Removal of displaced implant in to maxillary sinus using modified intra-oral approach- a case report

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Abstract

Implants placed in the maxillary posterior alveolar ridges can get dislodged into the maxillary sinus at the time of placement or during the bone remodelling phase. If untreated, it may lead to various complications including sinusitis and migration into sphenoid or ethmoid sinus. In this case report a modified Caldwell-Luc approach is described to retrieve the implant fixture from the sinus.

Keywords: implant retrieval, osseointegration, modified caldwell-luc approach

Introduction

Implant supported prosthesis over the years have become a popular choice for rehabilitation of missing teeth in both maxillary and mandibular jaws. However, alveolar bone remodelling that occurs following tooth loss may cause almost 40% reduction in height and 60% decrease in width during the first six months [1]. This gradual process of bone resorption and maxillary sinus pneumatization can make implant placement in maxillary posterior edentulous ridges challenging. The use of short implants and maxillary sinus floor elevation are well-documented and successful procedures to overcome these problems [2-4].

One rare but severe complication is implanting displacement into the paranasal sinuses. There are reports of implant migration into the sphenoid [5] or the ethmoid sinus [6, 7], but most commonly displacement occurs into the maxillary sinus [8-12]. Prominent causes of this complication are anatomical difficulties combined with surgical inexperience [8, 9]. Moreover, placement of dental implants without sinus lifting procedure in highly pneumatized sinuses, application of heavy force during implant insertion, the existence of untreated perforation of the antral base after completion of drilling sequence, as well as excessive tapping during sinus osteotomy are some of the mechanisms resulting in implant migration [9]. On the other hand, implant perforation of the sinus floor mucosa no greater than 2 mm, causes spontaneous recovery of the sinus membrane and coverage of the dental implant, based on clinical and experimental studies [13, 14].

Few methods for retrieving displaced dental implants have been published, the Caldwell-Luc technique, the endoscopic method and combination of the two [15]. A modification of the Caldwell-Luc method is described in this case report.

Case Report

A 45 year old male patient with partial edentulous maxilla was referred to us following migration of an implant into the right maxillary sinus during placement. He was examined the same day at our facility and all the dental and medical records were taken. An OPG (Fig 1) was available with the patient, however a CBCT examination was advised for accurate location of the implant in the maxillary sinus. Dental records indicated endodontic treatment in several teeth and placement of two immediate implants in the maxillary right posterior region and the displacement of the distal implant into the sinus. Patient was put on medications after the earlier procedures and did not give history of pain or any other significant finding and was scheduled for surgical retrieval of the implant the next day.

CBCT (Fig 2) revealed that implant fixture was dislodged into the antral lumen impinging the anterior antral wall. It was located 5.9-8mm from the lateral nasal wall, 30mm anterior to the posterior antral wall and positioned in an inverted orientation. Coronally, it was angulated in a bucco-palatal direction. The prosthesis apex was directed mesio-palatally downwards almost 15.6mm above the antral floor cortical lining on sagittal slice and 10.5mm in coronal slice. Posterior superior alveolar and greater palatine nerve blocks were given by injecting xylocaine 1% with epinephrine 1:100,000 solution. It was decided to use a modified Caldwell-Luc approach by creating an osteotomy window in the lateral wall of the maxilla in the vicinity of the previously placed implant site. This was done to avoid creating multiple widespread areas of bone defect in the maxillary jaw.

Full thickness flap was raised after removing the sutures placed previously at the surgical site (Fig 3). Upon reflection of the flap, fresh extraction socket in relation to maxillary right first molar and an implant fixture with improper angulation in premolar region was noted. Lateral window was created using rotary burs in a handpiece with copious amount of saline irrigation (Fig 4). A tear in the Schneiderian membrane was noted. The membrane was elevated through the lateral window

and suction tip was inserted inside the sinus. The implant fixture was retrieved towards the floor of the sinus using surgical aspiration and removed using Adson forceps (Fig 5). The implant in the premolar region was replaced with proper angulation. Bone grafts were only placed in the extraction socket and the replaced implant site and no attempt was made to raise the sinus floor as the sinus lining was not intact to contain the graft. Collagen membranes were used to cover the lateral window and the extraction socket site. Flap was advanced and sutured to prevent creation of any oroantral fistula (Fig 6). An implant was placed in the pterygomaxillary region on the same side to be later used for the fabrication of prosthesis. A post-operative OPG was done (Fig 7).

