Retrieval of Displaced Implant Attributable to an III-Fitting Denture From the Maxillary Sinus Six Months After Transcrestal Sinus Floor Augmentation and Implant Placement

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Introduction: Asymptomatic displacement of dental implants into the maxillary sinus after a transcrestal sinus augmentation is a rare complication that can occur when there is poor bone quality and minimal residual bone height. Patient compliance with postoperative appointments and failure to comply with denture-wearing instructions are critical contributing factors. To the best of the authors' knowledge, no cases of implant dislodgement attributable to a removable prosthesis have been reported in the literature, although some studies have suggested that improper occlusal forces can cause a longstanding implant to develop peri-implantitis and subsequent displacement of an implant into the sinus cavity.

Case Presentation: A 71-year-old female presented 6 months after undergoing transcrestal sinus lift and implant surgery that involved a modified Summers technique using mineralized solvent-dehydrated cancellous bone allograft and placement of six maxillary implants. A displaced dental implant was retrieved from the right maxillary sinus, which had an intact Schneiderian membrane. The patient was asymptomatic and infection free. The displaced implant was accessed and retrieved via a lateral window sinus technique. No clinical signs of sinus infection were evident, and there were no additional complications during the 2-year follow-up period.

Conclusion: This case report demonstrates a technique for the retrieval of implants that have been dislodged and migrated into the maxillary sinus cavity caused by an ill-fitting denture and improper masticatory forces. *Clin Adv Periodon-tics* 2016;6:175-181.

Key Words: Dental implants; dentures; maxillary sinus; sinus floor augmentation.

Background

This case report documents a patient in whom a transcrestal sinus lift was performed with concomitant placement of implants, with subsequent displacement of an

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implant into the maxillary sinus. Although there was displacement of the implant into the sinus cavity, the patient was asymptomatic and infection free. A literature search revealed few reports of implant displacement into the sinus cavity, and even fewer reports of late displacement of the implant into the sinus cavity after a transcrestal sinus lift technique¹ caused by an ill-fitting denture and improper masticatory forces.^{2,3} To the best of the authors' knowledge, no cases of implant dislodgement attributable to a removable prosthesis have been reported in the literature, although some studies have suggested that improper occlusal forces can cause a long-standing implant to develop peri-implantitis and subsequently displace into the sinus cavity.^{3,4} There are several treatment options for implant placement in the pneumatized maxillary posterior arch, including zygomatic, trans-sinus, or pterygoid plate implants and short or mini implants.⁵ However, one of the most well-documented treatments is the lateral window sinus lift or transcrestal sinus lift, the choice of which depends on the quality and height of the residual alveolar bone from the crest to the floor of the maxillary sinus.⁶ When the bone height is <4 to 5 mm, the preferred and more predictable treatment option is to perform a lateral window sinus augmentation.^{7,8}

Implants restored in sinus augmentation sites have survival rates ranging from 95.4% to 100% after 3 years of follow-up and 86.5% to 98.2% with up to 5 years of follow-up in several studies.⁹⁻¹¹ Despite these high survival rates, these procedures are not without complications. Common intraoperative complications include Schneiderian membrane perforation, which has been reported to be as high as 40%, as well as postoperative sinus infections or nausea and dizziness after a transcrestal sinus lift is performed.^{12,13} Other reported complications can involve implant displacement into the sinus cavity and/ or sinus infections.¹⁴

Clinical Presentation

A 71-year-old female presented to the Department of Periodontology, Stony Brook University School of Dental Medicine, Stony Brook, New York, in May 2014 after dental implant surgery and transcrestal sinus floor augmentation with a modified Summers technique using mineralized solventdehydrated cancellous bone allograft at site #4 and placement of six maxillary implants 6 months earlier (Fig. 1). The patient failed to show up for subsequent postoperative visits with both the surgeon and the restorative dentist for denture adjustment because of relocation and did not follow their initial instructions, which included not wearing her old ill-fitting maxillary denture or the newly made immediate denture until additional adjustments were made. She reported that her new dentist had refused to adjust her dentures, and therefore she was wearing and alternating between her old ill-fitting denture and the unadjusted immediate denture for 6 months. She stated that she initially had some sore spots under the denture, and so she alternated between using the old and the new denture to allow the sore spots to heal. She also stated that she did wear her dentures during the night while sleeping. Radiographs revealed that the implant at site #4 had dislodged into the right maxillary sinus cavity (Fig. 2). The patient was not aware of this and was asymptomatic.

