



## Sinus Augmentation Using Lateral Approach and Sticky Bone – An Emigma in The Field of Dentistry: A Case Report

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*(Received: 02 July 2023*

*Revised: 14 August*

*Accepted: 02 September)*

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### ABSTRACT:

In sinus floor augmentation of an atrophic posterior maxilla, platelet-rich fibrin (PRF) has been used and cerabone along with platelet rich fibrin which forms a sticky bone as a graft material.

Aim- The aim of this study was to achieve adequate bone height for implant placement.

Background- We herein discuss the sinus augmentation done in a 32- year old female patient with an atrophic maxilla on both the side of the quadrant. This case report also includes the comparison of piezo-surgery and LAS-kit for lateral approach sinus augmentation. The follow up period was 6 months post surgery .

Conclusion -As a result, new bone formation was confirmed histologically in both cases. Our findings show that the use of PRF as a graft material during sinus floor augmentation induces natural bone regeneration.

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### Background -

In the posterior maxillary area, insufficient vertical height of the alveolar bone due to the presence of the maxillary

sinus, postextraction bone resorption, and poor quality and quantity of alveolar bone may limit implant placement [1]. In such cases, several sinus augmentation



procedures for implant placement have been introduced since the 1980s [2, 3]. The techniques create space between the maxillary alveolar process and the elevated Schneiderian membrane, which is filled with various graft materials to maintain adequate space for new bone formation. Many graft materials have been applied to these techniques such as autogenous bone, allograft, xenograft, alloplastic bone, or combinations thereof [4, 5]. Although autogenous bone is considered to be the gold standard, it creates another wound at the donor site. Thus, autogenous bone is not widely used in clinical practical. The other graft materials also have limitations, including risk of infection, insufficient bone regeneration, and increased overall cost. Accordingly, no graft material appears to be superior to the others. Platelet-rich fibrin (PRF) was first reported in 2001 by Choukroun et al. as a second-generation platelet concentrate [6]. Several studies have recently reported the application of PRF in dental implant surgery. Notably, PRF mixed bone substitute or PRF has so far solely been used as a graft material for sinus augmentation using both the lateral and crestal approaches [7–9]. The application of PRF for sinus augmentation is a relatively easy surgical procedure and the clinical and radiological findings have been shown to have a good effect regarding new bone formation.

This article presents two case reports of direct sinus lift in the same individual using two treatment modality 1. Using LAS kit ( lateral approach sinus lift kit) and 2. Piezosurgery unit .

## Case report 1.

A 32 year old female patient reported to the department of periodontology at bharati vidyapeeth dental college and hospital, Pune, with the chief complaint of missing tooth in upper right and left back tooth region of jaw since 3 years. The patient underwent extraction 3 years back.

The patient was given treatment options and the patient for fixtures i.e. implants. The patient's case history was recorded and thorough clinical examination was carried out. The patient revealed no significant medical history. The patient was advised for a 3-D scan (CBCT) CONE BEAM COMPUTED TOMOGRAPHY. The findings

were evaluated and the amount of bone present in 16 and 26 was reported to be 0mm.

## SURGICAL PROCEDURE:

After the clinical examination , pre-operative radiographs and photographs . The upper and lower alginate impressions for diagnostic models were taken. The surgical procedure was planned for both the quadrants at 14 days of interval.

The patients informed consent was taken and the patient was prepared for the surgery. Local anaesthesia was administered with 1:1,00,000 adrenaline and posterior superior alveolar, middle superior and greater palatine nerves were anesthetized. The patients subjective testing was done.

Crestal incision was given on the middle of the alveolar ridge starting from the distal aspects of 15 and mesial aspect of 17( FIG 1). The crestal incision was connected with two vertical incisions, one at the distobuccal line angle of 15 and the other at mesiobuccal line angle of 17 and was extended to the mucogingival junction. Full thickness buccal and palatal flaps were reflected and the bone was carefully curetted to remove any granulation tissue tag on the bone ( FIG 2). The bone window was marked at 3mm from the alveolar crest and 2mm mesially and distally from the bone. The protocols of LAS kit was considered and dome shaped burs were used to thin the bony plate. The bone was thinned unless a bluish red hue of schneiderian membrane was visible. The upper layer of the bone was thinned with pore bur and the membrane was visible. Osteotomes were used sequentially to separate the membrane on the mesial, distal and lateral aspects of the bone .

