Socket preservation

Caecilia S.W.N, Ira Komara

Department of Periodontics Faculty of Dentistry Universitas Padjadjaran

ABSTRACT

Alveolar ridge will commonly decrease in volume and change morphologically, as a result of a tooth loss. These changes are usually clinically significant and can make placement of a conventional protesa or an implant more difficult. Socket preservation after tooth extraction can minimize ridge resorption. By using socket preservation techniques, it is possible to preserve the height and width of the ridge. Socket preservation can be done by atraumatic tooth extraction, placement of bone graft material, membrane, combination of bone graft and membrane, and connective tissue graf.

Key words: alveolar ridge, residual ridge resorption, socket preservation, graft.

ABSTRAK

Alveolar ridge biasanya mengalami penurunan volume dan perubahan bentuk sebagai akibat dari hilangnya gigi. Perubahan tersebut biasanya signifikan dan dapat membuat penempatan dari protesa konvensional atau implan menjadi sulit. Preservasi soket setelah pencabutan gigi dapat meminimalisasi resorpsi ridge. Dengan teknik preservasi soket, dapat memungkinkan untuk mempertahankan tinggi dan lebar dari ridge. Preservasi soket dapat dilakukan dengan pencabutan atraumatik, pemakaian bone graft, membran, kombinasi bone graft dan membran serta connective tissue graft.

***Kata kunci**: alveolar ridge, resorpsi residual ridge, preservasi soket, graft.*

Correspondence author: Caecilia, Department of periodontic Faculty of Dentistry Universitas Padjadjaran
Jl. Sekeloa Selatan No. 1 Bandung, West Java-Indonesia, Tel./Fax: +6222-2504985/2532805. Email:landosisil@gmail.com

INTRODUCTION

Alveolar bone is part of the maxillary and mandibular that shape and support the tooth socket. Alveolar bone is formed when the tooth erupts through the process of ossification, bone to provide attachment of the periodontal ligament.[1] Lack of bone dimensions, especially the width of the alveolar ridge on the buccal area endentulous further affect the treatment plan. Currently, the demand for implant placement has been very high in society. If significant bone resorption, the implant placement can be a difficult treatment after revocation because the rest of the alveolar ridge is minimal then it will be hard to find a place that meets the aesthetic and functional criteria for implant.[2]

This paper discusses the prevention of alveolar bone resorption after tooth extraction with or without the use of regenerative materials that aim to maintain the dimensions of the socket and allows the dentist to place the prosthesis or implant with a good aesthetic.

LITERATURE REVIEW

Alveolar bone can be changed for various reasons, among others: the pathological changes of chronic periodontitis, trauma (including tooth extraction), developmental disorders (cleft palate), tooth loss in the long term, the mechanical effect of the alveolar crest bone upper and lower jaw and forms tooth.[2]

Alveolar bone resorption or residual ridge resorption is a term used to describe changes that occur in the alveolar after tooth extraction and the process will continue even after healing of sockets. Resorption after tooth loss showed a predictable pattern. The maximum level ridge size reduction occurred in the first 3 months and then gradually tapers off. However, the activity of bone resorption continues throughout life at a slower rate, which resulted in the loss of a varying number of jaw structure. Height and width of the bone changes after the loss of teeth.[2,3]

Recent research showed greater loss of alveolar width than height of alveolar. This was due to anatomic, prosthetic, metabolic, functional, genetic and iatrogenic factors. Changes in the hard and soft tissue occurred in the first 3 months. Major changes occur within 12 months with an average reduction of 50% of the width of the alveolar ridge, approximately 6.1 mm resorption average of 2.7 to 12.2 mm, where it ranges from 3.8 mm 2/3 arises at 12 weeks first. In the premolar region reported changes in alveolar ridge width of about 4.9 mm, 3.1 mm which occurs in the first 12 weeks. The study reported that the reduction in alveolar ridge horizontal larger (3.79 mm) compared to vertical alveolar bone (1.24 mm on the buccal, 0.84 mm and 0.80 mm in the mesial distal) in the sixth month. Resorption (changes) in the mandible about 4 times greater than in the maxilla.[3]

Socket preservation is all procedures performed at the time of revocation is useful minimize external ridge resorption and bone formation in maximizing the socket, which aims to preserve and maintain the dimensions of the alveolar ridge after tooth extraction. It is very important to minimize the ridge resorption in the aesthetic zone. Expected with socket preservation of new bone remodeling. However, there are clinical situations where not recommended for ridge preservation at the time of revocation (eg. in acute infection).[4]

