*Arch Health Invest (2025)14(5):1499-1504*
http://doi.org/10.21270/archi.v14i5.6445



**Clinical Case**

# Clinical Resolution of Recurrent Sinusitis after Removal of Surgical Drill in the Maxillary Sinus: Case Report

*Resolução Clínica de Sinusite Recorrente após Remoção de Broca Cirúrgica no Seio Maxilar: Relato de Caso*

*Resolución Clínica de Sinusitis Recurrente tras la Extracción de una Fresa Quirúrgica en el Seno Maxilar: Reporte de Caso*

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## Abstract

This report describes the clinical resolution of recurrent sinusitis after removing a surgical drill from the maxillary sinus (MS) using the modified Caldwell-Luc technique. A 52-year-old male presented at the Oral and Maxillofacial Surgery Clinic of Araçatuba School of Dentistry - UNESP, complaining of recurrent headaches, sinusitis, and facial edema for one year, following the extraction of tooth #26 and subsequent oroantral communication. Physical examination revealed edema in the left midface, effacement of the fornix fundus, erythema, and an active fistula near tooth #23. A panoramic radiograph showed a radiopaque foreign body in the left MS. Cone beam computed tomography (CBCT) revealed hyperdense material resembling a surgical drill, bone fenestration, and residual roots. The MS was accessed using the modified Caldwell-Luc technique, expanding the previous bone fenestration to remove the drill, perform curettage, and irrigate the sinus. The fistula was excised, and residual roots of tooth #24 were extracted. The patient remained under clinical and radiographic follow-up with no complications. Complementary imaging is crucial for diagnosis and surgical planning, and the modified Caldwell-Luc technique is effective for foreign body removal in the MS, offering a low-cost solution, complete sinus cleansing, and prevention of oroantral fistula recurrence.

**Descriptors:** Removable Partial Denture; CAD-CAM; Digital Technology.

## Resumo

Este relato descreve a resolução clínica de sinusite recorrente após a remoção de uma broca cirúrgica do seio maxilar (SM) utilizando a técnica modificada de Caldwell-Luc. Um homem de 52 anos compareceu à Clínica de Cirurgia Bucomaxilofacial da Faculdade de Odontologia de Araçatuba - UNESP, queixando-se de dores de cabeça recorrentes, sinusite e edema facial há um ano, após a extração do dente #26 e subsequente comunicação oroantral. O exame físico revelou edema na região média da face esquerda, apagamento do fundo de saco, eritema e uma fístula ativa próxima ao dente #23. Uma radiografia panorâmica mostrou um corpo estranho radiopaco no SM esquerdo. A tomografia computadorizada de feixe cônico (TCFC) revelou material hiperdenso semelhante a uma broca cirúrgica, fenestração óssea e raízes residuais. O SM foi acessado utilizando a técnica modificada de Caldwell-Luc, expandindo a fenestração óssea prévia para remover a broca, realizar curetagem e irrigar o seio. A fístula foi excisada, e as raízes residuais do dente #24 foram extraídas. O paciente permaneceu em acompanhamento clínico e radiográfico sem complicações. Exames de imagem complementares são fundamentais para o diagnóstico e planejamento cirúrgico, e a técnica modificada de Caldwell-Luc é eficaz para a remoção de corpos estranhos no SM, oferecendo uma solução de baixo custo, limpeza completa do seio e prevenção da recorrência de fístula oroantral.

