Retrieval of two displaced dental implants from the maxillary sinus through Caldwell-Luc approach: A case report

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Abstract
Dental implants have gained popularity in the field of dentistry recently. There are multiple reasons for gaining this popularity, which include quick restoration of the function and esthetic. Along with many benefits, these dental implants are associated with many complications leading toward its failure. We present a case of displaced maxillary dental implants into the maxillary sinus. A 72-year-old male referred to our dental outpatient department complaining of pain, right nasal blockage, and headache at the right side of facial region. No intraoral soft or hard tissue abnormality was found on inspection. Orthopantomogram was advised and maxillary implants were found displaced into maxillary sinus or infratemporal fossa. Computed tomography scan investigation was done to see the exact location, and the implants were removed through Caldwell-Luc approach.

Keywords: Caldwell-Luc approach, endoscopic sinus surgery, orthopantomogram

Introduction
After the complete or partial loss of teeth, patients usually proceed with restoration of esthetics and function. Multiple options are available to replace lost teeth, but dental implants have gained popularity as the treatment of choice since they rehabilitate function and esthetics without compromising adjacent teeth.[1]

Dental implants have an outstanding long-term outcome as documented with 10 years success and survival rates of ≥94.9% compared to tooth-supported fixed partial dentures with an expected survival rate of 87% and 69% at 10 and 15 years.[2]

Surgical placement of dental implants is a safe procedure and usually has a very good prognosis. Complication of such surgical procedure includes neurosensory damage, hemorrhage, mandibular fractures, and implant displacement into the maxillary sinus or mandibular canal.[3]

Many of these complications can be avoided by careful pre-operative evaluation. Furthermore, the prevalence of dental implant displacement in a sample of the Saudi population in Jeddah was estimated at 1.2%.[4] There are multiple approaches to remove a tooth,[5] dental implant, or a foreign body from the maxillary sinus, which include endoscopic removal through the nasal cavity and Caldwell-Luc approach from the canine fossa. Functional endoscopic sinus surgery (ESS) has almost replaced the canine fossa approach (Caldwell-Luc approach).[6]

Case Report
A 72-year-old male was referred to the Department of Oral and Maxillofacial Surgery at King Salman Hospital with the complaint of the right nasal blockage and headache for 1 year. Dental history revealed multiple extractions and implants placement for 7 years. During clinical examination, no hard or soft-tissue abnormalities were detected. Pre-operative orthopantomogram (OPG) and lateral cephalogram showed that two maxillary implants have been displaced superiorly and posteriorly at the right side of the edentulous maxillary alveolar ridge, as shown in Figure 1a and b. The location of the two maxillary implants was further examined with the aid of computed tomography (CT). It was shown that one implant was placed near the medial side of the infraorbital margin, while the second implant was found at the posterolateral wall of the maxillary sinus, as shown in Figure 2. General physical examination revealed that the patient is fully stable and well oriented. After basic blood investigation and assessment at the pre-
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anesthesia clinic, he was admitted for the operation under general anesthesia.

**Surgical procedure**

Caldwell-Luc approach was used for the removal of the two dental implants, in which full-thickness mucoperiosteal flap was elevated to access the anterior wall of the right maxillary sinus after that osteotomy was performed using slow speed straight handpiece, as shown in Figure 3. After removal of the first implant, perioperative radiograph was done to detect the position of the remaining implant as it was difficult to assume which implant was taken out first, as shown in Figure 4. The second implant was taken out and packing of the sinus was done to control the bleeding and the flap was sutured [Figure 5]. Multiple medications used pre-operative, perioperative, and postoperatively to minimize post-operative inflammation and infection, as shown in Table 1.

The patient was followed up for 6 months, post-operative OPG done which showed that maxillary sinus is free from displaced implants, as shown in Figure 6. Paresthesia of the right infraorbital nerve was reported during the first 2 months, which was settled later on.

**Discussion**

Implantology is a new rapidly growing dental specialty practiced by dentists from varying degrees, including general practitioners to certified implantologists. Although everyone has adopted implant placement, poor understanding of biological principles has led to many post-operative complications and radiologists should also be familiar with these complications to be able to recognize them as incidental findings while performing their investigations such as CT scan and sialogram.

In our presented case report first, we requested plain radiographs which included OPG and lateral cephalograms since it was not satisfactorily accurate, we proceeded with

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**Figure 1:** (a) Pre-operative lateral view showing displaced maxillary dental implants. (b) Pre-operative orthopantomogram shows displaced dental implants above the maxillary ridge

**Figure 2:** Computed tomography (sagittal view) showing the location of the displaced implants, in which one is located near infraorbital margin and the second at posterolateral wall of the right maxillary sinus

**Figure 3:** Removal of implants through Caldwell-Luc approach

**Figure 4:** Perioperative computed tomography showing the presence of one implant at posterolateral wall of the maxillary sinus
Table 1: Different medication used during the management of the patient

| Pre-operative | Per-operative | Post-operative |
|---------------|---------------|----------------|
| Inj. Cefuroxime 750 mg IV state | Normal saline wash | Inj. Cefuroxime 750 mg IV 8 hourly 5/7 |
| Inj. Metronidazole 500 mg IV 8 hourly state | Inj. Metronidazole 5 mg IV 8 hourly 2/7 | Inj. Acetaminophen 500 mg IV 8 hourly 2/7 |
| Nasal decongestant nasal drops 12 hourly 5/7 | Enoxaparin 30 mg S/C 24 h post-operative OD | |

Figure 5: Removal of two maxillary dental implants for the right maxillary sinus

Figure 6: Post-operative orthopantomogram showing no remaining dental implants in the right maxillary sinus

As per systemic review conducted by Jeong et al., displacement of implants into the maxillary sinus is dependent on factors which include the underlying bone quality, availability of the remaining alveolar ridge, and close approximation of maxillary sinus lining with a decreased vertical height of the maxillary ridge. Furthermore, placement of implants in the posterior edentulous maxilla can be more demanding due to ridge resorption and sinus pneumatization, to reduce complications with such site, it is advisable to use shorter implants or utilize sinus lifting procedures.

According to the literature, maxillary implants displacement into the maxillary sinus varies from 0.6% to 3.8% and most of the researchers believe that these cases should be managed either endoscopically through transnasal approach or through Caldwell-Luc approach. In our case, we proceeded with the removal of the displaced maxillary implants through Caldwell-Luc approach. Perioperative radiograph was done after the removal of the first implant to inspect the position of the remaining implant.

According to the study conducted by Ikeda et al., in 1996, he concluded that there is only 4.6% risk of minor complication like bleeding in ESS approach, while Caldwell-Luc has more than 9.6% complications rate which includes paresthesia of infraorbital nerve and more blood loss. Our case report is in accordance with the Ikeda study, where we also observed infraorbital paresthesia for 2 months postoperatively, which resolved later on.

Conclusion and Clinical Significance

Maxillary dental implants should be inserted very carefully in the posterior maxilla. In the case of short alveolar ridge height, ridge height should be increased either through sinus lift or autogenous bone graft to avoid future complications. Caldwell-Luc approach is easy to perform with few minor complications.

Conflicts of Interest

There are no conflicts of interest.

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