Accidental Displacement of Dental Implants Into Both Maxillary Sinuses During Surgery

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INTRODUCTION

Implant displacement into the maxillary sinus during surgery or after a period of use is a complication recognized in the literature. Foreign objects in the maxillary sinus must be removed because they cause sinus infection via impaired mucociliary flow and tissue reactions. In this article, we present the case of a patient whose dental implants slipped into the maxillary sinuses on both sides during surgery and describe surgical removal of the implants via an intraoral approach.

Recently, prostheses supported by dental implants have become an acceptable and common treatment method in the treatment of partial and fully edentulous patients. Implantation into the posterior edentulous maxilla is difficult owing to insufficient and poor quality of the bone arising from pneumatization of the maxillary sinus and resorption of the alveolar crest. The use of short implants in the posterior edentulous maxilla or sinus lift procedures (SLP) has proven to overcome such difficulties. Although these methods make implantation safer, implant displacement into the maxillary sinus during surgery or after a period of use is a recognized complication. The causes of displacement include surgical inexperience, insufficient planning, changes in intranasal sinus pressure, autoimmune reaction, peri-implantitis or bone resorption, improper occlusal forces, and bone deficiencies.

Foreign objects in the maxillary sinus must be removed because they cause sinus infection due to impaired mucociliary flow and tissue reactions. Even fungal infections and cancer have been reported in cases of foreign objects slipping into the maxillary sinus. Owing to these complications, displaced dental implants must be removed as early as possible. Preferred methods for the removal of implants include endoscopic sinus surgery (ESS) or the classic Caldwell-Luc (CL) operation with intraoral approach. For some other cases, a combination of both methods can be applied. In this article, we present the case of a patient whose dental implants slipped into the maxillary sinuses on both sides during surgery and describe surgical removal of the implants via an intraoral approach.

CASE REPORT

A systemically healthy 64-year-old female patient who was previously diagnosed with slippage of an implant into the maxillary sinus presented at the periodontology clinic of the Faculty of Dentistry at Inonu University.

EXAMINATION

Upon intraoral examination, we found that rear sections of both the right and left upper jaw were partially edentulous. The patient underwent implant surgery via lifting of a mucoperiosteal flap from canine to tuber region. One implant each had been placed in the area of teeth numbers 4 and 12 on the same day. Panoramic radiography and cone-beam computerized tomography (CBCT) examination confirmed that the implants had displaced into both maxillary sinuses.

In axial view, the implants were found in oblique position on the lateral wall of the right maxillary sinus, horizontally touching the posterior wall of the maxillary sinus, and in the middle of the maxillary sinus on the left side (Figure 1). On the right sagittal view, a 6.5-mm wide perforation was seen at the top of the alveolar crest 5.5 mm away from the implant distally placed for the #4 tooth. The implant was located on the thickened mucosa of the inferior of maxillary sinus posterior lobe (Figure 2). In the left sagittal view, a 4.5-mm wide perforation was detected at the top of the alveolar crest 3 mm away from implant, which was placed distally on tooth number 12. The implant moved to the maxillary sinus in oblique position 1.5 mm distal to the perforated area on the thickened mucosa (Figure 3).

Surgical procedure

Oral surgical treatment was considered optimal based on CBCT data showing the implants in posterior regions, and because of the difficulty expected with an endoscopic technique and the freshness of the surgical wound (Figures 2 through 4). After patient consent was obtained, she was treated under intraorally
administered local anesthesia by using a lateral window surgical technique. Canine, premolars, and first molar regions were infiltrated, with facial, and greater palatine nerve and posterior superior alveolar nerve blocks, with articaine (Ultracain DS forte Ampul 2 mL Sanofi Aventis, France, Articaine HCl: 40 mg/mL. Epinefrin HCl: 0.012 mg/mL). The mucoperiosteal flap was removed from canine tooth area to the maxillary tuber region. The cavities were seen immediately distal to the implants. Piezonic surgical equipment (Ultrasonic Bone Surgery System VarioSurg, NSK, Japan) with sterile saline irrigation was used to create a rectangular osseous window in the posterior lateral wall of the sinuses. After the osteotomy was complete, the implants were accessed by perforating the released sinus membrane. The implants were then detected under direct vision and removed with forceps through the osseous window (Figure 5a through c). No infection or granulation tissue was detected in the surgical site. The surgical field was irrigated with sterile saline and a biocollagen membrane (Geistlich Bio-Gide; Geistlich Pharma AG, Wolhusen, Switzerland) was placed in the perforated regions (Figure 6a and b). The mucoperiosteal flap was closed using a 3-0 silk suture. After the operation, an amoxicillin/clavulanic acid combination of 1000 mg, an analgesic (flurbiprofen), and chlorhexidine gluconate were prescribed for 1 week. The patient was also instructed regarding coughing and sneezing techniques. There were no complications in the early period after the operation.

