

# Dental Implant Retrieval from Maxillary Sinus: Caldwell-Luc Technique

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## ABSTRACT

Placement of dental implants for oral rehabilitation is quite common. A very low incidence of complications is known to occur with this procedure. One such complication is accidental displacement of dental implants into the maxillary sinus. These should be removed because they can cause sinusitis and/or migrate into ethmoid or sphenoid sinuses.

In the present study, we report a case of dental implant displaced into maxillary sinus which was removed by Caldwell-Luc technique. The incision used to place the implant was modified by extending it anteriorly from the base of the flap into the canine fossa. Implant was retrieved through Caldwell-Luc technique and primary closure of the osteotomy site was achieved by advancement of the modified buccal flap.

**Keywords:** Dental implant retrieval, Modified buccal flap, Caldwell-Luc technique, Maxillary sinus.

## INTRODUCTION

Insertion of dental implants has become a conventional procedure and one of the best means of providing oral rehabilitation. A good number of dental practitioners, with different levels of expertise, is involved in implant placement. Placement of implants in the maxillary arch has always been challenging because of its proximity to the maxillary sinus. Displacement of a dental implant into the sinus, albeit in a low frequency, is not unknown. The maxillary sinus is the widest paranasal sinus, pyramidal in shape and varies remarkably in size. The average size in adulthood is 27 mm in transverse (mediolateral) dimensions, 35.6 mm in width (anteroposterior) and 37 mm in height (superoinferior).<sup>1</sup> Its pneumatization is related to age of the patient and the presence of teeth. Accidental displacement of dental implants into the maxillary sinus has been reported as complication during placement of dental implants<sup>2</sup> or during the healing phase.<sup>3</sup> In this report, we present a case of displacement of a dental implant into the maxillary sinus immediately after the extraction of tooth number #26 (left maxillary first molar) and its retrieval.

## CASE REPORT

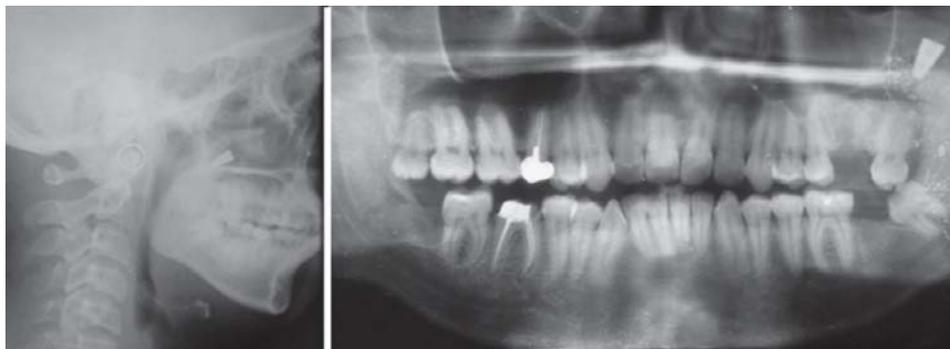
A 28-year-old male was referred to our clinic with dental implant in the maxillary sinus. The dentist who referred the

case had attempted immediate implant placement following extraction of #26 (left maxillary first molar). Intraoral Periapical (IOPA) radiograph revealed that the implant had migrated posteriorly (Fig. 1). The lateral cephalogram and orthopantomogram (OPG) of the patient showed mobility of the implant posteriorly (Fig. 2). Multiple unsuccessful attempts were made by the dental surgeon to retrieve the implant using a suction and extraction of #28 (left maxillary third molar) and subsequently referred the patient to us.

