

# Concurrent Implant Placement in Pneumatized Maxillary Sinus: A Case Report with One Year of Follow Up.

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## ABSTRACT

A clinical report outlines rehabilitation of a pneumatized maxillary sinus using combination of the piezo surgery unit and osseodensification (OD) technique to reduce the treatment time and achieve optimum implant stability in a challenging situation. The sinus cavity was grafted using mixture of allograft and xenograft. One year clinical and sequential CBCT (Cone Beam Computerized Tomography) follow up shows significant changes in the treatment modalities that have increased success rate of the implant retained fixed restorations in posterior maxilla.

**Keywords:** CBCT, Osseodensification, Piezosurgery, Pneumatized maxillary sinus, Sinus Lift.

## INTRODUCTION

Long term successful implant retained restoration is technique sensitive and challenging procedure due to bone quality and anatomy of the maxillary sinus.<sup>[1]</sup> Various graft material along with different approaches have been used for augmentation however, combination of osteo inductive allograft and osteo conductive xenograft have not only maintained the space by providing support to the release schneiderian membrane but also enhance bone regeneration.<sup>[2,3]</sup>

In this Clinical report, SA 4 sinus defect where residual bone height is 1-2 mm was managed by the direct approach.<sup>[4]</sup> Piezo surgical unit was used to create window on lateral wall of Maxillary sinus (Cald Wal Luc) to release the schneiderian membrane and achieve more than 5mm augmentation along with osseodensification for preparing the implant site.<sup>[5,6]</sup> Piezo surgery uses low frequency over modulation ultrasonic wave to cut the bone precisely with liner oscillation and it prevents soft tissue injury due to lack of energy.<sup>[7]</sup> Osseodensification (OD) is well established concept used to prepare implant site in which bone will expand and increase in the density where there is compression of the trabeculae due to viscoelastic property that results in higher primary stability.

As a diagnostic tool, CBCT (Cone Beam Computerized Tomography) has changed the face of regenerative implant dentistry by providing 3 dimensional volumetric images of the anatomical structures that has increased the accuracy and predictability of the rehabilitations.<sup>[10]</sup> To evaluate this case sequential CBCT were taken at the interval of pre-operative, post-operative 6 months and 1 year after functional loading.

The case report focuses on the management of SA 4 defect using Piezo surgery and osseodensification. The clinical and radiographic evaluation depicts the optimum implant stability and adequate bone around the implant after one year of the functional loading.

## CASE REPORT

A 55-year-old female patient with non-significant medical and dental history reported to dental clinic with chief complain of difficulty in chewing food due to missing teeth in upper left posterior quadrant. [Figure 1] The radiographic evaluation shows pneumatized maxillary sinus and D4 quality of the bone.

Considering all the factors patient was suggested for two treatment modalities. Patient opted for augmentation of maxillary sinus followed by implant retained 3 unit fixed dental prosthesis over the cast partial denture for Kennedy Class II.

The surgical site was anesthetized with PSA and GP nerve block along with buccal infiltration using 2% lidocaine (1:100,000) (Septodont). The lateral window technique was performed by elevating full thickness trapezoidal mucoperiosteal flap from mesial papilla of upper left first premolar to distal of the maxillary tuberosity for visibility and access.

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Inedible Pencil was used to score window of 8\*10 mm dimension. [Figure 2] Piezo Surgical tool with the vibration speed of 25 to 30 Hz and with bone cutting tips US1, USL1, USR1 (Ultra Surgery, Woodpecker) was used to prevent the injury to the schneiderian membrane in continuous brush motion. This was followed by use of elephant trunk tip to detach any bony attachment once the blue tinge of the membrane was visible through the borders of the window. To prevent the tear of the membrane constant contact was maintained between the curette and the bony wall of the sinus. During the surgical procedure, the patient was asked to perform valsalva maneuver to check patency of the sinus. The bony window along with membrane was reflected apically.

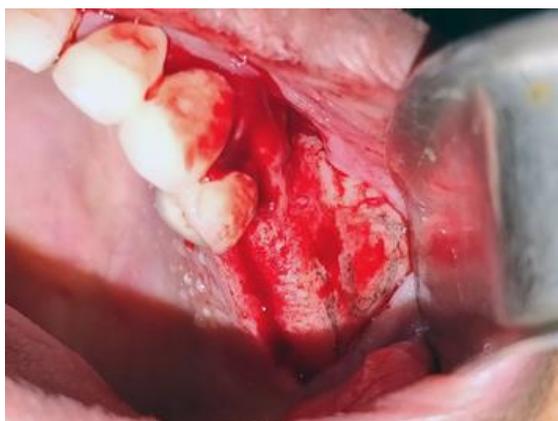
sinus membrane. Also, a mixture of allograft (Miner Oss, Bio Horizon) and xenograft (Bio-Oss) in 1:1 ratio was packed loosely in the sinus cavity to maintain the space for bone regeneration. The controlled motorized placement of the implants was done with the fixtures of 3.8\*12.5 and 4.6\*12.5mm (RBT, Bio horizon) with optimum insertion torque in 25 and 27 regions, respectively. [Figure 3] Again, a long resorbing cross linked collagen membrane (Bio Gide Perio, Geistlich) was placed to close the lateral window and tension free primary closure of the flap was done using 3-0 vicryl suture (Ethical, Johnson& Johnson).