Along with this , the patients own blood was drawn from left brachial artery and PRF membrane was prepared using PRF centrifugation machine for 20 minutes. The PRF membrane was separated from the underlying RBC layer. The RBC layer was mixed with Cerabone in a dappen dish was left for 20 minutes , the sticky bone was prepared ( FIG 4,5). After separation of membrane from the bone sticky bone was added in subsequent manner and condensed using bone condensers (FIG 6,7). The



graft was added such as the entire bone margins were at level. The platelet rich fibrin membrane was placed over the bony window and was carefully adapted. The buccal and palatal flap were sutured using horizontal mattress suture and continuous sling suture (FIG 8,9) .

Post-operative instructions were given to the patient and medications were prescribed for 7-days which included Analgesic- ZERODOL –P and antibiotic – AUGMENTION 625 thrice daily along with Chlorhex mouthwash twice daily for 14 days to prevent any plaque accumulation. The patient was recalled after 14 days for follow up and suture removal.

## Case report 2-

A 32- year female patient reported to the Department of periodontology , Bharati vidyapeeth dental college and hospital, Pune. The patient complained of missing teeth with 26. Patients detailed case history was recorded and the patient did not report for any systemic conditions that might affect the healing. The patient was advised for CBCT with 26 and the bone present was 0mm.

After clinical examination pre-operative pictures were taken along with alginate impressions of upper and lower jaw and diagnostic cast were prepared.

## Surgical procedure-

The patients informed consent was taken prior to surgery. Administration of local anaesthesia was done with 1:1,00,000 epinephrine. The patients subjective symptoms were checked.

Crestal incision was given from the distal aspect of 25 and it was extended to mesial aspect of 27. Vertical incisions were given on disto-buccal aspect of 25 and on the mesio-buccal aspect of 27 and were extended till the mucogingival junction. Buccal and palatal full thickness flaps were reflected to ensure proper exposure of bone. The bone was curetted for granulation tissue removal (FIG 10,11,12).

The bony window was marked at 3mm from the alveolar crest and 2mm mesially and distally. The piezo-surgery unit was used in this patient. Piezoelectric bone surgery is a recent and innovative technology, permitting a selective

cut of mineralized tissue while sparing soft tissue. Similar to a dental scaler, a high frequency vibration, in the range of 25–35 kHz, is transmitted to a metallic tip. However, the power of the piezosurgical instrument is three to six times higher than that of a dental scaler. The major advantages of this technology include high precision, a design that increases ease of curvilinear osteotomy, less trauma to soft tissue, preservation of neurological and vascular structures, reduced hemorrhage, minimal thermal damage to the bone, as well as overall improvement of healing. The handpiece of the instrument is equipped with a sterile irrigation system and light-emitting diode (LED) light, which improves visibility and overall safety.

The piezotomes were used gradually. The bony window was marked with round piezotome and the bony window was created separating it entirely from the schneiderian membrane.

The bony window was separated with a help bone separator and the bone block was placed in sterile saline solution. The entire membrane was checked for any perforation. The sinus membrane was separated from the bone on all the aspects- mesially, distally and laterally.

At the same time the patients blood was drawn from the left brachial artery and the PRF membrane was prepared at for 20 mins (FIG 13,14). The prf membrane was separated from the underlying RBC layer. The RBC layer was mixed with Cerabone in a dappen dish was left for 20 minutes , the sticky bone was prepared. After separation of membrane from the bone sticky bone was added in subsequent manner and condensed using bone condensers. The graft was added such as the entire bone margins were at level. The bone block was placed over the bony window and was carefully adapted . The platelet rich fibrin membrane was placed over the bony window and was carefully adapted. The buccal and palatal flap were sutured using horizontal mattress suture and continuous sling suture (FIG 15,16) .

Post-operative instructions were given to the patient and medications were prescribed for 7-days which included Analgesic- ZERODOL –P and antibiotic – AUGMENTION 625 thrice daily along with Chlorhex mouthwash twice daily for 14 days to prevent any plaque



accumulation. The patient was recalled after 14 days for follow up and suture removal.

