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Case Report

Management of Dental Implants Displaced into the Maxillary Sinus: A Case Report Presenting Critical Clinical Considerations

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Abstract

Implant displacement into the maxillary sinus is a rare but potentially serious complication associated with posterior maxillary atrophy and inadequate primary stability. Proper diagnosis and timely surgical management are essential to prevent chronic sinus disease. A 44-year-old female patient presented with two dental implants displaced into the left maxillary sinus eight months after placement, associated with recurrent sinusitis, facial swelling, and an oroantral communication. Cone beam computed tomography confirmed the intranasal position of the implants and sinus mucosal thickening. Surgical removal was performed through a lateral maxillary sinus approach under local anesthesia, followed by irrigation and closure with a resorbable collagen membrane. Postoperative management included antibiotics, analgesics, and anti-inflammatory medication. Clinical and radiographic follow-up up to 24 months demonstrated complete resolution of symptoms and stable healing without recurrence or functional impairment.

Keywords: Dental implant; Maxillary sinus; Implant failure, Surgical management

1. Introduction

Rehabilitation with dental implants in the posterior maxilla presents significant anatomical and biomechanical challenges, such as maxillary sinus pneumatization, thin cortical bone, low bone density, and reduced residual bone height, resulting in a substantially increased risk of intra- and postoperative complications, including implant displacement into the maxillary sinus during placement.[1]

Recent literature describes this event as infrequent but potentially severe, with clinical presentations ranging from asymptomatic findings to acute or chronic sinusitis. According to Seigneur et al.[2] 62.6% of implant displacements occur within the first six months, with 56.2% of cases remaining asymptomatic. Associated factors include inadequate preoperative planning, low insertion torque, improper implant selection, perforation of the Schneiderian membrane, excessive osteotomy preparation, and technical failures during sinus floor elevation procedures. The judicious use of cone-beam computed tomography (CBCT), appropriate sinus-elevation techniques, and protocols that ensure adequate primary stability have been identified as key preventive measures.[2-8]

When displacement occurs during implant placement, the clinical presentation may vary from asymptomatic to facial pain, purulent rhinorrhea, and nasal obstruction. If left untreated for extended periods, especially in the presence of recurrent infection, it may result in the spread of infection to primary and/or secondary facial spaces and potentially lead to patient death. Imaging examinations, such as conventional radiography or CBCT, may reveal the implant as freely positioned within the sinus cavity, embedded in thickened sinus mucosa, or associated with inflammatory changes. Most reported cases occur intraoperatively or within the first weeks prior to prosthetic loading, particularly in atrophic maxillae and following sinus elevation procedures. Therefore, immediate CBCT imaging, individualized antibiotic prophylaxis, and early determination of the surgical access route are strongly recommended.[2,6]

Regarding management, there is a growing consensus in favor of minimally invasive retrieval whenever feasible. The endonasal endoscopic approach, commonly performed through functional endoscopic sinus surgery (FESS), demonstrates high rates of complete implant removal with reduced morbidity, especially in the presence of sinusitis or extensive Schneiderian membrane perforation.[9] Lateral antrostomy remains indicated in selected cases, such as those involving difficult access or impacted implants. Across all clinical scenarios, prevention, through meticulous three-dimensional planning, strict control of insertion torque, and mastery of sinus elevation techniques, is recognized as the most cost-effective strategy to reduce the occurrence of this complication.[10,11]

The aim of this study was to evaluate the case of a 44 -year-old patient who presented with two dental implants displaced into the left maxillary sinus eight months after placement, associated with recurrent sinusitis, facial edema, and an oroantral communication. This clinical case is intended to provide a clear and concise demonstration of the management of this type of surgical complication, which may occur during the intra- and/or postoperative period. Furthermore, it underscores the critical importance of meticulous preoperative planning, including the selection of appropriate imaging modalities and implant characteristics for the posterior maxilla, an area frequently associated with limited bone height and reduced bone quality. These factors are essential for determining the most appropriate surgical approach. In addition, should such complications arise, this report offers guidance for their management, with the primary objective of minimizing morbidity and reducing the likelihood of patient sequelae.