Benefits of socket preservation include: minimizing the amount of decrease of alveolar bone after revocation, prepare an area for placing the implant at a later date, effective, painless, improve esthetic anterior region in particular, faster bone regeneration, and prevent ridge augmentation surgical procedure.[3,5]

Indication of socket preservation, among others: the area where the bone buccal area of less than 1.5-2 mm (usually in the anterior or aesthetic zone), in areas where there has been damage the socket wall, where there is damage to the buccal area at the time of healing, in areas in which to maintain bone volume minimizing risks include anatomical structures such as the maxillary or mandibular posterior, where the maxillary sinus or the inferior alveolar nerve can be complications if the bone quickly reduced, in patients with high aesthetic demands such a high lip line or vulnerable to recession, thin biotype, in patients with tooth extraction and preservation ridge that much important for subsequent restoration.[4,5]

Contraindications of socket preservation is in the case of acute infection, the patient's medical

condition does not allow surgery, does not need the addition of bone volume and socket healing can produce good ridge morphology. Patients must agree to all the procedures and briefed about the source material of the material to be used.[4,5]

Here are some methods which in principle is the preservation of the socket, which is atraumatic tooth extraction, the use of bone graft, use of barrier membranes, the use of bone graft and membrane, implant placement, the use of connective tissue graft.[5]

1. Extraction of teeth with minimal trauma

Socket preservation begins with tooth extraction without trauma that can minimize trauma to hard and soft tissue around teeth removed. To minimize trauma when the extraction, we can use periotome to loosen the soft tissue at the top of the bone, periodontal fiber cut and separate the bone from the teeth. Periotome inserted into the periodontal ligament fibers to decide coronal section so as to make the teeth become loose and the teeth may come out gradually. At the root of the tooth with more than one, can be done cutting the roots and removed one by one.[4,6,7]

Figure 1. Anterior tooth extraction with minimal trauma.[4]

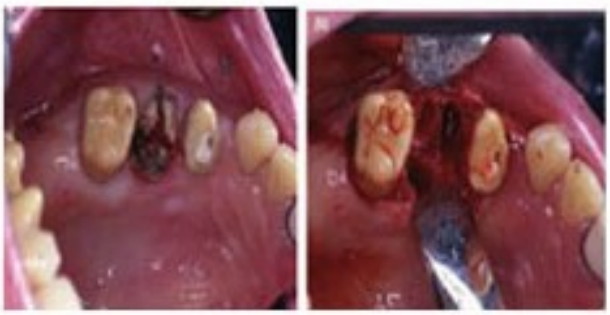


Figure 2. Posterior tooth extraction with minimal trauma .[4]

After tooth extraction, the tissues are damaged, do debridement is useful for cleaning the socket of everything that can inhibit healing. Remnants of these fragments must be cleaned thoroughly with periapical curette or excavators.[6,7]

2. Using bone graft

The goal is to repair a defect caused by deprivation, illness, accidents, or anomalies of growth and development. With bone graft expected no clinical improvement in periodontal bone. Bone graft is used to maintain the room under the membrane is needed for the formation of new bone. Many graft materials are available, with a range of biological properties. Bone graft have osteoinductive properties, osteoconductive, and osteogenic.[3,4,7]

Figure 3. The use of bone graft for socket preservation.[7]

3. Using membran

The role of the membrane is to protect the blood clot, keeping the space for the formation of new bone in the socket and prevents the cells of epithelial tissue and connective tissue of the gingiva to migrate to the apical region. If the socket is added membrane, so that the periodontal ligament and alveolar bone underneath can regenerate perfectly and will add a significant dimension of the alveolar bone compared to the socket without the use of a membrane.[8]

The membrane should be biocompatibility, can be a resorbable membrane or non-resorbable. Membranes were first used for GBR is a non-resorbable membrane ePTFE (expanded polytetrafluoroethylene), Gore-Tex, Gore Medical,

Flagstaff, Ariz, which is considered the "gold standard" compared with other membranes. Advantages of a non-resorbable membrane, among others, easily attached to the titanium material, many studies showing successes, remain intact until the process is taken back, bone formation in large numbers if the membrane is not exposed responses.[2]

However, a shortage of ePTFE membranes are such membranes have the potential to inhibit the healing potential and contaminated with bacteria in the mouth. In addition, a second surgery is needed to pick it up.[2]

