

# Accidental implant displacement into maxillary sinus

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## ABSTRACT

**Introduction:** The oral rehabilitation practice using dental implants have developed over the past thirty years. Like any technique, implant dentistry is subject to complications that often arise from professional inexperience, technical factors related to implant placement, the need for additional procedures and patient-related factors. Despite the large number of implants placed today, migration of an implant into the maxillary sinus is a rare complication. There are several techniques to correct it and it is up to the professional to choose the one that best suits the patient. **Objective:** This paper aims to report a case of accidental displacement of an implant into the maxillary sinus. **Conclusions:** Proper planning is the best tool to avoid such complications. It would be wise on the part of the dentist to constantly seek to improve their professional skills and knowledge in order to attain complete mastery of the theoretical and practical forms of prevention, as well as specific conducts and treatments.

**Keywords:** Dental Implants. Oral rehabilitation. Maxillary sinus.

**How to cite this article:** Queiroz CS, Silveira BBB, Castro CHS, Oliveira Junior JATB, Araújo MAV, Matos D, Miranda DAO. Accidental implant displacement into maxillary sinus. *Dental Press Implantol.* 2012 July-Sept;6(3):91-6.

» The authors inform that they have no associative, commercial, intellectual property, or financial interests representing a conflict of interest in products and companies described in this article.

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Submitted on: June 20, 2012.

Accepted on: June 26, 2012.

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## Introduction

Implant migration into the maxillary sinus is a rare complication associated with the placement of a dental implant in the posterior maxilla.<sup>1</sup> The maxillary sinus is located in the body of the maxillary bone, which is the largest of the paranasal sinuses. It exhibits the shape of a pyramid lying on its side, and its anatomical structure is limited by the lateral wall of the nasal cavity, orbital floor, alveolar process of the maxilla and zygomatic process of the maxilla.<sup>2</sup>

After a tooth extraction, resorption of the alveolar process occurs due to lack of the necessary stimulus to maintain bone quality and quantity. In the posterior maxilla, there occurs the resorption of the alveolar process as well as activation of the osteoclastic capacity of the periosteum adjacent to the sinus membrane. The result of this process is pneumatization of the maxillary sinus. In such cases, the distance between the alveolar crest and the floor of the maxillary sinus is rather decreased, limiting the placement of a bone implant due to the risk of accidental migration into the maxillary sinus.<sup>3</sup>

Among the factors causing migration of an implant into the sinus one could highlight surgeon inexperience, lack of primary stability, placement of a dental implant without first lifting the maxillary sinus (in cases where the sinuses are overly pneumatized), application of excessive force during implant insertion, presence of infection and, in some cases, the presence of osteoporosis or osteopenia.<sup>1,4</sup>

Although panoramic radiography is the diagnostic method of choice, and although the incidences of Waters and facial profile are also useful, computed tomography provides greater clarity and three-dimensional visualization, making it indispensable for proper evaluation and conduct towards the case.<sup>5</sup> The professional should bear in mind that any foreign body displaced into the maxillary sinus can move inside this anatomical structure, which

may cause the location displayed in imaging tests to be different from that found during surgery.

In literature three basic types of treatment are found to address the issue of accidental migration of an implant into the sinus: 1) Removal of the implant from the sinus through endoscopic surgery, 2) Removal of the implant and bone graft during surgery, 3) Monitoring without surgical intervention.<sup>2</sup>

Since it was developed in 1890, the Caldwell-Luc procedure is recognized as an appropriate means of access to the maxillary sinus as it allows inspection, diagnosis and treatment of diseases that affect it. Thus, it is a major surgical technique used to remove implants from inside the maxillary sinus and place bone graft in that region.<sup>2</sup>

This article aims to report a clinical case in which an implant accidentally displaced into the maxillary sinus was surgically removed.

## Case report

The 48-year-old male patient was referred by a dentist specializing in implant dentistry to the service of Oral and Maxillofacial Surgery and Traumatology of the Santo Antônio Hospital/Sister Dulce Social Work Association. He reported that a foreign body had accidentally been displaced into the maxillary sinus after implant surgery. His past history included placement of four implants in the maxillary region. Three months thereafter, the surgical site was reopened for placement of healing caps. It was at the time when an attempt was made to install the implant healing caps located in the posterior region of the left maxilla that the implant was displaced into the maxillary sinus.

During the interview, the patient did not report any systemic condition or disease. Physical examination revealed that the oral mucosa in the area reported had

no clinical signs of inflammation or communication with the maxillary sinus.

Palpation of the maxillary sinus region showed no clinical signs of inflammation, despite the patient's report. Panoramic radiography and routine laboratory tests were then ordered. Panoramic radiography showed an image suggestive of a radiopaque metal instrument in the posterior aspect of the left maxillary sinus, compatible with an implant (Fig 1). Analysis of the case records led to the conclusion that it would be impossible to surgically remove the object by drilling, which had been tried previously.

Thus, surgery for removal of the object was planned and scheduled for 30 days after the accident. During this period the patient was monitored and there were no signs or symptoms of buccal-sinus communication or sinus inflammation.