2. Case Presentation

This case report followed the CARE guidelines. A 44-year-old melanoderma female patient was referred to the Oral Surgery Clinic of the School of Dentistry for evaluation of two dental implants displaced into the maxillary sinus during a surgical procedure performed in a private dental office approximately eight months earlier. During anamnesis, the patient reported persistent pain in the maxillary region, recurrent episodes of sinusitis, passage of fluids from the oral cavity into the nasal cavity, four episodes of facial swelling, and the presence of purulent discharge, which required repeated courses of antibiotic therapy.

At the initial clinical examination, the patient presented no relevant systemic conditions and was considered medically fit for surgical intervention under local anesthesia. CBCT revealed the presence of two dental implants within the left maxillary sinus, associated with sinus mucosal thickening and an oroantral communication in the posterior maxillary region (Figure 1).

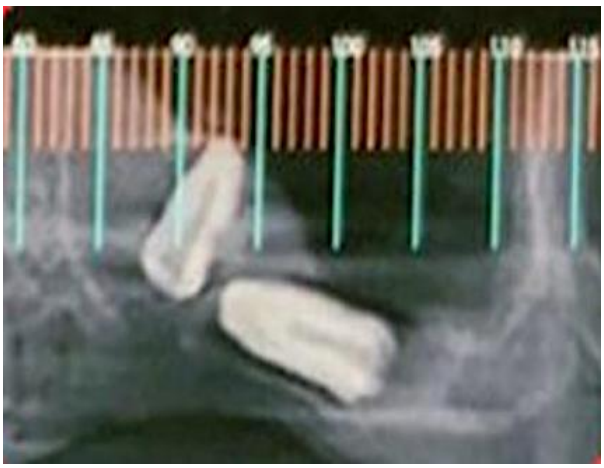

Figure 1. Visualization of a left-sided cone-beam computed tomography (CBCT) scan, showing the presence of dental implants displaced into the maxillary sinus.

The anesthetic-surgical plan included local anesthesia through posterior superior alveolar, middle superior alveolar, and greater palatine nerve blocks on the left side, using a 30-gauge short needle (DFL®, Rio de Janeiro, Brazil) and 4% articaine with 1:100,000 epinephrine (DFL®, Rio de Janeiro, Brazil). Two 1.8-mL cartridges were administered. Intraoral antisepsis was performed with 0.12% chlorhexidine digluconate mouth rinse (Periogard®, São Paulo, Brazil) for one minute, and extraoral antisepsis was carried out with 2% chlorhexidine degermant solution (Riohex®, Rio de Janeiro, Brazil), followed by placement of sterile surgical drapes.

After adequate anesthesia was achieved, an L-shaped incision was made extending from the region of teeth 24 to 27, with a vertical releasing incision on the buccal vestibule and a horizontal incision along the alveolar crest, using a No. 3 scalpel handle (Rhosse®, Ribeirão Preto, Brazil; Descarpack®, Ribeirão Preto, Brazil) and a No. 15C blade (Descarpack®, Ribeirão Preto, Brazil). A full-thickness mucoperiosteal flap was elevated using a Molt No. 9 periosteal elevator (Rhosse®, Ribeirão Preto, Brazil; Descarpack®, Ribeirão Preto, Brazil), and the surgical field was retracted with two Minnesota retractors (Rhosse®, Ribeirão Preto, Brazil; Descarpack®, Ribeirão Preto,

Brazil) to expose the lateral wall of the maxillary sinus (Figures 2A and 2B).

An orifice communicating with the maxillary sinus was identified, presumably corresponding to the penetration site of at least one implant. To allow safe removal of the implants, the bony window was enlarged using a spherical pneumatic surgical bur (MIG TOOLS®, Campo Largo, Brazil) mounted on a straight handpiece (KaVo®, São Paulo, Brazil), thereby improving visualization and access to the sinus cavity (Figures 2C and 2D).

