

A Maxillary Sinus Lift Technique by using New Maintained Active Bioline Implants-The Case Report

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ABSTRACT

Tooth extraction of maxillary posteriors often results in pneumatization of the sinus. As a result of this, there can be height and width reduction in the posterior region. Severe atrophy in the maxillary posterior bone caused by maxillary sinus pneumatization may cause difficulty in implant placement. It is essential that the sinus must be elevated in such cases. This will facilitate implant placement effectively. This case report describes the placement of implants in maxillary posteriors with the use of an autogenous bone graft for a sinus lift procedure which helps avoid the complexities usually faced with a direct sinus lift.

Keywords: Dental implants; Phosphosilicate putty; Indirect sinus lift; Hydraulic pressure

INTRODUCTION

Modern dentistry aims at restoring the patient's contour, function, aesthetics, speech, and health to normal and healthy form. It is done by restoring and replacing single or multiple decayed teeth. The ability to achieve these goals makes implant dentistry unique. The more teeth a patient is missing, the more the challenge. Because of ongoing research and methodology rehabilitation of even challenging clinical situations is possible.^[1]

Remodeling of the alveolar bone as well as a reduction in its dimension occurs following tooth loss. In the case of the maxillary posterior edentulous region, insufficient bone volume is a very common problem in the case of implant fixation. The presence of maxillary sinus and alveolar bone height reduction are the two challenges seen with an implant that is to be fixed in this area.^[2]

The method by which it can be increased is surgical sinus augmentation. There will be a reduction of alveolar bone by 1-2 mm and 4-5 mm in height and width, respectively following tooth extraction.^[3] An indirect sinus lift can be used if the residual bone height is more than 4mm and if the bone height is less than 4mm then a direct sinus lift with a lateral window approach can be done.

The presence of maxillary sinus makes implant surgery a technique-sensitive surgery in the maxillary posterior region. This area is often complicated by different factors. Some of them are unfavorable residual bone patterns, maxillary sinus pneumatization, remaining alveolar bone quality issues, and heavy occlusal forces in the posterior maxillary region.^[4,5] A direct maxillary sinus lift is done to overcome these limitations.

Maxillary sinus augmentation or sinus floor lift procedure is done in the maxillary posterior region, frequently it affects the implant success rate in the posterior maxilla.^[6]

After tooth extraction, bone resorption is maximum in the initial six months. This compromises the placement of implants in the future because of the reduced height and width of bone.^[7] Following tooth loss there will be the absence of functional load. This results in severe resorption of bone, sinus wall thinning as well as sinus pneumatization.^[8] Prior to implant placement, this must be restored. Sinus floor augmentation is performed either through an external approach or through an internal (transcrestal) approach.

The Caldwell-Luc operation is the pioneer technique described for lifting the maxillary antral floor. In this procedure they used a lateral window to reach the antrum. A bone graft was placed in order to provide sufficient bone density needed for implant placement.

Tatum at Alabama Implant Congress in Birmingham first presented the technique of sinus lift in 1976, but it was published by Boyne and James only in 1980.^[6]

Indications of indirect sinus lift procedures are Oro-antral fistula, Palate clefts reconstruction, Le Fort I fractures and interpositional graft placement, less than 10 mm bone height in the alveolous, less than 4mm residual bone width, no pathology history, presence of major sinus pathology.^[9]

Local contraindications of indirect sinus lift procedures are Maxillary sinus pathology, Chronic sinusitis, Scar in alveolous, Odontogenic infections, Allergic rhinitis, Irregular alveolar crest.^[9]

SURGICAL PROCEDURES

After a descriptive history taking and a detailed clinical examination, treatment options were given to patients. To find out the residual bone height at the implant site locations preoperative radiographic measurement as well as CBCT evaluation is required.

