

Sinus-Lift Ways and Types of Sinus Augmentation and Use of Piezo-Surgery Device for Fenestration of Sinus Maxillaries

Bardul Recani*

AAZ - Aarau Dental Clinic GmbH, Switzerland.

*Corresponding author

Bardul Recani DDS, MS, PhD, AAZ Private Dental Clinic Entfelder str.2, CH-5000 Aarau, E-mail: b.recani@gmx.de.

Submitted: 17 May 2017; Accepted: 26 May 2017; Published: 02 June 2017

Abstract

Maxillary sinus floor augmentation (also termed sinus lift, sinus graft, sinus augmentation or sinus procedure) is a surgical procedure which aims to increase the amount of bone in the posterior maxilla (upper jaw bone), in the area of the premolar and molar teeth, by lifting the lower Schneiderian membrane (sinus membrane) and placing a bone graft [2].

When a tooth is lost the alveolar process begins to remodel. The vacant tooth socket collapses as it heals leaving an edentulous (toothless) area, termed a ridge [3]. This collapse causes a loss in both height and width of the surrounding bone. In addition, when a maxillary molar or premolar is lost, the floor of the maxillary sinus expands, which further diminishes the thickness of the underlying bone. Overall, this leads to a loss in volume of bone that is available for implantation of dental implants, which rely on osseointegration (bone integration), to replace missing teeth [1]. The goal of the sinus lift is to graft extra bone into the maxillary sinus, so more bone is available to support a dental implant.

A Special form of Reconstruction of bone, especially changing the vertical structure of the maxillary Sinus floor in the upper jaw and the establishment of the mucous membranes of Sinusitis purpose of dental implant called Sinuslift [4, 5, 6 & 8]. Distance-maxillary sinus is often so low that an implant can not be included in stable long enough. With the incorporation of bone material or bone grafting, maxillary sinus floor, 'grow' and that this level can be implanted implants safe. Sinuslift distinguish Extern and Intern [9,10].

Abbreviations

SL – Sinuslift
PS – Piezosurgery
Au – Augmentation

Introduction

While there may be a number of reasons for wanting a greater volume of bone in the posterior maxilla, the most common reason in contemporary dental treatment planning is to prepare the site for the future placement of dental implants [7]. Sinus augmentation (sinus lift) is performed when the floor of the sinus is too close to an area where dental implants are to be placed. This procedure is performed to ensure a secure place for the implants while protecting the sinus. Lowering of the sinus can be caused by: Long-term tooth loss without the required treatment, periodontal disease, and trauma [1, 14, 15].

Patients who have the following may be good candidates for sinus augmentation [19].

- Lost more than one tooth in the posterior maxilla.
- Lost a significant amount of bone in the posterior maxilla.

- Missing teeth due to genetics or birth defect.
- Minus most of the maxillary teeth and need a strong sinus floor for multiple implants.

Material and Methods

Prior to undergoing sinus augmentation, diagnostics are run to determine the health of the patient's sinuses. Panoramic radiographs are taken to map out the patient's upper jaw and sinuses. In special instances, a computed tomography or CT scan is taken to measure the sinus's height and width, and to rule out any sinus disease or pathology [12].

There are several variations of the sinus lift technique. There are multiple ways to perform sinus augmentation. The procedure is performed from inside the patient's mouth where the surgeon makes an incision into the gum, or gingiva. Once the incision is made, the surgeon then pulls back the gum tissue, exposing the lateral boney wall of the sinus. The surgeon then cuts a "window" to the sinus, which is exposing the Schneiderian membrane [3, 11, 13]. Fig: 7, 9.



Figure 7

Figure 9

The membrane is separated from the bone, and bone graft material is placed into the newly created space Fig: 10. The gums are then sutured close and the graft is left to heal for 4–12 months.

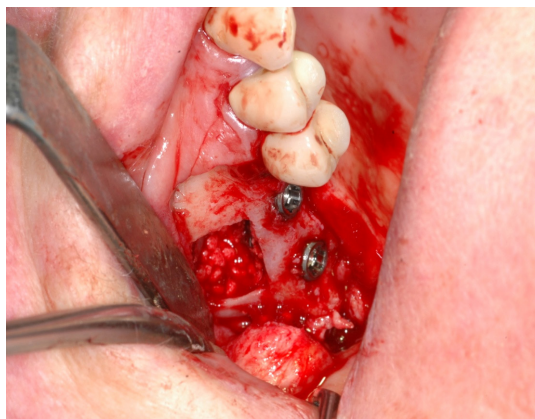


Figure 10

The graft material used can be an auto graft, an allograft, a xenograft, an alloplast (a growth-factor infused collagen matrix), synthetic variants, or combinations thereof [17, 18]. Fig: 8.