**Descritores:** Prótese Parcial Removível; CAD-CAM; Tecnologia Digital.

## Resumen

Este informe describe la resolución clínica de una sinusitis recurrente tras la extracción de una fresa quirúrgica del seno maxilar (SM) utilizando la técnica modificada de Caldwell-Luc. Un hombre de 52 años acudió a la Clínica de Cirugía Bucomaxilofacial de la Facultad de Odontología de Araçatuba - UNESP, quejándose de dolores de cabeza recurrentes, sinusitis y edema facial durante un año, tras la extracción del diente #26 y una subsiguiente comunicación oroantral. El examen físico reveló edema en la región media de la cara izquierda, borramiento del fondo de saco, eritema y una fístula activa cerca del diente #23. Una radiografía panorámica mostró un cuerpo extraño radiopaco en el SM izquierdo. La tomografía computarizada de haz cónico (CBCT) reveló material hiperdenso similar a una fresa quirúrgica, fenestración ósea y raíces residuales. Se accedió al SM utilizando la técnica modificada de Caldwell-Luc, ampliando la fenestración ósea previa para extraer la fresa, realizar curetaje e irrigar el seno. La fístula fue extirpada y se extrajeron las raíces residuales del diente #24. El paciente permaneció en seguimiento clínico y radiográfico sin complicaciones. Las imágenes complementarias son cruciales para el diagnóstico y la planificación quirúrgica, y la técnica modificada de Caldwell-Luc es efectiva para la extracción de cuerpos extraños en el SM, ofreciendo una solución de bajo costo, limpieza completa del seno y prevención de la recurrencia de la fístula oroantral.

**Descriptores:** Prótesis Parcial Removible; CAD-CAM; Tecnología Digital.

## INTRODUCTION

The paranasal sinuses consist of paired air spaces located in the skull and surrounding the nasal cavity. Their main functions consist of reducing the weight of the skull, heating and humidifying inhaled air, assisting speech resonance, and regulating intranasal pressure[1]. In the human skull, four different pairs of sinuses are present: maxillary sinuses (MS), frontal sinuses, sphenoid sinuses, and ethmoid sinuses. The maxillary sinuses are considered the largest among the paranasal sinuses. They are located bilaterally within the maxillary bone, adjacent to the nasal cavity, below the eye sockets, and over the roots of the posterior upper teeth[1]. They may differ in size, pneumatization, and the presence of septa[1].

The MS cavity is coated by a thin membrane composed of mucus-producing cells, portraying a crucial role in the cavity's defense and cleansing[2,3]. However, it is the most affected paranasal sinus by sinus diseases[4]. Due to the proximity of the MS floor to the roots of the upper posterior teeth, dental complications related to MS are common[5,6]. Among the main occurrences are the insertion of teeth and materials through oroantral fistulas, perforating traumas, and iatrogenic complications. The accidental introduction of foreign bodies during dental procedures can be included among possible iatrogenic complications[7].

Although the presence of foreign bodies in the MS is considered a rare occurrence[8,9], it has become increasingly frequent due to the oral rehabilitation processes in which bone grafts are inserted along with the installation of dental implants in this region[10]. A wide range of objects can be accidentally introduced into the MS, including tooth roots[11], drills[12], implants[13], needles[14], endodontic filling materials[15], and pieces of amalgams[16]. The iatrogenic presence of these materials represents a significant clinical challenge, demanding a specialized approach for their removal.

These foreign bodies within the MS may develop diverse and potentially serious sequelae, including chronic sinusitis, cutaneous fistula, rhinolith formation, and chronic pain[12,17,18]. The severity of these complications highlights the importance of an early and accurate diagnosis. The initial diagnosis can be achieved through radiographs[19]. Nevertheless, the exact location of the foreign body may be inadequate, imprecise, and insufficient, due to the two-dimensional nature of this imaging exam, which limits the detailed visualization of the anatomy involved[1,20].

Some case reports described situations where foreign bodies inside the MS were radiographically misdiagnosed with pathologies[21]. This misdiagnose emphasizes the inherent limitations of conventional radiographs in oral and maxillofacial diagnosis. Therefore, for a more accurate diagnosis, a better assessment of the extent of the problem, and accurate treatment planning, it is strongly recommended to request more advanced imaging modalities, such as computed tomography[1], which is considered the gold standard for this type of evaluation[21,22]. This type of image modality offers a three-dimensional view of the region of interest, allowing the precise location of the foreign body and supporting appropriate surgical planning for its removal.

In clinical situations in which foreign bodies remain undiagnosed or are treated inadequately, complications can aggravate, resulting in chronic infections and other conditions that may require more complex and extensive surgical interventions. Hence, the management of these cases must be approached in an interdisciplinary way, including specialists in oral and maxillofacial surgery, dental radiology, and, when necessary, otorhinolaryngology, to ensure the best possible outcome for patient[2,3]. Accordingly, the present paper aims to report on a case regarding removing a surgical drill lodged inside the maxillary sinus using the modified Caldwell-Luc technique.

