OPEN ACCESS
Saudi Journal of Oral and Dental Research
Abbreviated Key Title: Saudi J Oral Dent Res
ISSN 2518-1300 (Print) |ISSN 2518-1297 (Online)
Scholars Middle East Publishers, Dubai, United Arab Emirates
Journal homepage: http://scholarsmepub.com/sjodr/

Original Research Article

Hard Tissue Management: Mucoperiosteal-Bone Flap Splitting

Xiao-Quan Mao*, Pei-Qing Zhang, Lin Lei

Department of Implantology, Stomatology Center, Affiliated Haikou Hospital of Central South University Xiangya Medical School, China

DOI:10.21276/sjodr.2019.4.6.17 | **Received:** 12.06.2019 | **Accepted:** 25.06.2019 | **Published:** 30.06.2019
***Corresponding author:** Xiao-Quan Mao

Abstract

Purpose*:** To investigate the effect of using mucoperiosteal-bone flap split technique when width of alveolar bone ridge is insufficient. ***Methods: The width of alveolar bone ridge is 3-5mm. Patients underwent mucoperiosteal-bone flap splitting. A horizontal incision was made at the top of the alveolar ridge, and two vertical incisions at the mesio-distal alveolar bone, and the whole layer of the periosteum was cut through. The cortical bone was cut using an ultrasonic scalpel. As a result, the mucoperiosteal-bone flap was split**.** ***Results:*** The narrow alveolar bone was succeeded to be split. And gingiva was not recessionary, split bone was not necrotic after operation. ***Conclusion*:** Mucoperiosteal-bone flap split technique can solve the problem of insufficient bone width.

Keywords: Hard tissues; mucoperiosteal-bone flap split; implantology.

INTRODUCTION

Dental implants are being increasingly applied in the restoration of partially and completely edentulous patients. Often, in these patients, soft and hard tissues defect result from a variety of causes, such as periodontal infection, trauma, and tooth loss. These lead to less an anatomically favourable foundation for ideal implant placement. For prosthetic-driven dental implant therapy, reconstruction of the alveolar bone, through a variety of regenerative surgical procedures has become predicted [1].

Cases and Methods

General Data

Cases were accepted in the Department of Implantology, Stomatology Center, Affiliated Haikou Hospital of Central South University Xiangya Medical School ranging from October 2015 to December 2016, the average age of them is 35 years (range 18~56 years old). Material: OSSTEM TSIII implants (osstem trading company, South Korea), Bicon (trading company, USA) Bio-Oss (bone geistlich Trading Co. Ltd., Switzerland).

Inclusion Criteria

- The width of ridge is 3-5mm. the patient was found to have a horizontal bone loss and a coronal ridge width of 3 -5mm.
- Occlusal relationship is normal.
- Gingiva is normal.
- Patients can maintain good oral hygiene.
- Periodontitis can be controlled.

Exclusion Criteria

- Patients are found contraindication (systemic disease or medical history that could negatively influence surgery and healing).
- Acute and/or chronic inflammation of adjacent teeth.
- Vertical height of alveolar bone is seriously insufficient.
- Patients do not agree with mucoperiosteal-bone splitting technique.

METHODS

Preoperative examination and design of diagnosed. The basic situation of the ridge was examination, the risk of aesthetics was assessed and oral health education was carrying out. Conventional shooting CBCT can determine the correct three-dimensional position (See Figure-1). According to the specific circumstances of the patient to develop a program to explain the communication with the patient and to sign the operation informed consent.

Immediate implantation of preoperative chlorhexidine gargle, conventional disinfection shop towels then nerve block and infiltration anesthesia were given in relevant to region with 2% Xylocaine with 1:80,000 adrenaline.