In keeping with the surgical procedure, a linear incision was performed in the left maxillary region and a relaxant incision in the anterior region, which extended to the

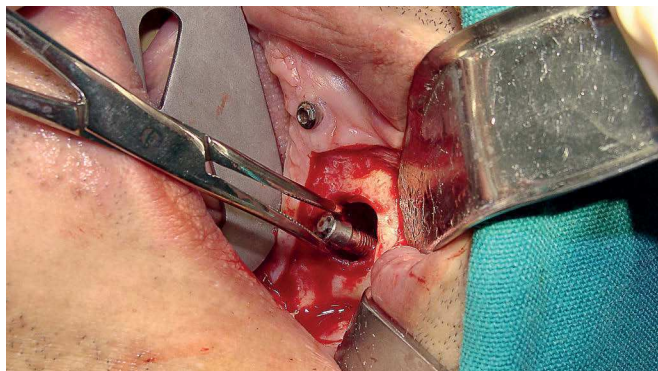
bottom of the sulcus. With the aid of retractors, the flap was raised along with the periosteum, exposing the lateroanterior wall of the maxillary sinus and the base of the zygomatic bone. An elliptical window was prepared with carbide bur n° 8 (Komet®, Besigheim, Germany) and a straight piece under copious irrigation with saline. The implant, located at the rear of the maxillary sinus, was removed through the opening with the aid of a hemostat (Figs 2 and 3). The site was then copiously irrigated with 0.9% saline and sutured with nylon 4.0 with the key purpose of repairing the mucous membrane.

The postoperative medication consisted of antibiotic (Amoxicillin 500 mg, Medley, SP) every 8 hours for ten days. Anti-inflammatory medication (100 mg Nisulid, Aché Laboratories, SP) was also prescribed every 12 hours as well as sufficient analgesics to control painful symptoms (Tylex 30 mg, Janssen-Cilag, SP). As an adjuvant in bacterial chemical control, the patient was instructed to perform mouthwash with chlorhexidine gluconate 0.12% (Colgate-Palmolive, SP) from the day after surgery until two weeks after surgery.

Suture removal was performed after seven days, and no major complications were noted during this period. Six months after implant removal a new panoramic radiograph was taken, and the displaced implant was no longer seen in the maxillary sinus. Furthermore, the other implants were found to be in their proper position as planned (Fig 4). Currently, the patient is scheduled by his implant dentist to undergo maxillary sinus grafting and placement of a new implant in the region, aimed at subsequent prosthetic rehabilitation.



**Figure 1** - Preoperative panoramic radiograph showing metal instrument in the region of the left maxillary sinus.



**Figure 2** - Removal of implant from inside the maxillary sinus with the aid of a hemostat.



**Figure 3** - Implant removed.



**Figure 4** - Postoperative radiograph after 6 months showing implants placed in the anterior maxilla with no trace of the implant which had accidentally been displaced into the maxillary sinus.

Inclusion of this case in the present article was authorized by the patient, who signed a term of free and informed consent.

### Discussion

The maxillary sinuses were first described in the seventeenth century by the English anatomist Nathaniel Highmore, and are therefore also called maxillary antrum or antrum of Highmore. Their shape and size vary according to factors such as facial type, color and

number of teeth.<sup>6</sup> Maxillary sinuses are usually larger than other sinuses and are located primarily in the body of the maxilla.<sup>2</sup> These anatomical structures tend to encroach (pneumatization) on the spaces left by missing teeth, usually becoming quite developed in edentulous patients.<sup>6</sup> A few different iatrogenic cases of maxillary sinus perforation have been reported. Fractured roots of second molars are the most commonly found foreign bodies in the maxillary sinus. Drills, amalgam, gutta-percha, endodontic files and

even periodontal curette tips are some of the dental products that have been found in maxillary sinuses.<sup>3,5,7</sup> With the advent of dental implants, this type of complication has also occurred during implant surgery in the posterior region of the maxilla,<sup>3</sup> such as in the case reported in this article.

Kluppelet et al<sup>1</sup> reported two cases of implant migration into the maxillary sinus. In the first, the patient returned for the second stage of surgery 6 months after implant placement for rehabilitation of edentulous spaces in the maxilla. At that time, it was noted that the implant

that had been inserted in the region of the upper right first molar was missing. Radiography revealed that the implant had migrated into the maxillary sinus. Surgery was performed to remove the implant concurrently with maxillary sinus augmentation during surgery. In the second case, the patient complained about a missing dental implant in the alveolar ridge. Panoramic radiography and computed tomography revealed a dental implant displaced in the maxillary sinus roof, in close contact with the orbital floor. Surgery was proposed to remove the implant and in another surgical procedure the ridge was reconstructed with autogenous graft, enabling rehabilitation with an implant-supported denture.

Aguiar,<sup>3</sup> in 2007, reported an unusual case of displacement of a surveyor into the maxillary sinus during a dental implant surgery in the region of tooth #25. Caldwell-Luc operation was employed to remove the instrument.

