A modified internal sinus-lift technique and simultaneous installation of a wide-diameter implant: a case report

Nelson Kim-Hung Au-Yeung
BDS, MDS (Prosthetic Dentistry), FRACDS, FHKAM (Dental Surgery), FCDSHK (Prosthodontics)

Edmond Ho-Nang Pow
BDS, MDS (Prosthetic Dentistry), PhD, FRACDS, FHKAM (Dental Surgery), FCDSHK (Prosthodontics)

Case report

A 46-year-old Chinese male with an unremarkable medical history requested replacement of a missing maxillary right first molar. He was fully informed of the different options for
Sinus-lift technique with a wide-diameter implant replacing missing teeth and decided to have an implant-supported restoration. On examination, the patient’s oral hygiene was good and no caries were found. The periodontium was healthy with a thick gingival biotype. The dimensions of the edentulous space were 11 mm in length, 10 mm in width with 7 mm of interocclusal clearance at the centric occlusion.

An orthopantomogram and periapical radiographs showed that the maxillary sinus was free from any pathology. The bone height in the edentulous ridge was measured using dental software available from the KODAK 9000 Panoramic system (Carestream Health, Rochester, New York, USA). The distance from the ridge crest to the floor of the maxillary sinus was found to be about 4 mm (Figure 1). Use of an internal sinus-lift technique with simultaneous implant placement was planned.

The patient started a 5-day course of antibiotics (amoxicillin 500 mg t.i.d.) 1 day before surgery. The procedure was carried out under local anesthesia. An incision was made in the palatal aspect of the edentulous ridge, followed by standard intrasulcular incisions and relieving incisions in 15 and 17 mesial aspects. An osteotomy was performed using a trephine with an external diameter of 6 mm to a depth of around 3 mm (Figure 2a). After removal of the crestal bone core, the Schneiderian membrane was gently exposed by using an ultrasonic instrument (Piezosurgery, Mectron, Italy) (Figure 2b). The membrane was then gently elevated around the base of the osteotomy with a curette. After ensuring the integrity of the Schneiderian membrane, a mixture of autogenous bone harvested during the osteotomy and puros bone particles (Puros cortical allograft, 250-1000 microns, Zimmer Dental, Carlsbad[CA], USA) was delivered into the implant site. A total of around 1 cc of puros particles was used. The osteotomy was then further modified with the 6.4 mm drill followed by the 6.9 mm drill. A wide-diameter implant (7.5 x 7 mm, Rescue system, Megagen, Korea) was installed and an insertion torque of 45 Ncm was recorded (Figure 3). A cover screw was connected and the muco-periosteal flap closed with multiple polyglycolic acid sutures. The patient was given a non-steroidal anti-inflammatory drug (arcoxia 120 mg/day for 4 days) to control any postoperative pain and swelling. A postoperative radiograph showed the implant was in a good position with satisfactory bone height augmentation. The integrity of the sinus membrane was well maintained (Figure 4).

At review 2 weeks after surgery, the patient was found to be healing without any postoperative complications. Uncovering surgery was performed 22 weeks after implant installation using the tissue punch technique. The definitive restoration was made and cemented 4 weeks after the
uncovering procedure (Figure 5). The occlusion was adjusted to eliminate tight occlusal contact both during centric occlusion and eccentric movements.

Six months after, the patient was reviewed and the restoration found to be clinically satisfactory with healthy peri-implant tissues. A periapical radiograph showed excellent bone maintenance around the implant (Figure 6) with no marginal bone loss. The margin between the augmented bone and existing bone was not as clear as in the immediate postoperative film indicating satisfactory bone remodeling and osseointegration.

**Discussion**

Inadequate posterior alveolar bone height is a common problem in implant dentistry. Presence of periodontal disease before tooth loss leading to extensive bone resorption, pneumatization of maxillary sinus following tooth loss, etc. are common factors rendering simple installation of implant in this region impossible.

A lateral window approach has been commonly...
used to augment the maxillary sinus with a high degree of success and predictability. However, this technique involves a relatively extensive operating procedure with a high incidence of postoperative morbidity such as swelling, bruising, and pain. An alternative technique, Summers’ approach, requires the use of an osteotome and mallet but is not well accepted by patients because the tapping force creates a very unpleasant experience. Postoperative headaches and vertigo have also been reported after this procedure. Moreover, use of Summers’ technique gains limited bone height because of problems with access and the visibility needed for proper reflection of the Schneiderian membrane.

The technique described in this case report is characterized by use of a wide-diameter trephine for the initial osteotomy. This approach can provide extremely good access and visibility for the whole procedure. In order to minimize the patient’s discomfort and chances of perforating the Schneiderian membrane, a more controllable ultrasonic instrument was used for breaking the bony sinus floor. Since the operating field is large and visible, a significant degree of membrane elevation can be done with hand instruments such as a curette and sinus elevator. This allows more space in the sinus cavity to accommodate sufficient grafting material to compensate for future bone remodeling and resorption. As the autogenous bone harvested was insufficient, a Puros allograft was also used in this case. This eliminates the need for harvesting extra bone from the patient and thus minimizes surgical trauma.

The Puros material has also been shown to have greater regenerative potential than other synthetic and alloplastic materials. More importantly, the material is completely resorbed and replaced by newly formed autogenous bone over a period of time. A radiograph taken 6 months postoperatively showed that the bulk of augmented bone was well maintained. A self-tapping wide-diameter implant was used because this offers good initial stability and prevents accidental displacement of the implant into the sinus cavity during or after treatment. It also helps to produce a better emergent profile for final restoration and it is better able to withstand occlusal stress during function.

This technique is a safe and well-controlled procedure that allows immediate implant insertion following sinus augmentation. Morbidity is reduced because only one surgical site is involved. It is more acceptable to patients and can be applied to any implant systems with slight modifications to accommodate different implant sizes. However, it should be noted that this technique can only be applied in carefully selected cases where sufficient residual bone width and height is available for the primary stability of the wide-diameter implant. Use of this technique should be studied prospectively in order to evaluate the long-term outcomes of the implant and augmented bone.

Disclosure
The authors disclose no commercial interest in the products used in the study.

References