**Table 1:** denotes dimensional of the sinus augmentation achieved after grafting procedure.

|                 | Pre-operative | Post op after 6 months | 1 year of functional loading |
|-----------------|---------------|------------------------|------------------------------|
| Vertical height | 1.2 mm        | 13.1 mm                | 13.1 mm                      |



**Figure 1:** Pre-operative



**Figure 2:** Scoring of the window with inedible pencil

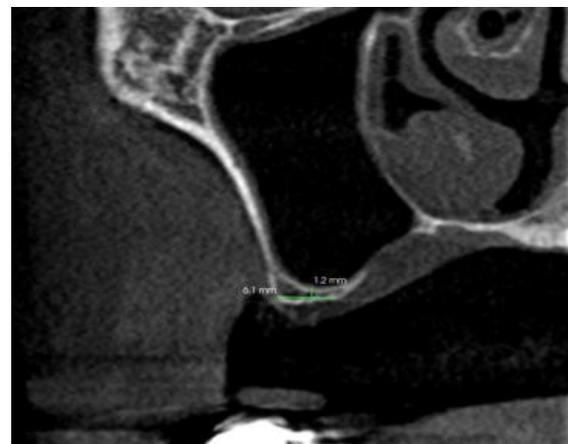
Osteotomy was performed using OD burs (Densah, Versah) in counterclockwise motion at 600 to 800 with copious irrigation in 25 and 27 tooth regions. This was followed by placing a cross linked resorbable collagen membrane (Bio-Gide Perio, Geistlich) soaked in antibiotic solution below the



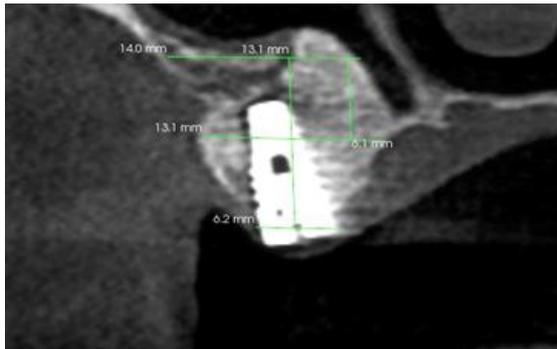
**Figure 3:** Grafting of sinus with mixture of allograft and xenograft



**Figure 4:** Three-unit screw retained prosthesis

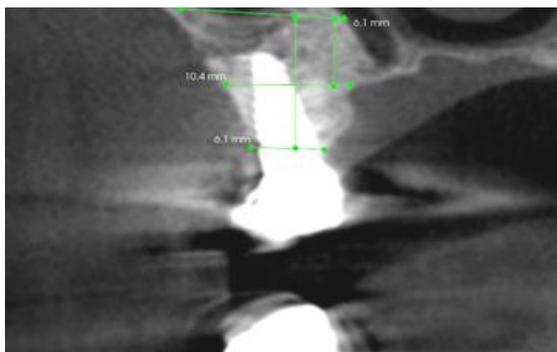


**Figure 5A:** Pre-operative CBCT shows the dimension of the residual bone



**Figure 5B: Six month post-surgical CBCT shows the osseointegrated implants**

The patient was educated to maintain post-operative oral hygiene. The follow up was done on day 1, 7 and 14 days after the surgery. Orthopantomogram and CBCT were done for radiographic evaluation. A CBCT taken after 6 months depicted adequate bone regeneration and patency of the antrum so gingival former was placed in second stage surgery. Implant level impression was taken after 1 month of second stage surgery. Screw retained 3-unit implant prosthesis was delivered. [Figure 4]



**Figure 5c: One year follow up after functional loading**

## DISCUSSION

Advancement in technology and bone grafting technique have reduced the complication rate and increased the longevity of implant retained prosthesis in poor quality of bone. Since the introduction of the piezo surgery for lateral window technique the sinus perforation has dropped to 0 to 6% compared to 25 to 30%. The type and volume of the graft are the factors that affect the bone regeneration, in this case combined property of allograft and xenograft maintains space and stimulate new bone formation to gain optimum results.

The use of OD in burs approach, condenses and expand bone rather cutting. Also, it maintains viable bone and compact contact that results in successful osseointegration. The augmentation of the sinus is evident in the [Figure 5A, 5B & 5C]. The [Table 1] shows the vertical augmentation of the sinus cavity after 1 year of the functional loading.

## CONCLUSION

The use of piezo surgery and osseodensification has helped the clinician to reduce treatment time for placement of implants retained restorations. Thus, evaluation of sequential CBCT ensures functional and esthetic outcome of implant prosthesis.

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