Acta Scientific Dental Sciences (ISSN: 2581-4893)

Volume 6 Issue 9 September 2022

Case Report

Transcrestal Sinus Lift Approach Employing Osseodensification Concept: A Case Report

Maria Beatriz Schott[1], Lucas Gabriel Carvalho de Souza[1], Eriksson Florêncio[2], João Geraldo Carvalho Fernandes[2], Marcos Flaminio Carlos Junior[2], Bruno Costa Martins de Sá[1], Claudio Ferreira Nóia[1], Sergio Charifker Ribeiro Martins[2], Leandro Lécio de Lima Sousa[2]*, João Carlos Vicente de Barros and Tarcio Hiroshi Ishimine Skiba[1]

[1]Department of Implantology, Dental Study and Research System, Brazil

[2]Department of Implantology and Periodontology RIDGE, Research Implant Dentistry and Graft Expetise and ICS FUNORTE, Brazil

***Corresponding Author:** Tarcio Hiroshi Ishimine Skiba, Department of Implantology, Dental Study and Research System, Brazil.

DOI: 10.31080/ASDS.2022.06.1448

Received: July 15, 2022

Published: August 09, 2022

Abstract

The instalation of dental implants in the partially or totally edentulous posterior maxilla may be an endeavoring procedure due to anatomical limitations, especially imposed by the sinus pneumatization. It is not uncommon the need for augmentation and the golden standard procedure is the sinus lift.

The aim of this paper is to report a case in which such this very procedure was performed based on the osseodensification protocol. The surgical procedure was described in this paper as well as a discussion.

Keywords: Transcrestal; Sinus Lift; Osseodensification

Introduction

The oral rehabilitation has been transformed by the utilization of dental implants as it yields an over 90% success rate [1]. Nonetheless, the partial or total edentulous posterior maxilla may hinder the implant-based rehabilitation since it imposes severe anatomical limitations, caused by the atrophy of the alveolar bone and the pneumatization of the maxillary sinus [2-4].

The maxillary sinuses are a paired structure and comprise one of the paranasal sinuses. They are an anatomical space filled with air and containing a mucoperiosteal membrane, also named schneiderian membrane, in which there is a respiratory epithelium on the cavity side and a periosteum bordered with the bone [5].

The rationale behind the pneumatization process of the maxillary sinus is: the osteoclastic activity of the schneiderian membrane, the positive pressure of the air within the paranasal cavity and the softer, type IV quality of the maxillary osseus tissue [6].

The main surgical strategy to increase the maxillary height in order to properly install the dental implants is the sinus lift technique put together with grafting material [1-7].

Two approaches embrace the sinus lift procedure: The lateral and the crestal window [8].

Regardless of the approach of choice, an amount of grafting material can be Applied: augogen, xenogen, allogen or alloplast. The

aim of the graft is to grant a viable bone to stabilize and osseointegrate the surroundings of the dental implant. The autogenous graft remains the golden standard for such procedure because it provides osteocytes and bone morphogenic protein for bone formation [5].

Concerning the crestal approach, one can perform a surgical window to gain access to the schneiderian membrane [9] or use a set of tools called Summers Osteotomes [7]. Differently from a window, these osteotomes move upwards the crestal bone below the sinus so that the sinusal membrane can be lifted and, with the insertion of grafting material, the augmentation be completed [7].

The sinus lift can also be performed transrectally by men's of osseodensification procedure [7].

The osseodensification technique involves the plastic condensation and deformation of the bone by means of a set of specially designed burs, which were developed to be used in counterclockwise rotation. These burs at the same time prepare the site for dental implant instalation and densifies the surrounding bone. Therefore, they do not cut the bone. Rather, they preserve it by increasing its density [7].

Case Report

A 60-year-old woman was referred for prosthetic rehabilitation. She presented a helpless left superior first molar (Figure 1). Therefore an implant based prosthesis was indicated. Her CT scan revealed periapical lesion and lack of vertical height for implant instalation (Figure 2). The intra and extraoral examination showed no abnormalities and she did not report any comorbidity either.

Figure 1: Left first molar to be removed for implant-based rehabilitation.