## CASE REPORT

The present paper is a clinical case report with descriptive purposes and a qualitative approach, demonstrating relevant data regarding the characteristics, etiology, and treatment of the removal of a surgical drill lodged inside the maxillary sinus. The clinical case was conducted at the Oral and Maxillofacial Surgery and Traumatology clinic of the Araçatuba School of Dentistry, São Paulo State University (FOA-UNESP). The patient signed the informed consent form provided by the institution, authorizing the diagnosis and execution of the treatment, as well as the use of the images for scientific purposes, such as publication in scientific journals[24].

A 52-year-old male patient, white, attended the Oral and Maxillofacial Surgery and Traumatology clinic of FOA-UNESP, reporting recurrent crises of headache, sinusitis, edema, and pain, for approximately 1 year starting after a tooth extraction. The patient reported that tooth #26 had been previously extracted in a private clinic and had an oroantral communication during the procedure. The patient also reported that the oroantral communication had been solved spontaneously during the postoperative period. Nonetheless, 30 days after the procedure, recurrent crises of headache, sinusitis, edema, and pain began to occur. These crises were contained during the use of antibiotic therapy; however, the symptoms returned after a few weeks. Due to the recurrence of the symptoms, the patient was referred to specialized care.

During the anamnesis, the patient denied any systemic comorbidities, allergies, or continuous medication use, and reported smoking.

During the extraoral and intraoral clinical examination, it was possible to observe slight edema in the middle third of the face on the left side, the presence of an active fistula near tooth #23, erythema, and effacement of the vestibule fundus. After acquiring panoramic radiography (Figure 1A), it was possible to verify the presence of an elongated radiopaque foreign body inside the left maxillary sinus. This finding was confirmed by cone beam computed tomography (CBCT) exam of the maxilla (Figure 1B, 1C, and 1D). Tomographic reconstruction in the coronal and axial planes (Figure 1B, and 1C) demonstrated the presence of a hyperdense foreign body, suggestive of a surgical drill, a vestibular bone fenestration, and residual roots of tooth #24.

These imaging findings corroborate the clinical evaluation where the fistula and edema were located. Tomographic reconstruction in the sagittal plane (Figure 1D) demonstrated the region of an oroantral communication, which was clinically covered by soft tissue. After correlating the clinical and imaging findings, it was concluded that the surgical drill was causing a chronic inflammatory process, and surgical treatment to remove the metal drill was indicated.

Initially, during the preoperative consultation, it was prescribed to the patient antibiotic therapy (amoxicillin 500 mg + potassium clavulanate 125 mg) every 8 hours for 7 days, through the oral route; topical nasal decongestant (naphazoline hydrochloride 0.5 mg/ml) every 6 hours; and analgesic (dipyrone 500 mg) every 4 hours. The surgery was performed the following week.

After antisepsis of the surgical field, anesthesia was performed by regional blockade of the anterior, middle, and posterior superior alveolar nerves, greater palatine nerve, and complementation with an infiltration technique, using a solution of 2% mepivacaine hydrochloride with adrenaline 1:100,000.

At the end of the anesthetic infiltration, the modified Caldwell-Luc technique was defined as surgical access, allowing access to the maxillary sinus. The modified Neumann incision was performed with a #15 scalpel blade, creating a dental relaxing incision on the mesial side of tooth #23 and another one on the distal side of tooth #25 (Figure 2A and Figure 2B), allowing the mucoperiosteal flap to be reflected and the bone fenestration (Figure 2C) and residual roots of tooth #24 (Figure 2D) to be exposed.

The residual roots and the fistulous tract were excised (Figure 2E). After that, using a #10 carbide bur, an osteotomy was performed on the lateral wall of the left maxillary sinus, starting at the bone fenestration, allowing access to the interior of the maxillary sinus (Figure 2F). With the help of curettes, the surgical bur was located and removed from the interior of the maxillary sinus with hemostatic forceps (Figure 2G).

After its removal, it was observed that the surgical drill was completely oxidized (Figure 2H) and that there was reactive tissue around it, which was removed. Then, the maxillary sinus was irrigated with 80 mg/2 ml gentamicin diluted in 0.9% saline solution, allowing the cavity to be cleaned (Figure 2I). Finally, the flap was repositioned with simple interrupted sutures (Figure 2J), the patient was instructed on postoperative care, and preoperative medication was maintained for another week.

