



ISSN Print: 2394-7489
ISSN Online: 2394-7497
IJADS 2019; 5(2): 462-466
© 2019 IJADS
www.oraljournal.com
Received: 01-02-2019
Accepted: 03-03-2019

Marcela de la Garza-Chapa
Student in Periodontics
Program, School of Dentistry,
Universidad Autónoma de
Nuevo León, Monterrey, Nuevo
León, México

Gloria Martínez-Sandoval
Graduate Periodontics Program,
School of Dentistry, Universidad
Autónoma de Nuevo León,
Monterrey, Nuevo León, México

María Gabriela Chapa-Arizpe
Graduate Periodontics Program,
School of Dentistry, Universidad
Autónoma de Nuevo León,
Monterrey, Nuevo León, México

Jesús Israel Rodríguez-Pulido
Graduate Periodontics Program,
School of Dentistry, Universidad
Autónoma de Nuevo León,
Monterrey, Nuevo León, México

Marianela Garza-Enríquez
Graduate Periodontics Program,
School of Dentistry, Universidad
Autónoma de Nuevo León,
Monterrey, Nuevo León, México

Correspondence

Marcela de la Garza-Chapa
Student in Periodontics
Program, School of Dentistry,
Universidad Autónoma de
Nuevo León, Monterrey, Nuevo
León, México

Diagnosis, management and preservation techniques of the alveolar ridge: Literature review

Marcela de la Garza-Chapa, Marianela Garza-Enríquez, Gloria Martínez-Sandoval, María Gabriela Chapa-Arizpe and Jesús Israel Rodríguez-Pulido

Abstract

At the time of extraction, the buccal surface is the most affected part of the bone that tends to reabsorb both horizontally and vertically. It is defined as "alveolar preservation", to the procedure that is performed at the time of extraction and allows to preserve dimensions and alveolar contours.

Objective: To analyze the literature of great importance on alveolar preservation, as well as alveolar reabsorption, atraumatic extraction, bone grafting and techniques.

Methods: A search was made in Pubmed, Medline y EBSCO databases. The terms "alveolar reabsorption", "atraumatic extraction", "bone graft", "techniques", in combination with the words "alveolar ridge" and "preservation" were used.

Results: Alveolar resorption can be really detrimental at the time of implant placement. Preservation of the vestibular wall during dental extraction can be achieved with an atraumatic technique, a minimally invasive procedure. The use of bone grafts is of great help at the time of alveolar preservation. It will totally depend on the case to be treated which technique is most appropriate for the increase of volume of the edentulous area, so the case has to be evaluated and diagnosed in an integral manner.

Conclusion: The preservation of the alveolar bridge has proven to be an excellent alternative in periodontal therapy which has shown favorable results to allow a good future restoration.

Keywords: Bone graft, techniques, alveolar ridge, atraumatic extraction

1. Introduction

When performing a dental extraction, a series of biological changes occur that lead to a reabsorption and atrophy of the alveolar ridge, which causes changes in all its dimensions [1], where 50% of the reabsorption occurs the first year after extraction, compromising the placement of implants [2].

Currently, alveolar ridge atrophy represents one of the greatest problems for the periodontist when planning a dental implant, since bone volume is compromised to achieve primary stability [3], an adequate anchorage and the ideal position, limiting the desired three-dimensionality [4]. Alveolar preservation is any procedure that is performed at the time of extraction and allows conserve alveolar dimensions and contours [5].

The alveolar crest preservation techniques are aimed at reducing resorption after dental extraction⁶. Several studies show that alveolar preservation helps to minimize dimensional changes after a tooth extraction [7]. In this way, it is believed that biomaterials used after an extraction play an important role for bone formation, preserving the alveolar bridge's contour for subsequent implant placement [8].

At present, there are different alveolar preservation techniques to reduce or even prevent alveolar ridge deformities, such as Biocol and Bartee, which have worked a lot to prevent as much as possible possible changes when removing a tooth. However, the operator must make an accurate diagnosis with the help of diagnostic tools to choose biomaterials and techniques that help reduce alveolar reabsorption when opting for a preservation of the flange [9].

The aim of the present study is to conduct a literature review on the diagnosis, surgical management, selection of biomaterials, as well as the different techniques of alveolar preservation.

2. Methods

A search was made in Pubmed, Medline y EBSCO databases. The terms "alveolar reabsorption", "atraumatic extraction", "bone graft", "techniques", in combination with the words "alveolar ridge" and "preservation" were used.

3. Literature review

3.1 Bone Resorption

Post-extraction resorption occurs at the moment when a tooth is lost and a process of atrophy is stimulated, which manifests itself in a gradual reabsorption of the alveolar process. Such resorption occurs differently in the upper jaw than in the lower jaw¹⁰. In the maxillary teeth, the vestibular cortex is extremely thin, which worsens deformities of the alveolar ridge at the time of extraction and scarring of the alveolus^[11, 12].