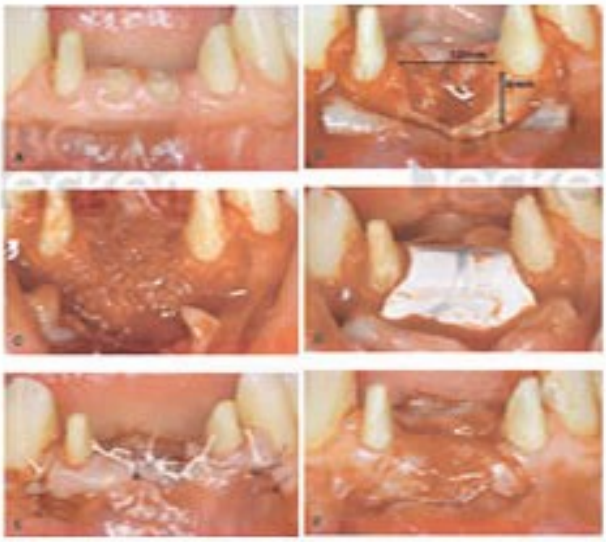
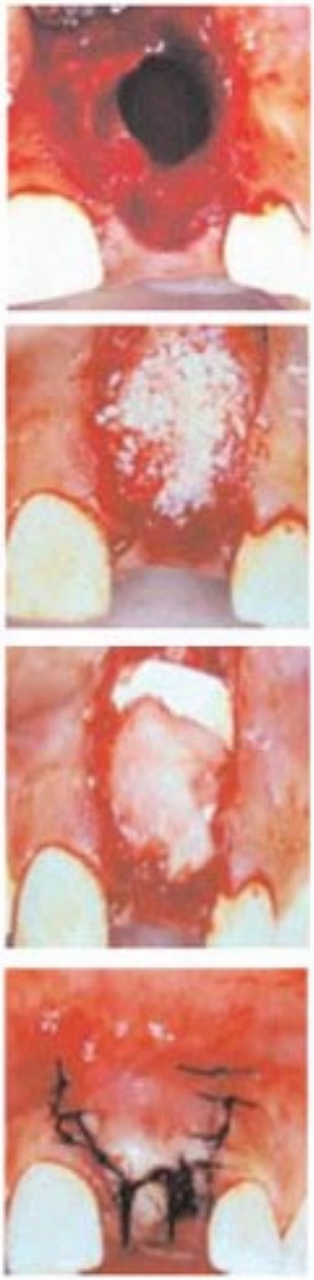


Figure 4. The use of membranes for socket preservation .[3]

Bioabsorable membrane is an effective and can achieve the maximum regeneration, is more effective because it does not require surgical removal and lower costs as well as the nature biokompatibiltas. Loss of membrane bioabsorable among others, is a sensitive technique, tissue inflammation can occur that can interfere with bone formation. Examples of bioabsorbable membrane among others Neomen (bovine collagen matrix; Citagenix Inc., Laval, Que), Bio-Gide (porcine collagen matrix; Geistlich AG, Wolhusen, Switzerland), Ossix (cross-linked collagen barrier; Implant Innovation Inc., Palm Beach Gardens, Fla). Resorbable membrane has the potential to support bone formation when combined with bone graft.[2]

4. Using bone graft and membrane

Several studies have investigated the use of bone graft and membrane tetracycline hydrated freeze dried bone allograft and a resorbable membrane (Bio-Mend). At DFDBA use combined with collagen membrane then decreased alveolar ridge width of 9.2 mm to 8.0 mm, while the socket website heal naturally decline from 9.1 mm to 6.4 mm.[2]



1. Extraction Socket after torough debridement. Note that a full thickness gingival flap was reflected with divergent vertical incisions the interdental papilae were preserved as much as possible.
2. Bio Oss Bovine bone graft partioles in extraction socket.
3. Bio Gide resorbable membrane adapted to fit over the bone graft.
4. Periosteal releasing incisions were mmade and the gingival flap was ooronally advanced to acieve tension free primary closure.