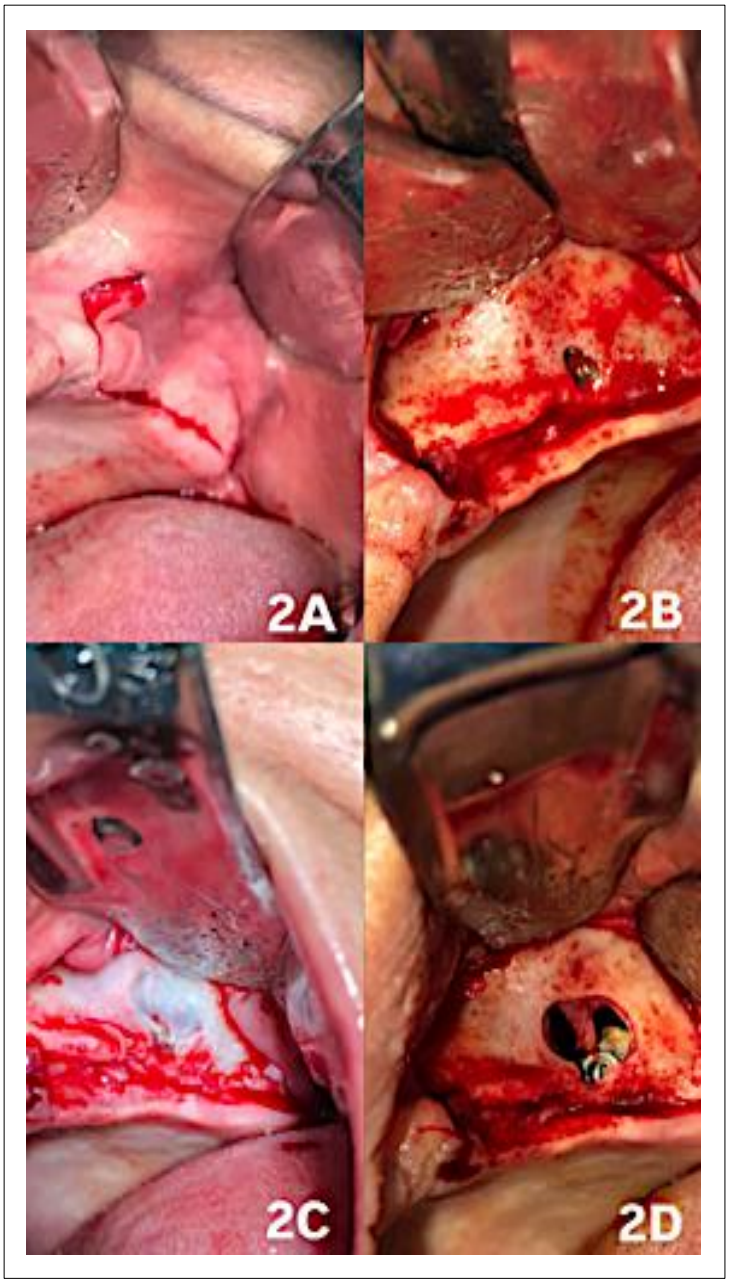

Figure 2. A. Intraoral visualization of triangular access in the region of the left maxillary sinus; B. Bone exposure of the region; C. Creation of a bony access to the maxillary sinus using a pneumatic spherical bur for removal of the dental implants; D. Direct visualization of the implants inside the maxillary sinus.

After full visualization of the sinus cavity, the implants were retrieved using a curved hemostatic forceps (Rhosse®, Ribeirão Preto, Brazil) (Figures 3A and 3B). Subsequently, the sinus cavity was thoroughly irrigated with 60 mL of 0.9% sterile saline solution (Fresenius®, São Paulo, Brazil) using a 20-mL syringe (Descarpack®, Ribeirão Preto, Brazil) and a 40 × 1.20-mm hypodermic needle (Descarpack®, Ribeirão Preto, Brazil) to remove inflammatory debris.