Accidental displacement of fragments into the maxillary sinus can predispose to the appearance of maxillary sinusitis, characterized by severe, constant and localized pain, sensitivity in the teeth located near the infected sinus, nasal secretion - which can be mucopurulent - and breathlessness. Onset of changes in the antral lining can be delayed for months or even years. However, if the sinus is not infected, there is no need for curettage and removal of the sinus membrane.<sup>2,6,8</sup> The present case did not display any infectious changes in the maxillary sinus, probably owing to the short period that the implant remained within the sinus. Thus, sinusectomy was not performed.

Bodies displaced into the maxillary sinus can be anatomically located through occlusal or panoramic radiography, Waters techniques, and lateral skull radiography. Spotting the object, however, is not always straightforward given the overlap of anatomical structures. Thus, computed tomography provides greater accuracy than conventional radiography techniques.<sup>6</sup> More often than not,

Morais<sup>5</sup> reported the use of panoramic radiography in these situations, associated with incidences of Waters and lateral cephalogram. He further reported the use of more complex tests such as CT and/or MRI. These methods are not justified in these cases as they do not contribute any additional information that might have a bearing on the diagnosis or therapy, while greatly burdening the patient and/or public service.

Foreign bodies can move within the sinus cavity. Therefore, imaging studies should preferably be conducted prior to surgery.<sup>2</sup> In the present case, panoramic radiography was used as a complementary imaging exam to pinpoint the exact location of the implant displaced into the sinus.

Recurrent chronic sinus diseases, tooth displacement or presence of foreign bodies inside the maxillary sinus are often reported in the literature as indications for surgical access by the Caldwell-Luc procedure.<sup>5</sup> This technique requires a U-shaped incision, also known as Wassmund incision. This technique can be performed starting with a linear incision on the mucosa of the buccal fornix.<sup>6</sup> Given that it is easy to handle, routinely used in surgery and provides proper visualization, this was the approach adopted for removal of the implant inside the maxillary sinus.

Endoscopic surgeries offer an alternative to the Caldwell-Luc procedure as an approach to the maxillary sinus. The technique is performed through an endoscope (an examination instrument which provides a wider field of vision and less exposure of the anterior wall of the maxillary sinus) allowing proper visualization of the surgical field, low morbidity and high patient acceptance. Nevertheless, given the fact that the technique is not so widespread in the dental area and that the logistical resources of both public and private services are deficient, the technique is not yet viable as a routine procedure.<sup>3,5</sup>

In this case, surgery was performed, but there is consensus that careful clinical evaluation combined with the dentist's common sense is a decisive factor in choosing the most appropriate therapeutic alternative for removal of foreign bodies from inside the maxillary sinus. It is important to assess the risks and benefits of each case, considering the possibility of nonsurgical follow-up.

### Conclusions

Surgery to place implants in the posterior maxilla must be performed safely and with proper planning. Prior to surgery, it is essential to assess – by clinical and imaging examination – bone quantity and quality since maxillary sinus augmentation should always be an option

in cases of severely pneumatized maxillary sinuses. When such precautions are not followed, problems may occur such as perforation of the maxillary sinus or an accidental displacement of instruments or implants into the maxillary sinus. These issues often require additional surgical procedures.

In light of the increasing demand for dental implants and the vast number of complications related to the displacement of foreign bodies into the maxillary sinus, surgeons are strongly advised to seek continued professional improvement to attain mastery over theoretical and practical forms of prevention, as well as conducts and treatments specific to the situation in question.

### REFERENCES

1. Kluppel LE, Santos SE, Olate S, Freire Filho FW, Moreira RW, de Moraes M. Implant migration into maxillary sinus: description of two asymptomatic cases. *Oral Maxillofac Surg.* 2010; 14: 63-66.
2. Mariano RC, Melo WM, Mariano LCF. Introdução acidental de terceiro molar superior em seio maxilar. *Rev Odontol Univ Cid São Paulo.* 2006;18(2):149-53.
3. Aguiar RC. Remoção cirúrgica de instrumento deslocado acidentalmente para o interior do seio maxilar durante a instalação de implantes. *RFO UPF.* 2007 Set/Dez;12(3):65-68.
4. Cedeno R, Costa S. Migración de implantes al seno del maxilar: A propósito de un caso clínico. *Rev Oper Dent Endod.* 2006;5:50.
5. Morais HHA. Corpo estranho no seio maxilar: relato de caso atípico. *Rev Cir Traumatol Buco-Maxilo-fac.* 2007 Jan-Mar;7(1): 65-70.
6. Bellotti A, Costa FS, Camarini ET. Deslocamento de terceiro molar superior para o seio maxilar: relato de caso. *Rev Cir Traumatol Buco-Maxilo-Fac.* 2008 Out-Dez; 8(4):35- 40.
7. Santiago MO, Paiva MEMS, Machado VC, Manzi FR. Presença assintomática de corpo estranho em seio maxilar – Relato de caso. *Arq Bras Odontol.* 2008;4(1):35-9.
8. Liston PN, Walters RF. Foreign bodies in the maxillary antrum: A case report. *Aust Dent J.* 2002; 47(4): 344-36.