Figure 5. The use of bone graft and membrane.[3]

5. Using implants

After tooth extraction can be performed implant immediately (immediate). In 1991, Barzilay et al. stating that the immediate implant placement may reduce alveolar ridge resorption during the early healing process of the socket.[3]

Implant in the socket after tooth extraction is a type of implant 1, implants placed 4-8 weeks after tooth extraction (implant type 2), implants placed after 12-16 weeks into the socket with bone healing rudimentary (implant type 3) , delayed implant installation in areas that have been cleared completely> of 6 months (implant type 4). The use of bone graft in the placement of implants in type 2 and 3 provide better results in the hard tissue and does not cause complications that are too complicated compared with the procedure of type 4.[3]

Figure 6. Healing of the implant socket with or without the use of graft material .[3]

6. Using connective tissue graft

The use of connective tissue graft to cover the socket after revocation aims to minimize the shrinkage of soft tissues, resulting in optimal esthetic implant, as well as gain closure to prevent bacterial infection and graft failure.[3]

Gambar 7. Preservation socket with connective tissue graft. A. The initial view before tooth 6 is revoked; B. Revocation atraumatic teeth; C. The area that shows a lack of bone in buccal; D. DFDBA placed in the socket; E. connective tissue graft is placed to hold the bone graft and add buccal; F. flap coronally position for closing the socket; G. Final prosthetic; H. Evaluation estetik.[5]

DISCUSSION

Tooth extraction can be caused by caries, trauma or periodontal disease and healing socket generally cause changes of alveolar bone in between the reduced height and width of alveolar. The largest in the buccal resorption jaw, because the margin of thin facial alveoli, more cortical, and brittle. Healing patterns can cause problems in terms of esteik for the manufacture of conventional and implant dentures.[2]

To minimize problems,we can do procedure socket preservation. Socket preservation is defined as the treatment of alveolar ridge dimension after the extraction of teeth. Socket preservation can be done by keeping the facial plate on alveolar bone and filling the socket with bone filler material.

To maximize the regeneration and minimize boneresorption, atraumatic tooth extraction should be carried out without opening the gingival flap and using periotome. Periotome useful to separate the periodontal ligament around the tooth corona and should not be used as an elevator. After the revocation, needs to be done debridement with a curette. The rest of the periodontal ligament is removed from the wall socket. The process aims to improve the vascularization in the socket.[6]

After removal, bone graft can be inserted into the socket. Graft materials that are used should biocompatibility, supporting the growth of bone and resorbable. Graft should be able to support the formation of vital bone in the socket to help the process of osseointegration of the implant. The nature of graft among others, osteogenic, osteoinduction, and osteokonduksi.[6]

First use of the membrane by using polytetrafluoroethylene (PTFE) which requires the closure of primary and second surgical process. Characteristics of an ideal membrane include biocompatibility, has durability of materials exposed to the outside, and has a good quality. The combined use of bone graft and membrane will deliver better results. Graft is inserted into the socket and then covered with a membrane. The flap is closed then do the sewing interrupted.[6]

The use of connective tissue graft can help optimize healing and volume of bone and soft tissue. Satisfactory results may be obtained by using such graft. The use of connective tissue graft requires a second surgical procedure that can cause discomfort to patients.[8]

CONCLUSION

Alveolar bone resorption is a term used to describe changes that occur in the alveolar after tooth loss. Socket preservation is a procedure that aims to preserve and maintain the dimensions of the alveolar ridge after tooth extraction. It is very important to minimize the ridge resorption in the aesthetic zone. Some socket preservation technique is based on the principles of bone regeneration or tissue such as the lifting of the trauma seminimal possible, the use of soft and hard tissue graft teeth, the use of membranes, as well as the placement of the implant as soon as possible.

REFFERENCES

1. Carranza FA, Rapley JW, Haake SK. Clinical of periodontology. 10th ed. Philadhelphia. WB Saunders.;2006.
2. Irinakis T. Rationale for socket preservation after extraction of a single-rooted tooth when planning for future implant placement. J Can Dent Assoc; 2006;72(10).
3. Giorgio P, Gaia P, William V, Giannobile, Giulio R. Review Article: Postextraction Alveolar ridge preservation: Biological basic and treatments. Intern J Dent. 2012.
4. Darby I, Chen S, De Poi R. Ridge Preservation: what is it and when should it be considered, Austr Dent J. 2008.
5. Cohen ES. Atlas of cosmetic and reconstructive periodontal surgery 3rd ed. Hamilton. BC Decker.2007.
6. Meyer MD. Management of the extraction socket: site preservation prior to implant placement. Austral dent pract. 2008.
7. Douglass G. Socket preservation techniques. dent AEGIS. 2006.2
8. Marius K, Ricardas K, Alvydas G, The preservation of alveolar bone ridge during tooth extraction. Stomatologija, 2012.