At the 7-day postoperative follow-up, the stitches were in position with no signs of infection or dehiscence (Figure 2K), and the postoperative cone beam computed tomography (Figure 3A, 3B, and 3C) demonstrated complete removal of the surgical drill from inside the left maxillary sinus. Thirty days after the removal of the stitches, a good clinical appearance of tissue healing was observed (Figure 2L).

The 3-month radiographic follow-up with a panoramic radiograph (Figure 4) demonstrated a normal appearance of the MS. The patient remained in follow-up for one year without reporting any complaints, and absence of the symptoms that were present prior to the surgical intervention.

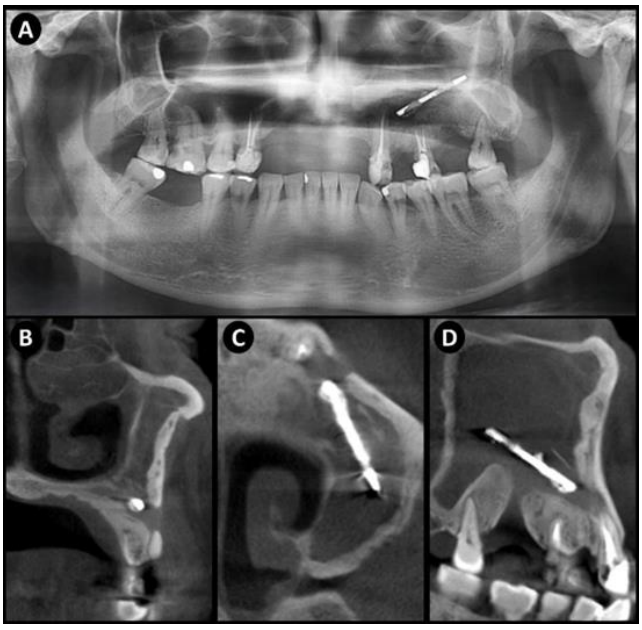


**Figure 1.** Preoperative imaging exams. **A –** Panoramic radiograph. **B –** Cone beam computed tomography (CBCT), coronal reconstruction. **C –** CBCT, axial reconstruction. **D –** CBCT, sagittal reconstruction.

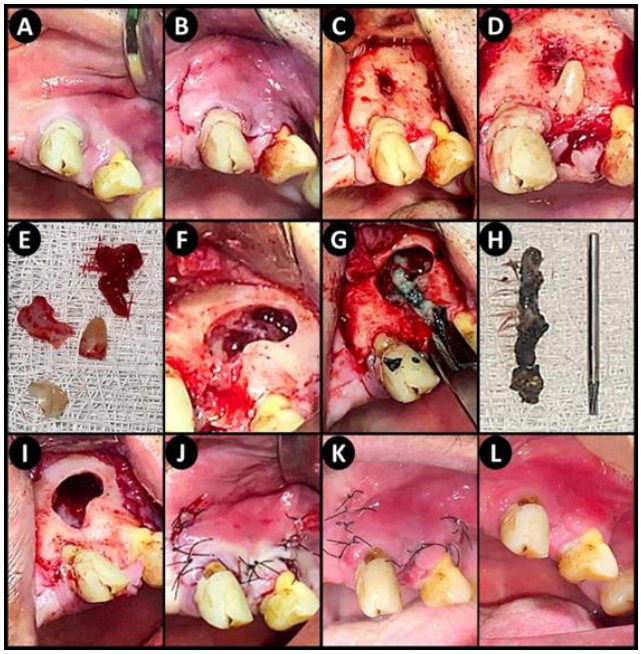


**Figure 2.** Surgical procedure. **A –** Initial clinical appearance. **B** – Incision. **C –** Reflection of the mucoperiosteal flaps and visualization of the bone fenestration. **D –** Location of the residual root of tooth #24. **E –** Residual roots and fistulous trajectory after their exeresis. **F –** Creation of the bone window. **G –** Removal of the surgical drill from the maxillary sinus. **H –** Comparison of the oxidized surgical drill removed from the maxillary sinus (left) with an intact surgical drill (right). **I –** Left maxillary sinus after cleansing. **J –** Suture with simple interrupted stitches. **K –** Clinical appearance 7 days after surgery. **L –** Clinical appearance 30 days after surgery.