After administration of adequate local anesthesia, a horizontal mid- ridge incision should be made on the edentulous area. On the buccal tissue, vertical release incision is made and flap is raised to facilitate full-thickness flap advancement.^[10]

The entry depth on the trephine is marked using a silicone stopper. The diameter of trephine core should be less than the buccopalatal width by at least 2mm. This will ensure a 1mm width on both sides of the implant. In order to avoid slipping and to create a good contact with crest, at first trephine is used in reverse direction and later drilling in forward direction is carried out.^[11]

1200-1500rpm should be the maximum cutting speed to be maintained. The trephine core is completed first, then according to diameter of the trephine calibrated osteotome should be chosen. The trephine core is pushed to the

depth required using gentle malting force. In indirect sinus lift technique, the correct caliber osteotome is first chosen and successive greater instrument diameters are worked. Finally, it will fracture the sinus floor and it is lifted.^[12]

With controlled force using surgical mallet, it should be separated from the Schneiderian membrane without damage. In case of a thick Schneiderian membrane seen in cone-beam computed tomography (CBCT), we can gently mallet beyond the overlapped area.^[13]

At implant site, the viscoelastic graft material calcium phosphosilicate alloplastic putty was placed using a bone carrier. Bone condenser is used to condense. The graft is evenly distributed using a bone spreader. The graft. Then sinus elevation is done. After elevating up to 8mm, the implant was placed. Then the cover screw is placed and flap is closed.

The implant size should be slightly more than the trephined site. This is to ensure a primary stability. A non resorbable dense polytetrafluoroethylene (PTFE) the membrane can be of help used if primary closure is not achieved.^[14]

After stabilising the membrane, mucoperiosteal flaps are repositioned and primary closure done using sutures. Three to six months is the usual healing period.^[15]

CASE PRESENTATION

A female patient of the age thirty-eight, visited Department of Prosthodontics and Implantology to place artificial teeth in her missing teeth regions. Intraoral examination revealed a partially edentulous arch. The missing teeth were 15,16, 36,37,44,46,47. There is no relevant medical history. The bone available from the crest to the antral floor was 4.8 mm in the 16 region and 6.8mm in 15 region, as per cone-beam computed tomography (Figure 1,2,3,4).



Figure 1:



Figure 2:



Figure 3:



Figure 4:

The patient came under SA-4 classification. This means there is a distance of 5mm between the crest of the alveolous and the floor of the maxillary antrum. This classification is proposed by Misch(Figure 5,6).^[16]

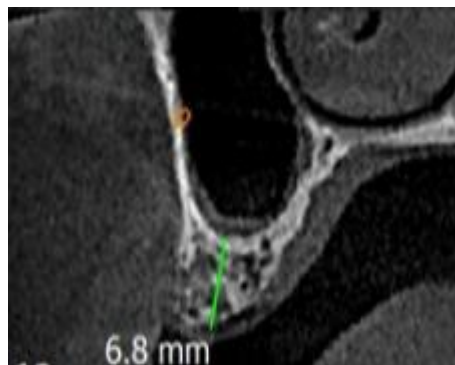


Figure 5:

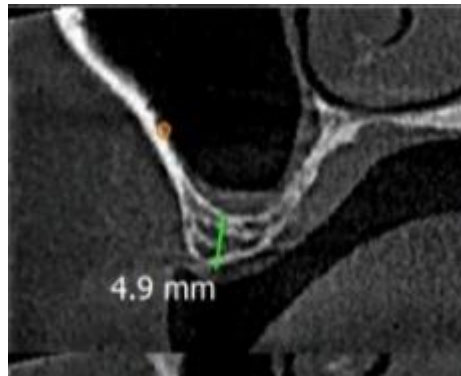


Figure 6:

Autogenous core lift technique was done, as the patient did not want to undergo for direct sinus lift surgical procedure. The patient was given prophylactic antibiotic coverage of (amoxicillin 2g, 1 hour before surgery) as proposed by Esposito et al.^[17]

After adequate local anesthesia, the right posterior superior alveolar nerve block and middle superior alveolar nerve block were administered. A muco- periosteal flap was raised following a mid-crestal horizontal incision (Figure 7).



Figure 7:

Incision was given over the ridge and a vertical relieving incision was given to provide a clear visualization of the alveolar bone and flaps were adequately reflected and mobilized (Figure 8).



Figure 8:

A PILOT drill is used to prepare the osteotomy site with 800rpm speed and a depth of 1mm short from sinus floor, that is 3.9 mm in 16 region and 5.8mm in 15 region. RVG is taken to confirm the position (Figure 9,10,11).



Figure 9:



Figure 10:



Figure11:

To the predetermined depth the bone was trephined Consecutive drills are ready with 800 rpm in the 16 regions first and followed to that RVG is taken to confirm the position (Figure 12,13).