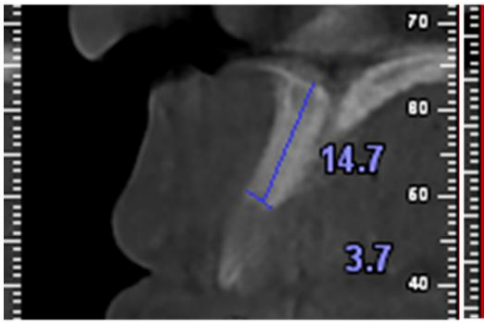

Fig-1: Preoperative CBCT

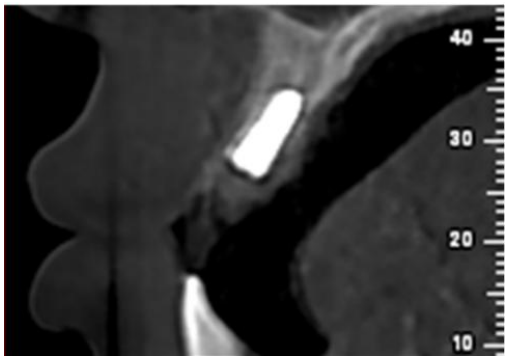

Fig-2: Postoperative CBCT

Fig-3: Preoperative design

Fig-4: Maxillary implant

Fig-5: Suture

Fig-6: Splitting bone

Fig-7: After splitting

Fig-8: Mandible implant

Table-1: Sociodemographic and clinical characteristics of the participants

	Age	18-56
Sociodemographic	Sex	Any
	Profession	Any
	Time	October2015 - December 2016
	Followed up	3months-1year
	Agreement	Signed
Clinical	Width of ridge	3-5mm
	Occlusal relationship	Normal
	Gingiva	Normal
	Oral hygiene	Good
	Contraindication	No
	Inflammation	No
	Height of alveolar bone	Normal

Preparation of mucoperiosteal-bone flap. A horizontal direction was made at the top of the alveolar ridge, and two vertical incisions were made at the mesio-distal edge of the alveolar bone, and the whole layer of the periosteum was incised. The cortical layer of the bone was cut through using an ultrasonic scalpel (See Figure 3, 4 & 8). The bone plate was gradually split in horizontal incision using a chisel but periosteum was still attached to the bone plate. When width of the gap on the alveolar ridge was bigger than 2mm, Bio-Oss was used between the labial-buccal or/and lingual bone plate. Some healing was used non-submerged healing abutment or a temporary abutment when the initial stability was enough (final torque is greater than 35N-cm). The other was submerged healing and to use screws (See Figure 5 & 6). The soft tissue flap was repositioned and sutured with 3-0 black silk (See Figure-7).

To confirm the position and direction with CBCT chip (See Figure-2). Then the patient was asked to maintain oral hygiene, chlorhexidine gargle 1 week. Postoperative instructions were given. Amoxicillin 500 mg t.i.d and Metronidazole 400 mg t.i.d were given for five days. Necessary oral pain-killer tablets about 1 week after the operation.

Second stage was operated 3 months later. Cover screws (OSSTEM TSIII) or rubber plug (Bicon) was removed and replaced with the healing abutment.

The final restoration. When bone formation showed good osseointegration after surgery, the final impression was done for permanent restoration.

Efficacy Evaluation

- The gingiva did not recess;
- The hard tissue was not absorbed, infected or necrotic.

DISCUSSION

Successful implant therapy is dependent upon an adequate volume of bone at the position of the implant placement, as the long-term prognosis of dental implant is adversely affected by inadequate bone volume [2, 3]. Many different techniques are available for alveolar bone reconstruction, it can be obtained by means of different surgical procedures, including autogenous blocks harvested from intraoral or extraoral donor sites [4], guided bone regeneration (GBR), ridge splitting or expansion techniques [5], and distraction osteogenesis [6].