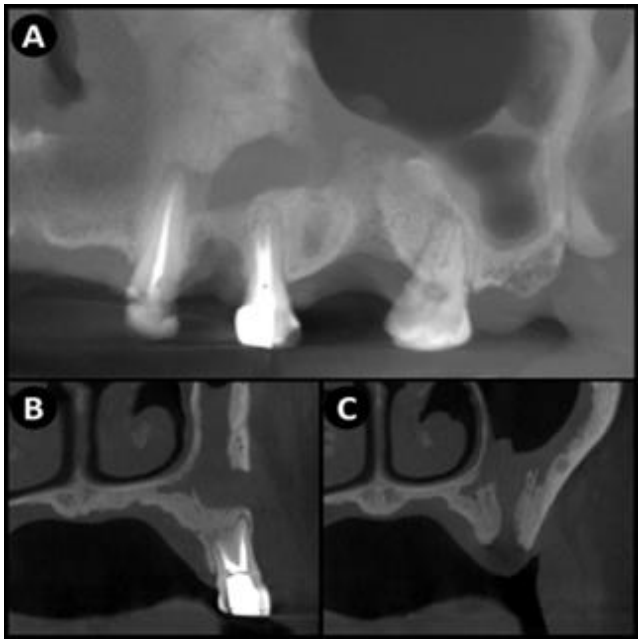


**Figure 3**. CBCT performed 7 days after the surgical procedure. **A –** CBCT, panoramic reconstruction. **B** – CBCT, coronal reconstruction demonstrating the surgical access performed. **C –** CBCT, coronal reconstruction demonstrating the region of the oroantral communication.

**Figure 4.** Follow-up panoramic radiograph acquired 3 months after the surgical procedure.

## DISCUSSION

Although rare, the number of complications associated with the presence of foreign bodies in the MS has increased in recent years. This increase may be related to the popularization of more invasive procedures, such as the placement of dental implants[10]. In addition to implants, the proximity between tooth roots and the MS is also a common cause of these complications[9,25]. Furthermore, iatrogenic cases also fall into this context, since careless handling, loosening of the drill in the high-speed handpiece, poor maintenance of dental instruments, and the reuse of drills[26] can result in complications as evidenced by the present case report.

The presence of foreign bodies in the MS can lead to a variety of complications, including persistent headaches and inflammation of the MS mucosa, which can manifest as facial pain, nasal obstruction, recurrent episodes of sinusitis, and sepsis[27]. These symptoms result from the tissue inflammatory response to the foreign body and can worsen if left untreated. In this case report, the patient presented recurrent crises of headache, sinusitis, edema, and pain for approximately 1 year, which began after tooth extraction with oroantral communication and introduction of the surgical drill into the MS. Foreign body displacement can happen due to recklessness; however, negligence, i.e. the act of not presenting conduct for the situation, can provoke reflections.

To avoid such complications, it is crucial to perform an accurate diagnosis, which can be achieved through imaging exams, such as panoramic radiographs and cone beam computed tomography. These exams are essential to identify the presence and exact location of the foreign body, allowing the development of an appropriate treatment plan[21].

Surgical removal of the foreign body is usually necessary to prevent the progression of symptoms and restore the physiology of MS. The Caldwell-Luc technique is one of the ways to remove foreign bodies[28]. This technique prevents fistulas, the formation of an area of fibrosis in the

sinus membrane and allows the closure of the defect in the region. Additionally, the Caldwell-Luc technique is considered financially low-cost, since it does not require new surgical instruments to perform the surgery[25,29]. Functional endoscopic sinus surgery is advocated for being less traumatic[30], but it is limited in some cases, since certain foreign bodies may be out of reach, and the technique may require specific instruments and the closure of the oroantral connection along with their removal[25,29]. In this case report, 30 days after surgical excision of the drill, a good aspect of tissue healing was observed on CBCT examination. During the patient's follow-up for 1 year, there was clinical resolution of recurrent sinusitis crises, with no local or systemic complaints reported.