Figure 12:



Figure 13:

The same osteotomy procedure was repeated for 15 region and the positions were confirmed by RVG (Figure 14,15,16,17,18,19).



Figure 14:



Figure 15:



Figure 16:



Figure 17:



Figure 18:



Figure 19:

After osteotomy completion till the desired width of 4.2mm in 16 region and 5mm in 15 region, for the lift of sinus, Summer's sinus lift technique was used by using osteotome and mallet.

Using gentle malleting force with osteotome of the consecutive width, the sinus floor was up fractured and sinus wall was lifted (Figure 20).

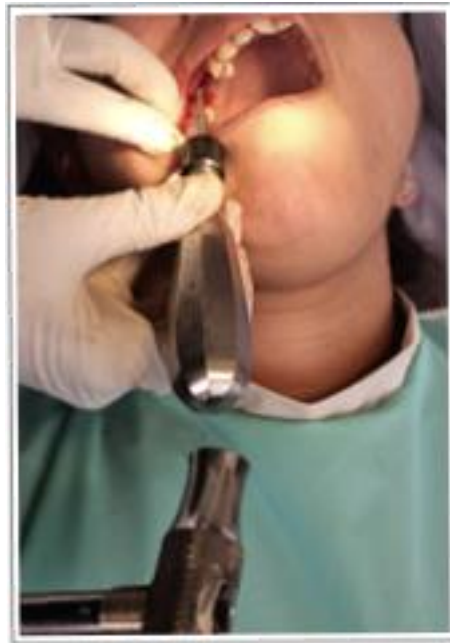


Figure 20:

A 5mm and 4mm lift was achieved in 16 and 15 regions respectively.

Novabone putty is injected after the lift and followed by the placement of Bioline active implants (Figure 21).



Figure 21:

Bioline Active implants are manufactured in such a way that Novabone putty bone graft material can be injected through it and with that force sinus can be lifted (Figure 22,23,24,25).



Figure 22:



Figure 23:



Figure 24:



Figure 25:

The implant is torqued using a wrench with primary stability of 35Ncm (Figure 26).



Figure 26:

Again, Novabone putty is injected through the coronal opening of the implant (Figure 27)



Figure 27:

With RVG, implant placement is confirmed and the cover screw is placed on 15 and 16. Suturing was done without tension using 3-0 vicryl.

Amoxicillin (500mg) and Ibuprofen (600 mg) were prescribed thrice daily for 5 days postoperatively. 0.12% chlorhexidine gluconate was given to rinse twice daily for 10 days. A soft diet and proper oral hygiene methods were advised for 2 weeks. After 14 days of the surgical procedure sutures were removed.

DISCUSSION

A common challenge when planning the placement of the posterior dental implant in the maxilla is insufficient bone volume. Different lateral and trans-alveolar sinus lift techniques are used to ensure sufficient bone volume. The limitations of direct sinus lift procedures via lateral approach are higher morbidity, time-consuming, and more invasive. Postoperative complications such as membrane perforations are also higher.^[18]

Summers in 1994 introduced the osteotome maxillary sinus floor elevation technique.^[19] It was later modified to a bone-added osteotome maxillary sinus floor elevation technique.

Tatum first described the maxillary sinus graft through the alveolar crest.^[20] It was then modified to the lateral wall sub-antral augmentation osteotomy and graft placement surgery.

To achieve sinus bone grafting, Summer's osteotome technique was done.^[20] Benign positional vertigo, eventually leading to litigation can occur if we use improper forceful use of mallet.

Indirect or direct sinus augmentation techniques can be used to treat atrophied posterior maxilla [15].

CONCLUSIONS

A lot of clinical techniques as well as new materials have been introduced to address bone loss. A sinus augmentation is a technique-sensitive procedure. Treatment planning is a major part of implant success. Some factors which affect the treatment success rate are the operator's skill, preoperative planning, technique, and graft material.

Atraumatic indirect sinus lifts involve the technique of autogenous core lift with alloplastic calcium phosphosilicate sealant and osteotomy. It provides greater bone density thereby increasing the stability in the posterior maxilla. It brings out a higher implant success rate. Overall, the results encourage us to stick with the chosen scheme in the future.

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