**DISCUSSION**

In the dental implantology literature, complications encountered of maxillary posterior implants include maxillary sinusitis, oroantral gap formation, or implant slipping into the paranasal sinuses. Implant displacement into paranasal sinuses is rare; complications are mostly seen with implant displacement into maxillary sinuses. Dental implants slipping into both the maxillary sinuses, as in this case, is not uncommon in the literature. The literature also reports cases of implants displacement into ethmoid sinus, sphenoid sinus, anterior cranial fossa, and orbital base.

Regarding implants displaced into maxillary sinus without graft surgery, common contributing factors include the following: insufficient surgical planning, lack of anatomical knowledge, surgical inexperience, Schneiderian membrane
perforation, excessive force application, improper force during removal of nonosseointegrated implants, unintentional formation of oroantral gap while creating an implant cavity on the sinus base, and an improper implant cavity. Other factors that cause delayed implant displacement include a change in intrasinus pressure and nose pressure, peri-implant bone destruction resulting from autoimmune reactions, and suboptimal occlusal forces. In this case, implant slippage was caused by perforation of the maxillary sinus membrane by the surgical drill. Surgical inexperience may have been a contributing factor in this case.

In the cases where the maxillary bone is insufficient in vertical size (<5 mm), an implant should be inserted after SLP. Radiographic records in this case show probable vertical bone insufficiency that would have required grafting for both maxillary sinuses. However, no bone graft material was used before or during the implant surgery. The implantation was attempted directly, and the implants slipped into the maxillary sinuses through perforation of the membrane.

Dental implants slipping into maxillary sinuses can create an infective situation, such as sinusitis, through contact with sinus mucosa. Rather serious events, such as fungal infection and cancer, have also been reported. The generally recognized treatment protocol is to remove the foreign object through techniques such as making a window on the sidewall of sinus intraorally, intraoral endoscopic technique and ESS, or a combination of these. The risk factors for conventional intraoral CL surgery include infraorbital nerve damage, buccal soft tissue retraction, mucosal healing leaving scar tissue, oroantral gaps resulting from incomplete periosteal closure, and an insufficient amount of bone in cases requiring insertion of a second implant. ESS is advantageous in protecting whole sinus tissue and allowing for cleaning of a secondary sinus infection. However, its disadvantages include inaccessibility to the sinus rear and front walls, failure in preventing oroantral communication, and requiring additional equipment. Moreover, removal is not optimal if the material to be removed is large in size or when it is enclosed by a large cyst. In this case, the implants were removed via an intraoral approach, owing to the positions and sizes of the implants; a large area was needed to direct surgical manipulation and prevent another mucosal injury. The endoscopic technique, although minimally invasive, was not preferred because of the restricted size of the opening and because the site of the operation was too low.

**Conclusion**

In conclusion, although displacement of implants in maxillary sinus or paranasal sinuses are rarely encountered, they are significant possible complications that accompany dental implantation. A very good preoperative evaluation of the patient by an experienced surgeon will prevent such complications.
Displacement of Implants Into Both Maxillary Sinuses

If the implant migrates into the maxillary sinus, it should be removed to avoid sinus pathology. In such early cases, the intraoral surgical approach may be preferred due to positioning of implants on posterior and anterior areas. Endoscopic methods would have been limited by difficulty in accessing the base, posterior, and anterior areas of maxillary sinuses, a small opening size, and larger size of materials to be removed.

**ABBREVIATIONS**

CBCT: cone-beam computerized tomography
CL: Caldwell-Luc
ESS: endoscopic sinus surgery
SLP: sinus lift procedure

**NOTE**

The information presented here was reported at the 42nd Annual Scientific Meeting of the Turkish Association of Periodontology, November 8–10, 2012, Ankara, Turkey.

**REFERENCES**