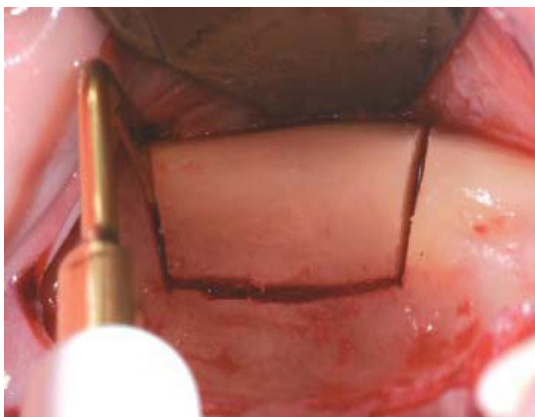


Figure 8: Bone block removal

Studies indicate that the mere lifting of the sinus membrane, creation of a void space and blood clot formation might result in new bone owing to the principles of guided bone regeneration.

In some cases the dental implant is also inserted during the same sinus lift procedure Fig: 10. As an alternative, sinus augmentation can be performed by a less invasive osteotome technique. This technique is normally performed when the sinus floor needs to be lifted less than 4 mm. The osteotome technique is performed by flapping back gum tissue and making a socket in the bone within 1–2 mm short of the sinus membrane. The floor of the sinus is

then lifted by tapping the sinus floor with the use of osteotomes Fig: 1, 2.

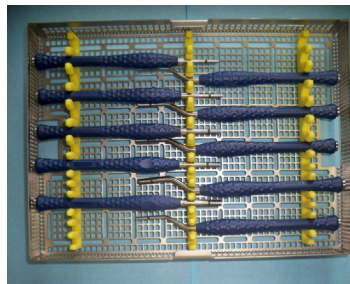


Figure 1: osteotome

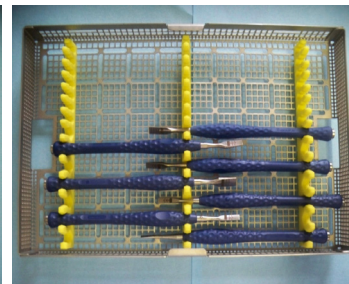


Figure 2: Chisel

The amount of augmentation achieved with the osteotome technique is usually less than what can be achieved with the lateral window technique. A dental implant is normally placed in the socket formed at the time of the sinus lift procedure and left to integrate with bone. Bone integration normally lasts 4 to 8 months. The goal of this procedure is to stimulate bone growth and form a thicker sinus floor, in order to support dental implants for teeth replacement [20, 21].

Cutting the bone from the piezo-surgery without damaging the soft tissue in surgery is a challenge, especially to compensate for the loss of bone extensive alveolar process. Implantologists use various techniques to increase respectively Augmentation bone-grafting. Piezotom enables the implementation of sophisticated procedures as osteotomic, osteoplastic for the opening of the jaw in Sagitale direction or elevation the membranes of the maxillary sinus. With the 28-36 kHz, the frequency is chosen so that Ultrasound Piezotom act exclusively in the solid tissues Fig: 5,6.

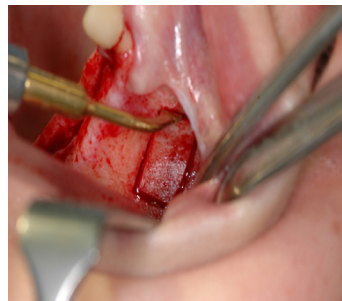


Figure 5

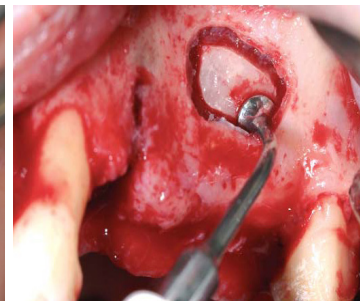


Figure 6

Piezosurgery is a relatively new technique for osteotomy and osteoplasty that utilizes ultrasonic vibration. The piezosurgery device is essentially an ultrasound machine with modulated frequency and a controlled tip vibration range Fig: 3, 4.



Figure 3: Piezon Surgery



Figure 4: Unit

The ultrasonic frequency is modulated from 10, 30, and 60 cycles/s (Hz) to 29 kHz. The low frequency enables cutting of mineralized structures, not soft tissue. Power can be adjusted from 2.8 to W, with preset power settings for various types of bone density. The piezosurgery tip vibrates within a range of 60-200 mm, which allows clean cutting with precise incisions [3, 16].

Conclusions

Once that is done elevation of the sinus membrane following its partial filling of the bone material in order to rebuild the bone. Good access additional instruments and limiting the amplitude of vibration work together for more accurate cutting of bone [22].

The piezosurgery device is a new instrument that can be used for bone surgery in a variety of dental surgical specialties.

The advantage of piezosurgery is that it can precisely cut hard tissue, while precluding injury to soft tissue. Minimal heat is generated during cutting, thus maintaining vitality of adjacent tissue. It provides substantial improvement in dental/implant surgery, benefiting the surgeon by ease of use and the patient by minimizing surgical trauma and promoting rapid healing [23, 24].