Finally, as evidenced by this study, the importance of performing diagnostic imaging exams after complications in dental care is noteworthy, as they may reveal conditions that are not clinically detectable. Early detection of these conditions through imaging exams is crucial for effective diagnosis and treatment, preventing serious complications and improving patient prognosis[31,32]. The incorporation of imaging exams into clinical practice, the diagnostic accuracy, and the right choice of the surgical procedure significantly contribute to a successful resolution and management of the clinical case.

## CONCLUSION

It is concluded that the presence of the surgical drill in the MS for a long period causes both local and systemic impacts, and its surgical removal must be meticulously planned with the aid of complementary imaging exams, such as CBCT. The modified Caldwell-Luc surgical access guarantees resolution with the advantage of being low-cost, enabling complete cleansing of the maxillary sinus, and avoiding the recurrence of oroantral fistulas.

## ACKNOWLEDGMENTS

We thank the authors Vinícius Franzão Ganzaroli, Adair Trepiche Junior, Estêvão Lopes Pereira, Ana Carolina Zucon Bacelar, Fernanda Coelho-Silva, Leda Maria Pescinini Salzedas, Wilton Mitsunari Takeshita, and Daniela Ponzoni for their essential collaboration in the preparation of this article

## REFERENCES

1. Parks ET. Cone beam computed tomography for the nasal cavity and paranasal sinuses. Dent Clin North Am. 2014;58:627-651.
2. Saliba MC, Freitas VA, Moraes EC, Barros FL, Guimarães RE. Oncocytic papilloma. Braz J Otorhinolaryngol. 2009;75(2):317.
3. Da Silva AF, Fróes GR Jr, Takeshita WM, Da Fonte JB, De Melo MF, Sousa Melo SL. Prevalence of pathologic findings in the floor of the maxillary sinuses on cone beam computed tomography images. Gen Dent. 2017;65(2):28-32.
4. Gelardi M, La Mantia I, Drago L, Meroni G, Aragona SE, Cupido G, et al. Probiotics in the add-on treatment of otitis media in clinical practice. J Biol Regul Homeost Agents. 2020;34(6 Suppl.1):19-26.
5. Krishnan S, Sharma R. Iatrogenically induced foreign body of the maxillary sinus and its surgical management: a unique situation. J Craniofac Surg. 2013;24(3):e283-e284.
6. Tian XM, Qian L, Xin XZ, Wei B, Gong Y. An Analysis of the Proximity of Maxillary Posterior Teeth to the Maxillary Sinus Using Cone-beam Computed Tomography. J Endod. 2016;42(3):371-377.
7. Mohanavalli S, David JJ, Gnanam A. Rare foreign bodies in oro-facial regions. Indian J Dent Res. 2011;22(5):713–715.
8. Connolly AA, White P. How I do it: transantral endoscopic removal of maxillary sinus foreign body. J Otolaryngol. 1995;24(1):73-74.
9. Manigandan T, Rajalakshmi Rakshanaa TV, Judith MJ, Seethalakshmi C, Jawahar A, Priscilla Wincy WM. Rare incidental foreign body in the maxillary sinus on routine radiographic examination. Indian J Dent Res. 2023;34(1):108-110.
10. 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.
11. Seigneur M, Cloitre A, Malard O, Lesclous P. Displacement of tooth roots in the maxillary sinus: Characteristics and treatment. J Oral Med Oral Surg. 2020;26(3):34.
12. Smith JL, Emko P. Management of a maxillary sinus foreign body (dental bur). Ear Nose Throat J. 2007;86(11):677–78.
13. Iida S, Tanaka N, Kogo M, Matsuya T. Migration of a dental implant into the maxillary sinus. A case report. Int J Oral Maxillofac Surg. 2000;29(5):358-359.
14. Fan VT, Korvi S. Sewing needle in the maxillary antrum. J Oral Maxillofac Surg. 2002;60(3):334-336.
15. Yamaguchi K, Matsunaga T, Hayashi Y. Gross extrusion of endodontic obturation materials into the maxillary sinus: a case report. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2007;104(1):131-134.
16. Macan D, Cabov T, Kobler P, Bumber Z. Inflammatory reaction to foreign body (amalgam) in the maxillary sinus misdiagnosed as an ethmoid tumor. Dentomaxillofac Radiol. 2006;35(4):303-306.
17. Nandakumar BS, Niles NNA, Kalish LH. Odontogenic Maxillary Sinusitis: The Interface and Collaboration between Rhinologists and Dentists. J Otorhinolaryngol Hear Balance Med. 2021; 2(4):8.
18. Craig J, Poetker D, Aksoy U, Allevi F, Biglioli F, Cha BY, et al. (2021). Diagnosis of odontogenic sinusitis: An international multidisciplinary