Case Management

Advanced imaging was used to evaluate the sinus cavity and locate the implant (Fig. 3). The treatment recommendation was removal of the displaced implant with a modified Caldwell-Luc sinus access technique.¹⁵ This was preferred over an endoscopic technique¹⁶ so that implants at sites #6 and #7 also could be evaluated intraoperatively. Written informed consent was obtained. The medical history was non-contributory, and vital signs were within normal limits. Two percent lidocaine at 3.4 mL with 1:100,000 epinephrine



FIGURE 1 Periapical radiograph of the posterior right maxilla taken at the time of transcrestal sinus lift and implant placement.



FIGURE 2 Periapical radiograph of the posterior right maxilla taken 6 months after implant placement, showing the migration of the implant at site #4 into the maxillary sinus space.

was administered via greater palatine and posterior superior alveolar nerve blocks and local infiltration. A midcrestal incision with an anterior releasing incision was placed in the maxillary right quadrant from the canine area immediately mesial to the anterior implant to the tuberosity area, and a mucoperiosteal flap was raised. A rectangular lateral osseous window was created in the posterior lateral wall of the right maxillary sinus using a surgical round bur under copious irrigation with sterile saline (Fig. 4a). The Schneiderian membrane was intact with no clinical signs of infection. There were no radiographic or clinical signs of remaining graft material still present. A 6-mm horizontal incision was then made through the intact sinus membrane to access and retrieve the displaced implant with sterile forceps under direct vision (Figs. 4b and 4c). The surgical field was irrigated with sterile saline, and a resorbable collagen membrane[§] was fitted over the sinus membrane and osteotomy site (Fig. 4d). Flap closure was obtained using absorbable polyglactin 910 4-0^{II} sutures in a continuous mattress manner (Fig. 4e). The

[§] Gestlich Bio-Gide, Geistlich Pharma North America, Princeton, NJ.

VICRYL, Ethicon, Johnson & Johnson, Somerville, NJ.



FIGURE 3 Cone-beam computed tomography taken 6 months after implant placement, showing the position of the implant within the right maxillary sinus.

patient was placed on a 7-day course of amoxicillin (875 mg twice daily), chlorhexidine mouthrinse (0.5 oz twice daily for 2 weeks), and ibuprofen (800 mg), as needed for pain. Post-operative healing was uneventful.

Clinical Outcomes

There were no signs of infection at subsequent postoperative visits, and sutures were removed at the 2-week visit. The healing was uneventful. Additional follow-up visits for 2 years revealed complete healing of the surgical area and no complications (Fig. 5).

Discussion

Rosen et al.¹ reported that, when pretreatment bone height was ≥ 5 mm, the survival rate of dental implants was 96% or higher; however, when pretreatment bone height was ≤ 4 mm, then survival rate fell to 85.7%. They concluded that preexisting bone height between the sinus floor and the crest was the most important factor influencing implant survival. In this case re-

port, the implant was placed in the posterior maxilla with 5-mm residual bone height, and the implant insertion torque was >30 Ncm in type II-III bone; however, without proper prosthesis adjustments, postoperative follow-up visits, and good patient compliance, it is possible that masticatory forces caused implant movement during the implant healing period. This is more likely to happen in combination with poor bone quality in the posterior maxilla even when there is sufficient primary stability.



FIGURE 4a A rectangular lateral osseous window was created in the posterior lateral wall of the right maxillary sinus using a surgical bur under copious irrigation with sterile saline. 4b A horizontal incision was made through the sinus membrane to access the displaced implant. 4c The displaced implant was removed from the sinus with sterile forceps under direct vision. 4d A resorbable collagen membrane was fitted over the sinus membrane and osteotomy site. 4e Flap closure was obtained using absorbable polyglactin 910 4-0 sutures in a continuous mattress manner.



FIGURE 5 Periapical radiograph from the maxillary right posterior sextant taken after implant removal.

Summary

Why is this case new information?	 Documentation of successful retrieval of an implant displaced late after an osteotome technique from the sinus cavity by performing a lateral window sinus access surgery with a 2-year follow-up
What are the keys to successful management of this case?	 Successfully locating the displaced implant through advanced imaging Accessing the sinus through a lateral window approach Purposely incising the Schneiderian membrane to retrieve the dislodged implant Uneventful healing after the retrieval surgery and good patient recovery following the procedure
What are the primary limitations to success in this case?	 Challenges posed by the edentulous posterior maxilla for implant therapy in cases of poor bone quality and minimal remaining residual crestal bone height Judicious use of transcrestal sinus augmentation with simultaneous implant placement when the residual crestal bone height is <5 mm, especially when the bone quality is poor Importance of patient compliance with postoperative follow-ups and denture adjustments when multiple implants are placed

Acknowledgment

The authors report no conflicts of interest related to this case report.

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