INTRODUCTION

Migration of foreign bodies into the maxillary sinuses is a relatively frequent complication in dental clinical practice. Potential ways of escape for these are penetrating trauma, an oroantral fistula or an iatrogenic displacement during dental procedures such as extractions of teeth, routine endodontic treatment, \(^1\) apical surgery or, lately, dental implant placement. \(^2\) Most common foreign bodies associated with sinus perforation are displaced fractured roots, whole teeth, dental impression materials, dental burs, gutta-percha \(^3\) and silver points, amalgam fillings, and dental implants. Examples of more bizarre materials are bullets, pieces of glass, stones, and wood.

All of these objects may cause inflammation/sinusitis by interrupting mucociliary clearance or causing a tissue reaction. \(^4\) It is widely recognized that prompt and conservative surgical intervention is desirable to remove these foreign bodies from paranasal sinuses but also to treat a possible hyperplastic or infected sinus mucosa. This early intervention is suggested to prevent or treat the possible sequelae of acute or chronic sinusitis, antrolith formation, mucosal cyst formation, and persistent oroantral communication. \(^5\) Extension of infection intracranially, aspergillosis connected with zinc endodontic obstruction materials, or malignant tumors are rare complications of sinus foreign bodies and pathologic conditions. \(^5\)

Displacement of dental implants into the maxillary sinus can violate the anatomic integrity and interfere with the physiologic mechanisms of the maxillary sinus, creating potential complications, like a foreign-body reaction of conventional sinusitis. \(^6\) The failure rate of osseointegration of dental implants is more significant to the maxilla than the mandible because of the anatomy related to the surrounding structures (such as the maxillary sinus), bone quality Class IV (thin cortical bone with spongy or low density), rapid alveolar bone resorption after tooth extraction, maxillary sinus pneumatization, and so on. \(^7\) More precisely, due to the insufficient height of the alveolar ridge, the implants often touch or even slightly perforate the Schneiderian membrane of respiratory epithelium, which lines the floor of the antrum. \(^8\) Moreover, inadequate implant preparation, drilling or installation errors, and

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excessive tapping during sinus osteotomy procedure\textsuperscript{4} can lead to sinus complications related to several maxillary reactions, chronic maxillary sinusitis of “dental” origin being the more frequent one.\textsuperscript{9} Also, the displacement of an implant into the maxillary sinus can result in a foreign-body reaction or a sinus infection secondary to peri-implantitis,\textsuperscript{10} or it can remain uneventful for a long period.\textsuperscript{11} Nevertheless, cases of complete migration of dental implants into the maxillary sinus\textsuperscript{7,9,12} or even into the sphenoid sinus\textsuperscript{13} are rarely mentioned in the literature.\textsuperscript{10,14}

**CASE REPORT**

A 43-year-old white man came to our private practice office with a chief complaint of a mucosal trauma on the left posterior maxillary region caused by the prosthetic rehabilitation of movable overstructure, placed and loaded on dental implants 8 years ago. A careful clinical examination showed the disappearance of an abutment on the posterior left side of the maxilla and the absence of the implant from the same area, though the housing on the overdenture was clearly seen. The conventional panoramic and Water’s radiograph revealed migration of the dental implant into the left maxillary sinus, situated in an anterior position attached to the medial wall (Figure 1a and b). The radiographic evaluation was completed by a computerized tomography scan of the facial skeleton (Figure 1c). The patient presented no clinical symptoms from the sinus, like nasal congestion or discharge, facial pain or hyposmia, and no chronic oroantral fistula was observed.

After obtaining the patient’s consent for suggested treatment, he was treated under general anesthesia by a minimally invasive surgical technique. After the raise of an atraumatic buccal full-thickness flap and the
use of round bur No. 2 to create a small rectangular osseous window (bone flap) in the anterior wall of the sinus, the implant was detected under direct vision and removed with forceps through the osseous window of the osteotomy. The bone segment (bone lid) that was removed to facilitate access to maxillary sinus was preserved, as it was repositioned at the end of the surgery, guided by small matching holes and stabilized by resorbable stitches. The whole antrum cavity was carefully examined making clear the absence of granulomatous reaction tissue (Figures 2 through 4).

The histologic examination showed no inflammatory signs connected to the migrated implant. The immediate and further postoperative recovery of the patient was uneventful and no complications occurred. Six months later 2 new osseointegrated implants were placed in the left posterior maxillary region assisted with demineralized bone graft and plasma-rich growth factor, and an over-structure was made with a successful result.

**DISCUSSION**

The pathogenesis of migration of an implant into the maxillary sinus is difficult to explain, but 3 probable mechanisms include the changes in intrasinal and nasal air pressure, an autoimmune reaction to the implant causing peri-implant bone destruction and compromising the osseointegration, and a bone resorption produced by an incorrect distribution of occlusal forces. No matter the cause, implant displacement into the maxillary sinus causes chronic maxillary sinusitis due to the foreign-body reaction and needs to be treated with surgical removal of the implant, even when it is asymptomatic. In our case, the forces acting on the implant were unclear, and the possibility of a small penetration of the floor of the antrum during the placement existed as well. Also, the duration of the hospitality of the implant is unknown.

Treatment modalities for removal of a migrated dental implant initially included the conventional Caldwell-Luc (C-L) procedure,
and in specific situations, preservation alone. Recent minimally invasive attitude in maxillofacial surgery led to transoral or transnasal functional endoscopic sinus surgery (FESS), as well as the conservative intraoral approach with the creation of a bony window in the lateral wall of the sinus, and the alternatives of the C-L procedure.

The risks of the conventional C-L procedure include infraorbital nerve injury, retraction of the soft tissues of the cheek, replacement of mucosa by scar tissue, or an oroantral fistula if the periosteum is not closed adequately, and can make subsequent implant insertion difficult. FESS is a less invasive procedure as it respects the integrity of the sinus the most and permits infection control of paranasal sinuses secondarily involved, but it cannot close oroantral communications and is usually inadequate to get access to dental materials dislocated anteriorly or to the bottom of the sinus. Also, it has a limitation of use when the object is large or accompanied by a dental cyst, and it requires specific training and equipment.

In our case, the intraoral approach with the technique of bone flap (bone lid) in the anterior wall of the maxillary sinus was preferred because of the position and size of the implant and the requirement of a wide opening for the direct surgical manipulations without other mucosal disturbances. The endoscopic surgery, even though minimally invasive, was not indicated due to the restricted opening and the lower site where it was performed.

**ABBREVIATIONS**

C-L: Caldwell-Luc procedure  
FESS: functional endoscopic sinus surgery

**REFERENCES**