References

1. Hema Seshan, Kranti Konuganti, Sameer Zope (2009) Piezosurgery in periodontology and oral implantology, Indian Soc Periodontol 13: 155-156.
2. Robiony M, Polini F, Costa F, Vercellotti T, Politi M (2004) Piezoelectric bone cutting in multipiece maxillary osteotomies: Technical Note. J Oral Maxillofac Surg 62: 6.
3. Vercellotti T (2000) Piezoelectric surgery in implantology. Int J Periodont Restor Dent 20: 358-365.
4. Horton JE, Tarpley TM, Wood LD (1975) The healing of surgical defects in alveolar bone Produced with ultrasonic instrumentation, chisel and rotary bur. Oral Surg Oral Med Oral Pathol 39: 536-546.
5. Srouji S, Ben-David D, Lotan R, Riminucci M, Livne E, et al. (2010) The innate osteogenic potential of the maxillary sinus (Schneiderian) membrane: an ectopic tissue transplant model simulating sinus lifting. Int J Oral Maxillofac Surg 39: 793-801.
6. Chen TW, Chang HS, Leung KW, Lai YL, Kao SY (2007) Implant placement immediately after the lateral approach of the trap door window procedure to create a maxillary sinus lift without bone grafting: a 2-year retrospective evaluation of 47 implants in 33 patients. J Oral Maxillofac Surg 65: 2324-2328.
7. Thor A, Sennerby L, Hirsch JM, Rasmusson L (2007) 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 65: 64-72.
8. Lin IC, Gonzalez AM, Chang HJ, Kao SY, Chen TW (2011) A 5-year follow-up of 80 implants in 44 patients placed immediately after the lateral trap-door window procedure to accomplish maxillary sinus elevation without bone grafting. Int J Oral Maxillofac Implants 26: 1079-1086.
9. Boyne PJ, James RA (1980) Grafting of the maxillary sinus floor with autogenous marrow and bone. J Oral Surg 38: 613-616.
10. Del Fabbro M, Testori T, Francetti L, Weinstein R (2004) Systematic review of survival rates for implants placed in the grafted maxillary sinus. Int J Periodontics Restor Dent 24: 565-577.
11. Vercellotti T (2000) Piezoelectric surgery in implantology: a case report-a new piezoelectric ridge expansion technique. Int J Periodontics Restor Dent 20: 359-365.
12. Bovi M (2005) Mobilization of the inferior alveolar nerve with simultaneous implant insertion: a new technique. Case report. Int J Periodontics Restor Dent 25: 375-383.
13. Vercellotti T, De Paoli S, Nevins M (2001) The piezoelectric bony window osteotomy and sinus membrane elevation: introduction of a new technique for simplification of the sinus augmentation procedure. Int J Periodontics Restor Dent 21: 561-567.
14. Stubinger S, Kuttenger J, Filippi A, Sader R, Zeilhofer HF (2005) Intraoral piezosurgery: preliminary results of a new technique. J Oral Maxillofac Surg 63: 1283-1287.
15. Dong-Seok S, Mi-Ra A, Won-Hyuk L, Duk-Sung Y, So-Young L (2007) Piezoelectric osteotomy for intraoral harvesting of bone blocks. Int J Periodontics Restor Dent 27: 127-131.
16. Schlee M (2009) Piezosurgery-a precise and safe new oral surgery technique. Aust Dent Pract. Spiegelberg F, Claar M. Piezo: a minimally traumatic alternative in implantology. Aust Dent Pract 41: 38-142.
17. Tawil G, Mawla M (2001) Sinus floor elevation using a bovine bone mineral (Bio-Oss) with or without the concomitant use of a bilayered collagen barrier (Bio-Gide): A clinical report of immediate and delayed implant placement. Int J Oral Maxillofac Implants 16: 713-721.
18. Cricchio G, Sennerby L, Lundgren S (2011) Sinus bone formation and implant survival after sinus membrane elevation and implant placement: A 1- to 6-year follow-up study. Clin Oral Implants Res 22: 1200-1212.
19. Wen SC, Chan HL, Wang HL (2013) Classification and management of antral septa for maxillary sinus augmentation. Int J Periodontics Restorative Dent 33: 509-517.
20. Schweikert M, Botticelli D, de Oliveira JA, Scala A, Salata LA, et al. (2012) Use of a titanium device in lateral sinus floor elevation: An experimental study in monkeys. Clin Oral Implants Res 23: 100-105.
21. Emmerich D, Att W, Stappert C (2005) Sinus floor elevation using osteotomes: A systematic review and metaanalysis. J Periodontol 76: 1237-1251.
22. Sohn DS, Lee JS, An KM, Choi BJ (2009) Piezoelectric internal sinus elevation (PISE) technique: A new method for internal sinus elevation. Implant Dent 18: 458-463.
23. Karabuda C, Arisan V, Hakan O (2006) Effects of sinus membrane perforations on the success of dental implants placed in the augmented sinus. J Periodontol 77: 1991-1997.
24. Lee JY, Kim YK (2008) Sinus bone graft using minimal invasive crestal approach and simultaneous implant placement: preliminary report. Implantology 12: 4-16.

Copyright: ©2017 Bardul Recani. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.