consensus statement. Int Allergy Rhinol. 2021;11(8):1235–1248.
19. Preda M, Sarafoleanu C. Foreign body of endodontic origin in the maxillary sinus. Rom J Rhinol. 2021;11(43):111–117.
20. Thomas AE, Soni SK, Krishna BP, Singh R, Batra S. A long-standing foreign body in the oral cavity: An unusual presentation. RJDS. 2022;14(3):118-120.
21. Jayasuriya NSS, Karunathilaka PRCL, Wijekoon P. An unusual foreign object mimicking an odontoma in a patient with cleft alveolus: a case report. J Med Case Reports. 2017;11(1):279.
22. Liguori A de AL, Fayh APT. Computed tomography: an efficient, opportunistic method for assessing body composition and predicting adverse outcomes in cancer patients. Radiol Bras [Internet]. 2023;56(6):VIII–IX.
23. Nakamura N, Mitsuyasu T, Higuchi Y, Oka M. Successful removal of a foreign body from the maxillary sinus via a combined transnasal endoscopic and Caldwell-Luc approach: A case report. J Oral Maxillofac Surg. 1999;57(12):1511-1513.
24. Pereira AS, Shitsuka DM., Parreira FJ, Shitsuka R. Methodology of cientific research. UFSM; 2018. Disponível em: https://repositorio.ufsm.br/bitstream/handle/1/15824/Lic_Computacao_Metodologia-Pesquisa-Cientifica.pdf?sequence=1&isAllowed=y.
25. Ganzaroli VF, Bacelar ACZ, Pereira EL, Costa LL Da, Rocha AN, Kirasuke AM, et al. Remoção de raiz residual do seio maxilar: Técnica de Caldwell-Luc modificada. Res Soc Dev. 2024;13(7):e13013746438.
26. Froum SJ, Elghannam M, Lee D, Cho SC. Removal of a Dental Implant Displaced Into the Maxillary Sinus After Final Restoration. Compend Contin Educ Dent. 2019;40(8):530-535.
27. Shao L, Qin X, Ma Y. Removal of maxillary sinus metallic foreign body like a hand sewing needle by magnetic iron. Int J Clin Pediatr Dent. 2014;7(1):61-64.
28. Hamdoon Z, Mahmood N, Talaat W, Sattar AA, Naeim K, et al. Evaluation of different surgical approaches to remove dental implants from the maxillary sinus. Sci Rep. 2021;11(1):4440.
29. Maciel J, Borrasca AG, Delanora LA, Simão MDS, Araújo NJ, Faverani LP, et al. Remoção de implante de seio maxilar: técnica de Caldwell-Luc modificada. Res Soc Dev. 2020;9:e901997936.
30. Tilaveridis I, Stefanidou A, Kyrgidis A, Tilaveridis S, Tilaveridou S, Zouloumis L. Foreign bodies of dental iatrogenic origin displaced in the maxillary sinus: a safety and efficacy analysis of a retrospective study. Ann Maxillofac Surg. 2022;12(1):33-38.
31. Batra M, Mohod S, Sawarbandhe PA, Dadgal KV. Multilocular Radiolucent Pathology in the Body and Ramus of the Mandible: A Case Report. Cureus. 2024;16(7):e63722.
32. Ishiyama M, Namaki S, Yaoita M, Kikuiri T. A Radicular Cyst in the Mandibular Anterior Region of Primary Teeth. Cureus. 2024;16(7):e63782.

## CONFLICT OF INTERESTS

The authors declare no conflict of interest.

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**Received** 18/03/2025
**Accepted** 05/05/2025