.
- Matti E, Emanuelli E, Pusateri A, Muniz CCS, Pagella F. Transnasal endoscopic removal of dental implants from the maxillary sinus. *Int J Oral Maxillofac Implants.* 2013;28(3):905-10. DOI: 10.11607/jomi.2894.
- Brescia G, Saia G, Apolloni F, Marioni G. A novel nasal endoscopic approach for removing displaced dental implants from the maxillary sinus. *Am J Otolaryngol.* 2017;38(1):92-5. DOI: 10.1016/j.amjoto.2016.09.005.
- Chiapasco M, Felisati G, Maccari A, Borloni R, Gatti F, Di Leo F. The management of complications following displacement of oral implants in the paranasal sinuses: a multicenter clinical report and proposed treatment protocols. *Int J Oral Maxillofac Surg.* 2009;38(12):1273-8. DOI: 10.1016/j.ijom.2009.09.001.
- Manor Y, Anavi Y, Gershonovitch R, Lorean A, Mijiritsky E. Complications and management of implants migrated into the maxillary sinus. *Int J Periodontics Restorative Dent.* 2018;38(6):e112-e118. DOI: 10.11607/prd.3328.
- Albu S. The 'double-barrel' approach to the removal of dental implants from the maxillary sinus. *Int J Oral Maxillofac Surg.* 2013;42(12):1529-32. DOI: 10.1016/j.ijom.2013.04.013.
- Hitu D, Chele N, Scerbatuic D, Cabac V, Mighic A, Badarau L. Maxillary sinusitis of odontogenic origin. *European Journal of Oral and Maxillofacial Surgery.* 2022;6(1):11-6. DOI: 10.23736/S2532-3466.20.00248-9.