When cortical bone is destroyed during extraction or due to other causes such as fractures, injuries^[13], periodontal disease, its result will result in atrophy of the alveolar crest and a collapse of soft tissues^[14, 15]. Allen classifies bone defects according to their magnitude:

Mild when it has less than 3 mm of bone loss, moderate between 3 and 6 mm of bone loss and severe in those cases with more than 6 mm of bone loss^[16].

Abrams H, Kopczyk R and Kaplan Alan, found that after the loss of anterior teeth, alveolar ridge deformities occur with an incidence of 91% varying in location, anatomy and severity, with the most prevalent class III or combined defect (55.8%)^[17]. This type of defect is the most difficult to treat because tissue is lost in height and width. The defect that occupies second place in prevalence is class I or lip-lingual deformity (32.3%). This is perhaps the simplest to treat, and that currently there are different procedures that can return to the edge its width loss. Class II defects, where there is only loss of height, are the least common, since they occur most of the time in combination with tissue loss in width^[18].

The dimensional changes of the alveolar ridge will be varied depending on the case and the factors of why the tooth has a poor prognosis; so it is necessary to take into account that both bone can be lost at the time of extraction and what is the future of that edentulous space since they can be handled with different graft materials and surgical procedures reported in the literature^[19].

3.2 Definition and Description of Bone Resorption After a Dental Extraction

Currently in the field of dentistry has become very important to study the healing process of the alveolus followed by an extraction due to a series of events and changes both physical and biological in the alveolus and its surroundings, which can be difficult the aesthetics of this zone once it is necessary to restore^[20].

The alveolar process is defined as the bone that surrounds an erupted tooth; and below this alveolar bone is the basal bone in both the upper and lower jaw^[21].

Cardaropoli *et al*, in 2003, in a study with dogs, analyzed the tissues around an alveolus after extraction and it could be observed that immediately after this act the hard lamina showed remains of the periodontal ligament, and the Sharpey fibers were found dispersed in the clot, this inflammatory reaction stimulates the recruitment of granulation tissue^[22].

3.3 Histology, Mechanisms and Times of Cicatrization After a Dental Extraction

Histologically an intralveolar process occurs and it was

observed on the seventh day that the matrix was formed by blood vessels, mesenchymal cells, leukocytes and collagen fibers, which evidences osteoid tissue at the base of the alveolus, by day 17 there is presence of osteoclasts, which It is a sign of resorption. There is a process of bone formation where the fasciculated bone is replaced by reticular bone, which fills the entire alveolus and for 100 days the maximum radiographic density can be shown^[23].

During the first 3 post-extraction months, the largest series of dimensional changes in the alveolar ridge (two-thirds of bone resorption) arise both vertically and horizontally. After one year of tooth extraction, 50% will have been lost^[24].

The lingual wall within 8 weeks of the extraction remains relatively equal, while the vestibular table decreases by a few millimeters; this due to its thin thickness and its fasciculated bone composition that it loses completely. Following this loss or bone resorption, the soft tissue collapses following the way in which bone remodeling takes place, creating a defect in the flange^[25].

All these mentioned events are of vital importance to know them before performing an extraction and to consider what will be done in the future in that edentulous space, in order to somehow prevent the resorption of the residual ridge thus avoiding surgical intervention for an increase of ridge^[26].

3.4 Atraumatic Extraction

The objective of the atraumatic extraction is the minimal affection of the hard and soft tissues that surround the tooth. The complexity of the procedure depends on the location of the tooth, the biotype of the patient and very vestibularized teeth^[27].

It is a conservative procedure that favors healing, aesthetics and tissue maintenance, thus facilitating its management during rehabilitation therapy^[28].

However, traditional methods of tooth extraction with forceps and elevators can damage the tissues and fracture the vestibular table^[29]. In 2012, in a study of a clinical report, an atraumatic extraction method was presented where an air-powered sonic instrument with specially designed inserts was used; This technique provides the clinician with efficient extraction of teeth and preservation of the intact vestibular table^[30].

The preservation of the vestibular table during dental extraction is a determining and important factor of the esthetic result. Nowadays, different techniques for atraumatic extraction have been proposed, such as the use of rotating drills, periostomes, piezoelectric, and even removing the root in fragments at the time of being milled when preparing to position the implant^[31]. Clearly, this technique is very helpful in order to be the most minimally invasive for all the tissues that surround the tooth and have better results^[32].