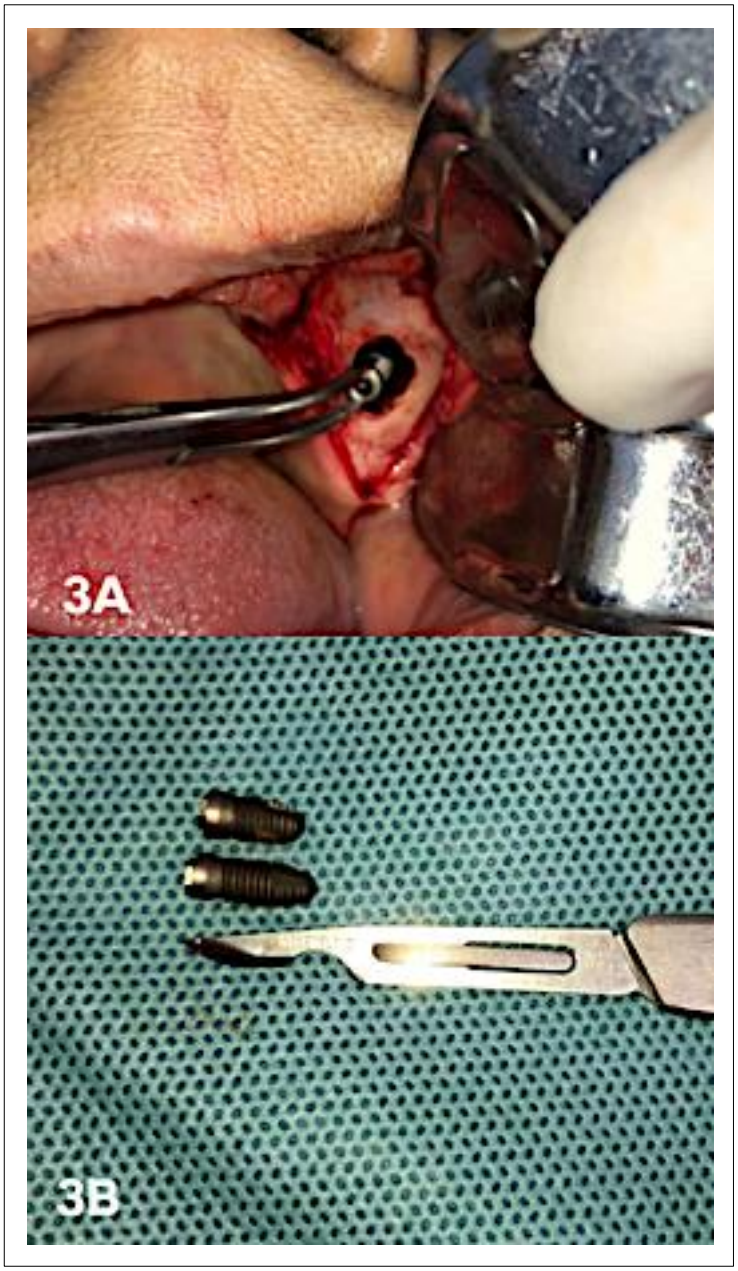

Figure 3. A. Removal of the implants using curved forceps; B. Visualization of the dental implants after their surgical removal.

Due to the presence of an oroantral communication and the enlargement of the surgical site, an absorbable collagen membrane (Surgidry®, Belo Horizonte, Brazil) was placed to seal the communication and protect the surgical area.

Postoperative instructions were provided, and the patient was prescribed analgesics (dipyrone 1 g every 6 hours for 3 days - Eurofarma®, Rio de Janeiro, RJ, Brazil), anti-inflammatory medication (nimesulide 100 mg every 12 hours for 3 days - Eurofarma®, Rio de Janeiro, RJ, Brazil), and systemic antibiotic therapy (amoxicillin 500 mg every 8 hours for 7 days - Eurofarma®, Rio de Janeiro, RJ, Brazil).

Clinical follow-up at 7, 14, and 21 days demonstrated satisfactory primary healing, absence of inflammatory signs, no wound dehiscence, and complete resolution of facial swelling. At long-term follow-up at 12 and 24 months, the patient remained asymptomatic, with no recurrence of infection, oroantral fistula, or functional and esthetic impairment, confirming successful treatment and stable healing.