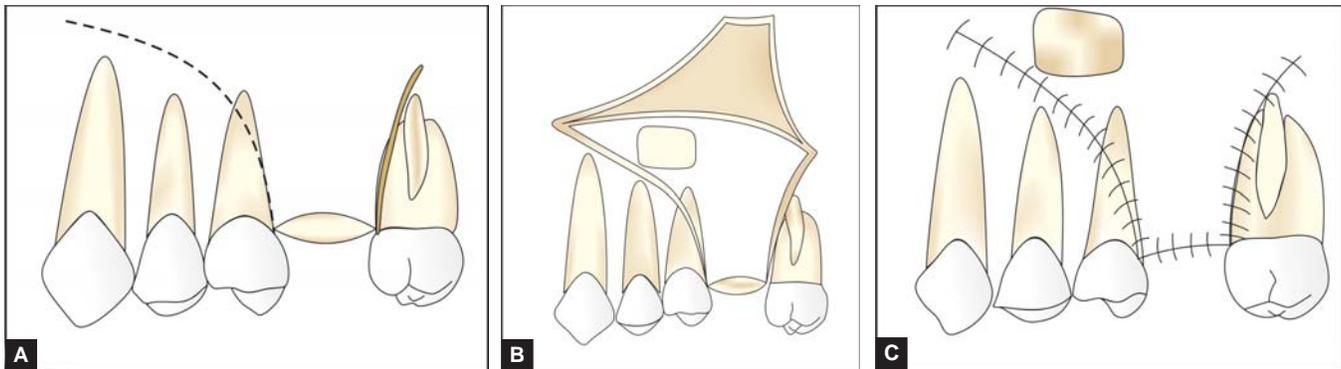
The patient was reassured and all the vital signs were recorded, which were found to be within the normal parameters. The surgery site was prepared and infraorbital nerve block was administered with Lignocaine/Adrenaline combination (1:80,000 ratio) along with greater palatine nerve block. The existing incision, used to place the implant, was modified by extending it anteriorly into the canine fossa (Fig. 3A). After adequate reflection of the flap, a window was prepared slightly distal to the canine fossa region taking care to protect the vital structures and to obtain a direct access to the sinus (Fig. 3B). The entire sinus could be visualized through the access opening. On exploration of the sinus, the implant was found to be in the posterolateral aspect to the sinus. The implant was grasped with a curved artery forceps and retrieved (Fig. 4).



**Fig. 1.** IOPA X-rays, showing implant migration



**Fig. 2.** Lateral ceph, OPG showing implant in the sinus



**Figs 3A to C.** (A) Existing incision extending into the canine fossa, (B) Modified flap raised and window prepared, (C) Flap advanced and primary closure achieved

The extraction and the Caldwell- Luc sites were covered by collagen membrane [Biomend<sup>®</sup>, Zimmer Dental]. The mucoperiostium was scored and the modified buccal flap advanced over the primary extraction site and a primary water-tight closure was obtained with 4-0 vicryl suture (Fig. 3C). Primary closure was also achieved at #28 extraction site with 4-0 vicryl suture.

The patient was given Inj. Augmentin<sup>®</sup> [1.2 gram Amoxicillin and Potassium Clavulanate, Inj] and Cort-S<sup>®</sup>

100 mg [Hydrocortisone]. The patient was postoperatively put on Cap. Augmentin 625 mg twice daily, Tab. Metrogyl 400 mg [Metronidazole] t.i.d and Tab. Voveran 50 mg [Diclofenac Sodium] b.i.d. One Multivitamin capsule a day and Clohex<sup>®</sup> [Chlorhexidine] oral rinse thrice daily were also prescribed. The patient was instructed about the coughing and sneezing technique. The patient returned for follow-up appointments, the immediate postoperative day and at regular intervals. The site healed uneventfully (Fig. 5).



Fig. 4. Implant retrieved



Fig. 5. Postoperative-OPG

## DISCUSSION

The maxillary sinus is the first of the paranasal sinuses to appear in the fetus, and develops at about 14 to 16 weeks of i.u. life. The sinus at birth is an oblong cavity about 1 cm long and 0.5 cm high. The floor of the sinus does not extend below the nasal cavity until the eruption of the secondary dentition. The fully developed maxillary sinus in adult is pyramidal in shape. The antrum is lined by ciliated columnar epithelium with mucus secreting cells. The drainage of the sinus occurs in a spiral manner into the nasal cavity at the ostium, which opens below the middle meatus.

Typically following tooth loss or removal and healing, pneumatization of the sinus occurs and bone height is lost. Tooth removal and implant placement may proceed simultaneously in incisors, canine, and premolars. This approach cannot be used in the molars, especially the maxillary first and second molar sites because they involve the sinus floor and the trifurcation.<sup>4</sup> Due to inappropriate planning, accidental displacement of dental implants into the maxillary sinus can occur during placement (as reported in our case) or during healing phase if there is inadequate bone volume and/or density for implant stabilization.<sup>2,3</sup> Implant migration into the sinus may be followed by signs of infection and oroantral communication<sup>5,6</sup> or can be asymptomatic.<sup>7</sup>

The displaced implants should be surgically removed in order to prevent the development of rhinosinusitis due to interrupted mucociliary clearance or a tissue reaction. It is appropriate to retrieve the implant during perioperative time if accidental displacement occurs during placement, delayed removal of implant can cause migration to the sphenoid sinus or ethmoid sinus.<sup>8,9</sup>

Two different approaches for accessing maxillary sinus have been proposed:

1. Transnasal approach with functional endoscopic sinus surgery (FESS).
2. A transoral approach via the canine fossa [Caldwell-Luc].