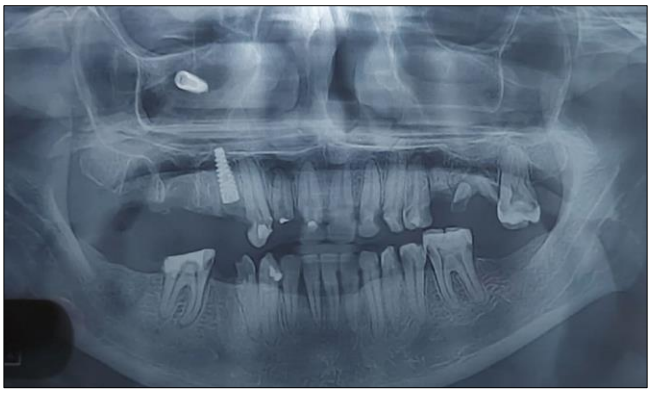

Fig 1

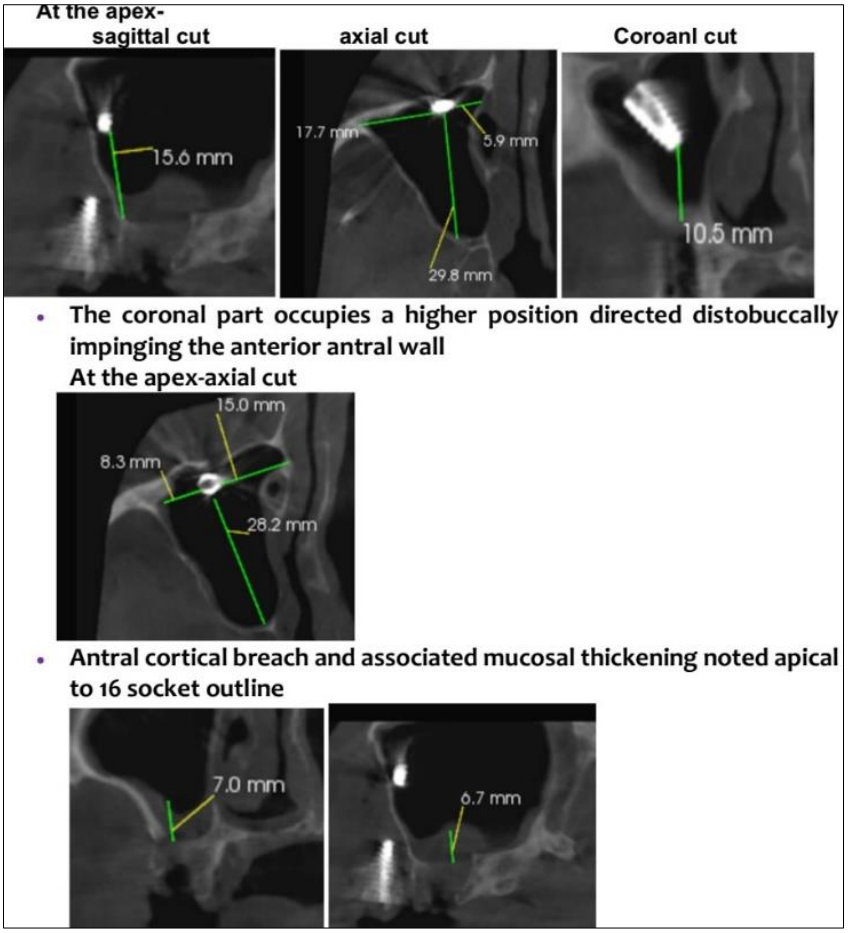

Fig 2

Fig 3

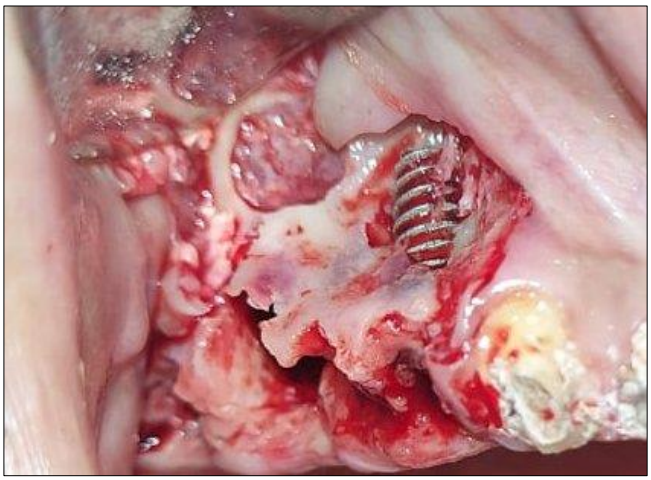

Fig 4

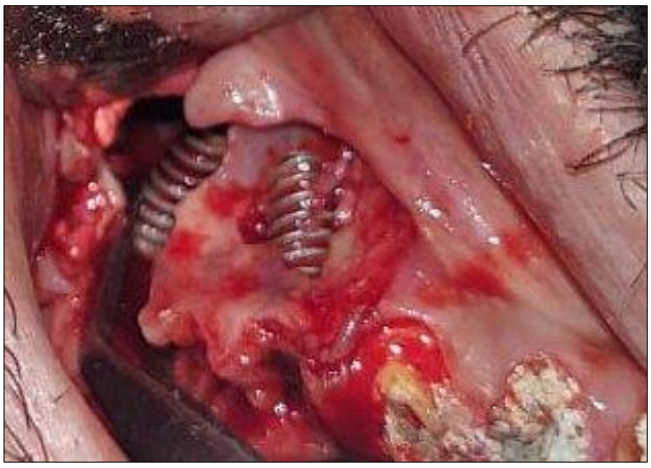

Fig 5

Fig 6

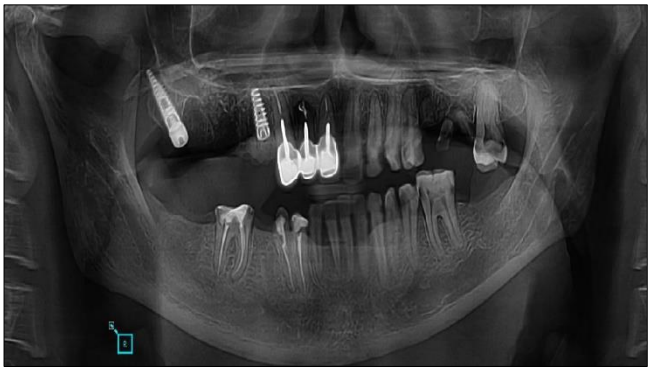

Fig 7

Discussion

Among the various complications associated with implant supported prosthesis specially in posterior maxillary region, the displacement of implant fixture into the maxillary sinus either at the time of placement, bone remodelling phase or after functional loading has been reported regularly [10, 16]. Varol *et al* [17] and Chappuis *et al* [18] have attributed this dislocation to improper positioning of the implant, error during the surgical procedure, lack of initial stability, fibro-osseointegration, failure to regenerate adequate bone after tooth extraction, implant placement without pneumatized maxillary sinus floor elevation, failure to treat sinus lining perforation caused by implant drilling and peri implantitis leading to bone loss around the implants. Implant micro movement because of poor initial stability can cause improper clot formation and hinder revascularization process eventually creating difficulty in new bone formation around the implant.

The first two weeks of bone remodelling that occurs after implant fixation is critical and can result in loss of stability than what is achieved at the time of implant insertion eventually displacing the implant into maxillary sinus [19].

Galindo *et al* in their study have attributed the dislocation of implant occurring between two weeks and two months after surgery to incorrect surgical techniques, untreated bone infection that existed at the time of implant placement, osteopenia and osteoporosis [20]. Regev *et al* [21] have described migration of implant happening after loading or during healing to changes in intra-nasal pressure, peri-implantitis, and imbalance in the occlusal forces. The maxillary sinus lift procedure carried out using osteotome has been involved in more incidence of implant displacement into the sinus than the lateral window approach. One reason provided for this finding is the difference between the dimensions of the last osteotome used and the implant placed [14, 22, 23].

Changes that occur in the maxillary sinus due to implant migration include mucosal thickening, swelling, narrowing of ostium, decreased movement of cilia and mucocilliary clearance. Histological studies from the retrieved implants have shown presence of mucous and serous glands tissues, formation of pseudocyst and inflammatory cells along the implant threads. One study has also reported that the displaced implants may cause aspergillosis and cancer [24, 25].