Figure 2: CT scan showing extensive decay and vertical deficiency.

The case was planned as it follows: minimally traumatic tooth removal, sinus lift by means of osseodensification burs, alveolar grafting and implant instalation. All these procedures performed in a single surgery under local anesthesia.

She was given 0,12% Chlorexidine rinse preoperatively as well as 1mg Amoxicilyn and 8mg Dexamethasone P.O. 1 hour before surgery. The surgery was performed with Arthicaine 4% and 1:100.000 epinephrine.

The tooth was removed in a minimally traumatic fashion by means of odontossection with 702 handpiece bur (Figure 3) and the periapical lesions were thoroughly curetted (Figure 4 and 5).

Figure 3: Minimally traumatic extraction.

Figure 4: Periapiacal lesions curetted.

Figure 5: Periapical lesions and molar roots.

After that, the osseodensification burs set was employed in a counter clockwise rotation as it follows: 2.0, 2.3, 2.5, 3.0, 3.3 and 3.5. The latter elevated the sinus membrane (Figure 6). The aim of the set was twofold: Create the implant installation site and lift the sinus membrane (Figure 7).

The roots sockets were filled with particulated xenogen graft (Lumina Bone porous small – Criteria) as well as the bottom of the implant installation site. Subsequently a BLX 4.0 X 10 mm Straumann dental implant was installed with a 20 Ncm torque (Figures 8-10).

Next, the whole socket was filled with xenograft material (Figure 11) and an autogen barrier was sutured with a 5-0 PTFE suture at the socket mucosa in order to separate the surgical lieu from the oral cavity. Such autogenous barrier was a free gingival graft harvested from the maxillary tuberosity (Figures 12-15).

Figure 8: Osseodensification bur employed.

Figure 7: Implant installation site with sinusal membrane lifted.

Figure 8: Particulated Xenogen graft (Lumina Bone Porous Small - Criteria).

Figure 9: Insertion of BLX 4.0 X 10 mm Straumann dental implant.

Figure 10: Implant and grafting material inserted in the dental socket.

Figure 11: Whole dental socket filled with xenograft.

Figure 12: Free gingival graft being harvested from the maxillary tuberosity.

Figure 13: Free gingival graft.

Figure 14: Free gingival graft used as an autogenous barrier to protect the surgical site.

Figure 15: Autogenous membrane sutured with PTFE sutures at the socket mucosa.

The surgical procedure evolved without complications and the implant-based crown was set six months later (Figures 16-18).

Figure 16: Post operative sinus lifting CT Scan.

Figure 17: Abutment installed six months post operatively.

Figure 18: Screw retained crown as implant based prothesis.

Discussion

The lateral window sinus lift technique was first published in 1980 by Boyne and James. Six years later, Tatum reported his surgical technique, which was mentioned in 1977, during a lecture[10]. Within this approach there is a possibility to increase greater than 9 milimeters the height of the vertical maxillary bone [11].

The most common complication of this procedure is the perforation of the Schneiderian membrane, with occurrence from 22 to 44% trans operatively, namely those with septa [8]. These perforations may lead to sinusitis, antral extrusion of the grating material, pain, swelling, ecchymosis and local infection [5]. Besides, there is a risk of bleeding during the preparation of the lateral wall and also donor site morbidity, in case of harvesting autogenous graft [8].

Other disadvantages include need of specialized tools, high costs and time-consuming procedure, as patience and time are required from the surgeon in order to avoid membrane perforation [7].

The transcrestal osteotome lift technique, or summers technique was reported in 1994 by Dr Summers and is considered to be less invasive than the lateral window procedure. Its indication is for alveolar ridges which vertical height ranges from 5 to 10 millimeters. A set of 4 or 5 osteotomes are mandatory for such technique. As complications one may include pain, swelling, edema, sinusitis and morbidity of the grafting biomaterial [7].

A new concept of implant preparation called osseodensificaton technique was developed by Huwais and reported in 2013. The

author created a series of burs that instead of cutting bone, they preserve and condensate the surrounding bone of the osteomy site. Differently from them, the standard burs cut and substract bone whereas osteotomes may create fractures of the surrounding bone, leading to a longer remodeling time and hindering implant stability [12].