In the case of nasal or sinus diseases, functional endoscopic sinus surgery (FESS) should be considered as the option of choice but in the absence of sinus infection and if the ostio-meatal complex (OMC) is normal, the implants can be retrieved using Caldwell-Luc technique.<sup>10</sup> The choice of surgical approach is dictated by specific clinical indication and in certain instances, a combination of FESS along with Intraoral approach may be necessary.<sup>11</sup> The indications are:

1. FESS alone with displacement of implants into the maxillary sinus with or without signs and symptoms of paranasal sinusitis and/or obstruction of the natural maxillary ostium, but with no oroantral communication.
2. Intraoral approach alone, with creation of bony window in anterior - lateral wall of maxillary sinus, with no signs and symptoms of paranasal sinusitis and in cases of patent maxillary ostium.
3. FESS with intraoral approach when signs and symptom of paranasal sinusitis are present along with obstruction of maxillary ostium and oroantral communication.

Although endoscopic removal of dental implants has its own advantages, the procedure requires specific training and equipment.<sup>5,6,12</sup> In our case, the existing incision used to place the implant was modified by extending it anteriorly into the canine fossa<sup>13</sup> to perform a Caldwell-Luc procedure and retrieve the implant. The flap was advanced over the extraction site<sup>14</sup> (oroantral communication) without tension to achieve a primary water tight closure.

## CONCLUSION

The classic Caldwell-Luc approach is a reliable procedure and requires no special training and equipment. This approach can be used to retrieve dental implants displaced into the maxillary sinus during perioperative time and treat oroantral communications simultaneously.

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## REFERENCES

1. Abubaker AO. Diagnosis and treatment of diseases and disorders of the maxillary sinus. *Oral Maxillofac Surg Clin North Am* 1999;11(1):1-13.
2. Pelayo LJ, Diago PM, Bowen ME, Diago PM. Intraoperative complications during oral implantology. *Med Oral Patol Oral Cir Bucal* 2008;13(4):E239-43.
3. Pikos MA. Complication of maxillary sinus augmentation. In: Jensen OT (Ed). *The Sinus Bone Graft*, Second edition, Quintessence Publishing Co., Inc.) 2006;103-14 [Chapter 9].
4. Fugazzotto PA. Implant placement in maxillary first premolar fresh extraction sockets: Description of technique and report of preliminary results. *J Periodontol* 2002;73(6):669-74.
5. Kitamura A. Removal of a migrated dental implant from a maxillary sinus by transnasal endoscopy. *British journal of oral maxillofacial surgery* 2007;45:410-11.
6. Kim J-W, Lee CH, Kwon TK, Ki DK. Endoscopic removal of a dental implant through a middle meatal antrostomy. *British journal of oral maxillofacial surgery* 2007;45:408-09.
7. 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* 2009 (Published online).
8. Felisati G, Lozza P, Chipasco M, Borloni R. Endoscopic removal of an unusual foreign body in the sphenoid sinus: An oral implant. *Clin Oral Implants Res* 2007;18(6):776-80.
9. Haben CM, Balys R, Frenkiel S. Dental implant migration into the ethmoid sinus. *J Otolaryngol* 2003;32:342-44.
10. Pignataro L, Mantovani M, Torretta S, Felisati G, Sambataro G. ENT assessment in the integrated management of candidate for (maxillary) sinus lift. *Acta Otorhinolaryngol Ital* 2008;28(3):110-19.
11. Chiapasco M, Felisati G, Maccari A, Borloni R, Gatti F, Di Leo F. The management of complications following displacement of oral implants in the paranasal sinuses: A multicenter clinical report and proposed treatment protocols. *Int J Oral Maxillofac Surg* 2009;38(12):1273-78.
12. EI Charkawi HG, EI Askary AS, Ragab A. Endoscopic removal of an implant from maxillary sinus: A Case Report. *Implant Dent*, 2005;14:30-35.
13. Julian RS. Diagnosis and treatment of diseases and disorders of the maxillary sinus. *Oral Maxillofac Surg Clin North Am* 1999;11(1):69-81.
14. Laskin DM. Diagnosis and treatment of diseases and disorders of the maxillary sinus. *Oral Maxillofac Surg Clin North Am* 1999;11(1):155-64.



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