There are some reports with up to eight years of follow up which have described asymptomatic displaced implants, but their removal is necessary because of late development of sinusitis or foreign body reactions [26].

Four surgical techniques have been described for the retrieval of the implants displaced in to the maxillary sinus. Functional endoscopic sinus surgery (FESS) is a minimally invasive technique which involves middle meatal antrostomy, partial ungiectomy and enlargement of the maxillary sinus ostium. FESS is particularly useful in cases without oroantral fistula. One major complication of this technique is formation of synechia's that occurs because of scar formation between nasal septum and inferior turbinate [12, 15].

Caldwell-Luc procedure is another technique used for removal of displaced implants. It involves creation of a window in the anterior-lateral wall of the maxillary sinus which allows visibility and access to the migrated implant. However, this procedure can be used in cases which do not show any symptoms of paranasal sinusitis and maxillary ostium should be patent [12]. In cases with oro-antral fistula, a modified approach can be used which utilizes the communication between maxillary sinus and alveolar bone and implant can be taken out through this opening [10]. A combination of FESS technique and Caldwell-Luc procedure has also been described which can be used in cases with symptomatic sinusitis, obstructed maxillary sinus and oro-antral communication [12].

The retrieval of implant in the case presented was based on the intra oral technique with creation of the bony window in the lateral wall of maxilla slightly posterior to the location than in Caldwell-Luc method. Osteotomy was guided by the CBCT findings that accurately predicted the location of the implant in the maxillary sinus.

Conclusion

Various methods have been described in the literature for the removal of the implant displaced into the maxillary sinus. Every technique has it's own advantages and limitations. The removal of migrated implants becomes necessary due to development of complications associated with the presence of implant in the sinus or the risk of it's migration into associated spaces.

The choice of technique should be based on the case which would allow the surgeon to easily retrieve it with causing the least post-operative complications.

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