A slow plastic modelation of the bone at the preparation site takes place during the use of the condensation burs set [12].

As an advantage of preserving the surrounding bone during osteotomy, the primary stability of the dental implant is enhanced, consequently increasing the success rate of the osseointegration [4].

The usual osteotomy protocol can be assessed as a subtractive surgery since it removes bone tissue from the dental implant preparation lieu, whereas in the osseodensification protocol the bone is compacted and shaped in order to favor the implant installation [13].

The ossification burs can also be employed in cases of sinus lift because as the osteotomy site is prepared, there is a compaction of the autogenous bone at the apical end leading to a soft sinus lifting [4].

As it precludes the need for a grafting material, this kind of procedure can be considered a minimally invasive sinus lift technique [4].

One should notice that the osseodensification protocol lifts the sinus up to 3 mm. If an additional gain is necessary, the practitioner should gently insert grafting material into the osteotomy site and then apply the burs, so that at the end of the surgery an additional 2mm vertical height will be obtained [7].

Conclusion

The Osseo densification protocol has proven to be an importance allied in the practitioner´s routine, as it increases the primary stability and the rate of success in implant-based rehabilitation cases. Moreover, it can be applied successfully in cases of sinus lift procedures, because in many cases the grafting insertion is unnecessary; decreases the odds of schneiderian membrane perforation and is time saver since only one surgery is necessary for implant installation and augmentation. Hence, the likelihood of complications like bleeding, sinusitis, graft exposure, edema and ecchymosis diminish manyfold.

Based on these facts, one can state that the Osseo densification-based sinus lift is a predictable and minimally invasive surgical technique.

Bibliography

1. Padhye NM., *et al.* "Osseodensification-a systematic review and qualitative analysis of published literature". *Journal of Oral Biology and Craniofacial Research* 10.1 (2000): 375-380.
2. L de., *et al.* "Maxillary sinus lift surgery-with or without graft material? A systematic review". *International Journal of Oral and Maxillofacial Surgery*.12 (2016): 1570-1576.
3. Raghoebar GM., *et al.* "Long-term effectiveness of maxillary sinus floor augmentation: A systematic review and meta-analysis". *Journal of Clinical Periodontology* 46.21 (2019): 307-318.
4. Rodda A., *et al.* "Implant Placement Post Maxillary Sinus Lift Using Osseodensification Concept: A Case Report". *Cureus* 14.1 (2022): e21756.
5. Stern A and Green J. "Sinus Lift Procedures: An Overview of Current Techniques". *Dental Clinics of North America* 56 (2012): 219-233.
6. Mohan N., *et al.* "Maxillary Sinus Augmentation". *Dental Clinics of North America* 59.2 (2015): 375-388.
7. Bhalla N and Dym H. "Update on Maxillary Sinus Augmentation". *Dental Clinics of North America* 65 (2021): 197-210.
8. Danesh-Sani AS., *et al.* "A comprehensive clinical review of maxillary sinus floor elevation: anatomy, techniques, biomaterials and complications". *British Journal of Oral and Maxillofacial Surgery* 54.7 (2016): 724-730.
9. Soardi CM., *et al.* "Crestal Window Sinus Elevation and Its Long-Term Clinical Outcomes". *International Journal of Periodontics and Restorative Dentistry* 40.5 (2020): 757-764.
10. Wanaga J., *et al.* "Revisiting major anatomical risk factors of maxillary sinus lift and soft tissue graft harvesting for dental implant surgeons". *Surgical and Radiologic Anatomy* 42 (2020): 1025-1031.

11. Al-Dajani M. "Recent Trends in Sinus Lift Surgery and Their Clinical Implications". *Clinical Implant Dentistry and Related Research* 18.1 (2016): 204-212.

12. Pai UY., *et al.* "Osseodensification - A novel approach in implant dentistry". *The Journal of Indian Prosthodontic Society* 18 (2018): 196-200.

13. Inchingolo AD., *et al.* "The Effectiveness of Osseodensification Drilling Protocol for Implant Site Osteotomy: A Systematic Review of the Literature and Meta-Analysis". *Materials* 14 (2021): 1147.