3. Discussion

Sinus augmentation procedure is a routine approach for treatments.[12,13] Implant displacement into the maxillary sinus is primarily associated with poor bone quality, advanced sinus pneumatization, limited residual bone height, and technical errors during osteotomy preparation.[6,7] CBCT enables precise evaluation of sinus floor topography, septa, and mucosal thickness, supporting safer surgical planning.[10,11] The use of short or wide implants in atrophic posterior maxillae has been shown to reduce the need for extensive sinus elevation procedures and decrease the risk of Schneiderian membrane perforation and implant migration.[14] In this reported clinical case, computed tomography imaging demonstrated reduced residual bone height (maxillary sinus floor-alveolar crest relationship), and the implants selected were long and narrow. According to the literature, these factors are associated with higher rates of surgical failure and an increased risk of implant displacement into the maxillary sinus. Thus, this case corroborates the existing evidence and underscores the critical importance of careful preoperative planning and its proper execution.

Displacement may occur immediately, usually related to membrane perforation or lack of primary stability, or in a delayed manner as a result of micromovements, occlusal overload, and progressive loss of osseointegration.[15,16] Clinical presentations range from asymptomatic findings to acute or chronic maxillary sinusitis, facial pain, and purulent nasal discharge.[17,18] Postoperative imaging follow-up using periapical and/or panoramic radiographs, performed in the immediate postoperative period and at least once within the first three months prior to definitive prosthetic rehabilitation, is highly effective for early detection of complications in these cases. In this case, the patient was under follow-up in a private practice setting; however, the complication was not identified, and no postoperative imaging was performed, thereby further delaying accurate and timely diagnosis.

When surgical intervention is required, functional FESS is currently regarded as the treatment of choice due to lower morbidity and high success rates compared with the Caldwell-Luc approach.[2,19] However, the choice of surgical approach depends on several important factors, including the cost of the procedure, the surgeon’s skill and experience, and the availability of appropriate materials and instruments. In the present case, a lateral window approach was selected because it was the technique available at our institution at the time, and the responsible surgeon

had over 20 years of experience with this method. Therefore, these factors are closely associated with the overall success of the procedure. Moreover, the presence of an oroantral communication further supported the indication for a lateral window approach, as it allows for the placement of a resorbable membrane to achieve proper closure of the defect.

Postoperative pharmacological management plays a critical role in preventing infectious complications. Amoxicillin-clavulanate is widely recommended as first-line antibiotic therapy following sinus manipulation because of its effectiveness against odontogenic and respiratory pathogens.[20,21] In penicillin-allergic patients, doxycycline or respiratory fluoroquinolones may be considered. Adjunctive therapies such as saline nasal irrigation, intranasal corticosteroids, and non-opioid analgesics contribute to edema reduction, pain control, and improved sinus drainage.[22-25] The pharmacological protocol adopted in the present clinical case is consistent with the current literature, reflecting the standardization of this type of procedure with respect to infection control, as well as pain and local inflammatory management. Such measures are essential to ensure patient well-being and to minimize the risk of reinfection in the affected region.

Ultimately, prevention remains the most effective strategy for avoiding implant displacement into the maxillary sinus. Meticulous three-dimensional planning, strict control of drilling depth and insertion torque, achievement of adequate primary stability, and surgical experience are critical factors in minimizing the risk of this complication.[6,7,14] The authors of this study concur with the existing literature regarding preventive strategies across the preoperative, intraoperative, and postoperative periods. Moreover, patients who have undergone dental implant placement, even in the absence of early complications, should be monitored at six-month or annual intervals through clinical and radiographic assessments. Such follow-up enables early diagnosis and timely intervention, thereby reducing the risk of infections that may compromise the patient's physical and psychological well-being or, in severe cases, result in significant sequelae or even mortality due to the dissemination of infections originating in the oral cavity.

4. Conclusion

Dental implant displacement into the maxillary sinus is a rare but clinically highly relevant complication. Its prevention relies on accurate three-dimensional planning, appropriate implant selection, and meticulous surgical execution, particularly in atrophic posterior maxillae. When complication occurs, early diagnosis and endoscopic removal represent effective management strategies. When this complication occurs, early diagnosis and surgical removal are crucial. However, in the present case, a delayed referral to a specialized service resulted in a prolonged period of active infection. Furthermore, adequate pharmacological therapy and careful postoperative follow-up further complement the therapeutic approach.

Abbreviation	**Full Form**
CBCT	Cone-beam computed tomography
FESS	Functional endoscopic sinus surgery
CARE	Case Report guidelines

Declarations

Supplementary Materials: Not applicable.

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