## Discussion:

The maxillary sinus elevation operation is now widely regarded as the most reliable of the pre-prosthetic surgical procedures<sup>6</sup>. When using the proven evidence-based decisions to employ rough-surfaced implants, xenogeneic bone replacement grafts, and a membrane over the window, success rates are in the high 90th percentile, as measured by the secondary outcome measure of implant survival. With such high success rates, new bone graft augmentation factors (BMPs, growth factors, and stem cell products) technologies are unlikely to make a significant difference. They could be able to shorten the time it takes for grafts to mature. This ability has been demonstrated in studies as they could be able to shorten the time it takes for grafts to mature. This ability has been demonstrated in studies using rh-PDGF 35 and Osteocel 36. The evolution of surgical technique is aimed at reducing complications that may have a negative impact on the primary procedure.

## Conclusion:

The patient was recalled at 3 months interval and the follow up period revealed bone formation on both the aspects of jaw.

Hence it can be concluded that Sinus augmentation is very helpful intervention for implant placement in future as it will provide sufficient amount of bone height and width.

Both the surgical interventions- LAskit and piezosurgical unit gave promising results.

## REFERENCES

- [1] Tatum HJr. Maxillary and sinus implant reconstructions. *Dent Clin North Am* 1986;30:207-29.
- [2] Boyne PJ, James RA. Grafting of the maxillary sinus floor with autogenous marrow and bone. *J Oral Surg* 1980;38:613-6.
- [3] Smiler DG. The sinus lift graft: Basic technique and variations. *Pract Periodontics Aesthet Dent* 1997;9:885-93.
- [4] Wallace SS, Tarnow DP, Froum SJ, Cho SC, Zadeh HH, Stoupe J, et al. Maxillary sinus elevation by lateral window approach: Evolution of technology and technique. *J Evid Based Dent Pract* 2012;12:161-71.
- [5] Mazon Z, Horowitz RA, Del Corso M, Prasad HS, Rohrer MD, Dohan Ehrenfest DM, et al. Sinus floor augmentation with simultaneous implant placement using Choukroun's platelet-rich fibrin as the sole grafting material: A radiologic and histologic study at 6 months. *J Periodontol* 2009;80:2056-64.
- [6] Thor A, Sennerby L, Hirsch JM, Rasmusson L. Bone formation at the maxillary sinus floor following simultaneous elevation of the mucosal lining and implant installation without graft material: An evaluation of 20 patients treated with 44 Astra tech implants. *J Oral Maxillofac Surg* 2007;65:64-72. [↑](#)
- [7] Hatano N, Sennerby L, Lundgren S. Maxillary sinus augmentation using sinus membrane elevation and peripheral venous blood for implant-supported rehabilitation of the atrophic posterior maxilla: Case series. *Clin Implant Dent Relat Res* 2007;9:150-5.
- [8] van den Bergh JP, ten Bruggenkate CM, Disch FJ, Tuinzing DB. Anatomical aspects of sinus floor elevations. *Clin Oral Implants Res* 2000;11:256-65.
- [9] Underwood AS. An inquiry into the anatomy and pathology of the maxillary sinus. *J Anat Physiol* 1910;44:354-69.
- [10] Krennmair G, Ulm CW, Lugmayr H, Solar P. The incidence, location, and height of maxillary sinus septa in the edentulous and dentate maxilla. *J Oral Maxillofac Surg* 1999;57:667-71.
- [11] Ulm CW, Solar P, Krennmair G, Matejka M, Watzek G. Incidence and suggested surgical management of septa in sinus-lift procedures. *Int J Oral Maxillofac Implants* 1995;10:462-5.
- [12] Kim MJ, Jung UW, Kim CS, Kim KD, Choi SH, Kim CK, et al. Maxillary sinus septa: Prevalence,