The traditional method to increase the alveolar bone width is effective [7], but it is easy to cause alveolar bone fracture, necrosis and absorption [8]. The recipient site was then prepared with a trapezoidal full thickness flap with the bone exposed. On the other hand, thin tissue biotype might be associated with a lack of keratinized mucosa and increased risk of mucosal recession together with unsatisfactory aesthetic outcomes because blood supply was decreased and the periosteum-attach-to the bone has been broken. Such resorption rate prompted the use of combined epithelialized-subepithelial grafts for augmenting the keratinized mucosa around implants. Therefore there has been proposed that delayed bone splitting to solve these problems. The delayed bone splitting technique perform two operations, first time the full flap was made so as to make rectangular incision and cut through the cortical bone in the implant area, after 4 to 6 weeks of healing, the operation was performed for second time, the operation retained mucoperiosteal flap of split bone plate [9] in order to keep blood supply and prevent resorption of alveolar bone.

The rationale is based on a vascularization of the connective tissue, which has received a flow of plasma and ingrowth of capillaries from the surrounding connective tissue. Then it forms a three-dimensional mucoperiosteal capillary traffic network at the same time [10].

This study used a mucoperiosteal-bone flap splitting, and the full thickness flap was not peeled, horizontal incision and two vertical incisions in mucous membrane, cortical layer was cut through in the three incisions and then the bone was split. The advantages were that the periosteum can still be attached to the

bone and it can guarantee the blood supply in the split bone. What is more, it can reduce gingival recession after surgery, especially thin gingival type gums, as a result, aesthetic effect can be ensured maximally.

ACKNOWLEDGEMENT

Supported by Key projects of Haikou science and Industry Information Bureau (2015-029)

REFERENCES

1. Gita, V. B., & Chandrasekaran, S. C. (2011). Hard and soft tissue augmentation to enhance implant predictability and esthetics:'The perio-esthetic approach'. *Journal of Indian Society of Periodontology*, *15*(1), 59-63.
2. Sohn, D. S., Lee, H. J., Heo, J. U., Moon, J. W., Park, I. S., & Romanos, G. E. (2010). Immediate and delayed lateral ridge expansion technique in the atrophic posterior mandibular ridge. *Journal of Oral and Maxillofacial Surgery*, *68*(9), 2283-2290.
3. Anitua, E., Begoña, L., & Orive, G. (2012). Controlled ridge expansion using a two-stage split-crest technique with ultrasonic bone surgery. *Implant dentistry*, *21*(3), 163-170.
4. Nkenke, E., Schultze- Mosgau, S., Kloss, F., Neukam, F. W., & Radespiel- Tröger, M. (2001). Morbidity of harvesting of chin grafts: a prospective study. *Clinical Oral Implants Research*, *12*(5), 495-502.
5. 5、Milinkovic, L. Cordaro, "Are there specific indications for the different alveolar bone augmentation procedures for implant placement? A systematic review," International Journal of Oral and Maxillofacial Surgery. 2014,43 (5) : 606–625.
6. Laster, Z., Rachmiel, A., & Jensen, O. T. (2005). Alveolar width distraction osteogenesis for early implant placement. *Journal of oral and maxillofacial surgery*, *63*(12), 1724-1730.
7. Maiorana, C., Andreoni, D., & Poli, P. P. (2016). Hard and Soft Tissue Management of a Localized Alveolar Ridge Atrophy with Autogenous Sources and Biomaterials: A Challenging Clinical Case. *Case reports in dentistry*, *2016*.
8. Enislidis, G., Wittwer, G., & Ewers, R. (2006). Preliminary report on a staged ridge splitting technique for implant placement in the mandible: a technical note. *International Journal of Oral & Maxillofacial Implants*, *21*(3):445-449.
9. Xiong, H., & Xie, Z. (2015). Application of alveolar bone splitting in dental implant. *Journal of Clinical Stomatology*, 31(1), 51-52.
10. Xie, Z., & Xiao, X. (2014). Application of maxillary bone splitting technique to increase bone width in narrow alveolar ridge. *International Journal of Stomatology*, 41(4):373-377.