- height, location, and morphology. A reformatted computed tomography scan analysis. *J Periodontol* 2006;77:903-8.
- [13] Kaufman E. Maxillary sinus elevation surgery: An overview. *J Esthet Restor Dent* 2003;15:272-82.
- [14] Woo I, Le BT. Maxillary sinus floor elevation: Review of anatomy and two techniques. *Implant Dent* 2004;13:28-32.
- [15] Cho SC, Wallace SS, Froum SJ, Tarnow DP. Influence of anatomy on Schneiderian membrane perforations during sinus elevation surgery: Three-dimensional analysis. *Pract Proced Aesthet Dent* 2001;13:160-3.
- [16] Fry RR, Patidar DC, Goyal S, Malhotra A. Proximity of maxillary posterior teeth roots to maxillary sinus and adjacent structures using denta scan®. *Indian J Dent* 2016;7:126-30
- [17] Eberhardt JA, Torabinejad M, Christiansen EL. A computed tomographic study of the distances between the maxillary sinus floor and the apices of the maxillary posterior teeth. *Oral Surg Oral Med Oral Pathol* 1992;73:345-6.
- [18] Solar P, Geyerhofer U, Traxler H, Windisch A, Ulm C, Watzek G, *et al.* Blood supply to the maxillary sinus relevant to sinus floor elevation procedures. *Clin Oral Implants Res* 1999;10:34-44.
- [19] Elian N, Wallace S, Cho SC, Jalbout ZN, Froum S. Distribution of the maxillary artery as it relates to sinus floor augmentation. *Int J Oral Maxillofac Implants* 2005;20:784-7.
- [20] Harris D, Horner K, Gröndahl K, Jacobs R, Helmrot E, Benic GI, *et al.* E.A.O. Guidelines for the use of diagnostic imaging in implant dentistry 2011. A consensus workshop organized by the
- [21] European Association for Osseointegration at the Medical University of Warsaw. *Clin Oral Implants Res* 2012;23:1243-53.
- [22] Temmerman A, Hertelé S, Teughels W, Dekeyser C, Jacobs R, Quirynen M, *et al.* Are panoramic images reliable in planning sinus augmentation procedures? *Clin Oral Implants Res* 2011;22:189-94.
- [23] Janner SF, Caversaccio MD, Dubach P, Sendi P, Buser D, Bornstein MM, *et al.* Characteristics and dimensions of the Schneiderian membrane: A radiographic analysis using cone beam computed tomography in patients referred for dental implant surgery in the posterior maxilla. *Clin Oral Implants Res* 2011;22:1446-53.





FIG 1



FIG 2



FIG 3



FIG 4

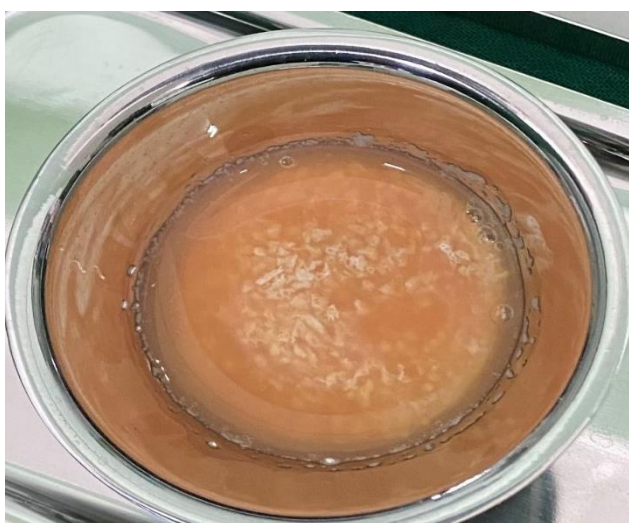


FIG 5



FIG 6



FIG 7



FIG 8





FIG 9



FIG 10



FIG 11



FIG 12



FIG 13

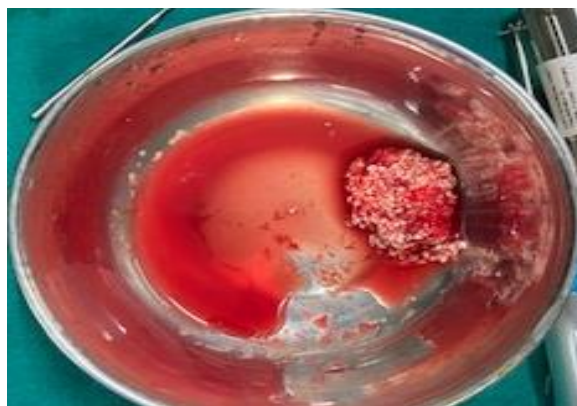


FIG 14



FIG 15



FIG 16