3.5 Bone Grafts

The materials that have been used to try to preserve the alveolar ridge are the same used for bone or guided tissue regeneration^[33]. Each of them has its advantages and disadvantages, so the clinician must have knowledge of all the properties, characteristics, obtaining techniques and in which cases they can be used to choose the most appropriate^[34].

There are several procedures that are used for bone preservation; a clear example are bone grafts and, in relation to their origin, they were classified^[35].

- **Autografts:** It is considered as the gold standard because it has 3 properties that are osteogenesis, osteoinduction and osteoconduction. It is obtained from multiple areas of

the same patient such as the chin, the tuberosity of the maxilla, torus, tibia, iliac crest, among others. One of the disadvantages is its rapid resorption, which is why it is usually combined with xenograft or allografts and in this way improve its properties [36].

- **Allografts:** They are osteoinductive; This type of bone graft is taken from the same species. There are 2 types: frozen-dried mineralized (FDBA) and frozen-dried mineralized (DFDBA). This type of grafts need to be processed so that they are free of antigenic properties [37].
- **Xenografts:** They are osteoconductive; also called heterograft and are of bovine or porcine origin. In this type of grafts, implant placement is recommended six months after alveolar preservation. A clear example of this type of grafts is the much-listened Bio-Oss Collagen [38].
- **Alloplastics or synthetic bone substitutes:** Most of them are only osteoconductive. Due to its characteristics and properties, some alloplastic materials are increasingly used in procedures for the preservation of the alveolar process at the time of dental extraction to avoid collapse of the flange [38].

The use of bone grafts for alveolar preservation is of great help to maintain a good height and crestal width, so in recent years have been applied a lot in dentistry.

3.6 Preservation Techniques

Set of techniques aimed at preserving the ridge volume that exists at the time of extraction [39]. Bone loss of height and alveolar thickness can be treated today with alveolar preservation techniques, and thus have a better prognosis when placing a restoration, specifically an implant [40]. So there will be a dimensional reduction of the crest but not so significant. It has been described that it does not affect at all the success rate in implants placed in alveoli grafted to non-grafted ones, since their dimensions are adequate [41].

There are many methods or techniques commonly used to perform alveolar preservation; there are the methods described by Darby, among others; but it is believed that the simplest technique is through an atraumatic extraction, achieving a biological healing of the alveolus with primary closure [41].

The graft is placed in the alveolus and covered with a membrane to then release flap and can be displaced and achieve primary closure of the wound. There is also graft by coronal displacement, but without membrane or, only the placement of a membrane on the alveolus, without bone graft filling it. In spite of the fact that before it was believed the opposite; of late, flange preservation procedures are preferred less invasive by means of the technique without flap elevation [42, 44, 45].

It will be totally dependent on the case to be treated which type of technique is the most appropriate for the increase in volume of the edentulous area, so that the case must be evaluated and diagnosed in an integral manner. There are some techniques described in the literature, including:

3.6.1 Bartee Technique

The resorbable membranes are effective but require a primary closure to prevent premature dissolution of the membrane. In this technique, the author develops a method using a dense membrane of expanded polytetrafluoroethylene (PTFE), as a barrier to contain the graft and thus facilitate guided bone regeneration. The only contraindication is the presence of an

infection. If this is the case, antibiotics should be given for 7 to 14 days [46].

Steps: Once the atraumatic extraction is done, preserving the corticals, a curettage of the alveolus is done eliminating remnants of alveolus tissue and periodontal fibers. Subsequently, decortication (optional) is performed, which helps blood supply of adjacent bone tissue.

The bone graft is maintained in sterile saline and soon it is placed in the extraction site, taking great care not to overpack to allow adequate revascularization.

The membrane is cut so that it moves away from the adjacent margin 1mm, and extending from 3-4 mm of alveolar margin to apical. Once the membrane is placed in the desired location, we use 3-0 polyglycol suture or interrupted PTFE monofilament in the interdental papilla and a horizontal suture over the alveolus.

The excessive tension of the flap will prevent the blood supply and may cause necrosis of the margin of the flap, so it should be avoided. After 2 weeks, the suture is removed and the area cleaned in case of bacterial accumulation. Depending on the size of the defect and the condition of the alveolar walls, the membrane is removed 3-4 weeks postoperatively, where infiltration of anesthetic is not necessary.

The advantage of this technique is the ability to maintain the graft in the alveolus, its facility to place and remove the membrane, and the preservation of the mucogingival architecture.

3.6.2 Biocol Technique

Technique described by Dr. Anthony Sclar, which is used to reduce bone resorption when removing a tooth. The objectives of this technique are to preserve the alveolar morphology, to prevent the effects of primary closure of soft tissues, to maintain the periosteum minimizing loss of the vestibular table and the preservation of both the architecture and the volume of the keratinized gingiva at the treated site.

The atraumatic extraction technique is performed and placed in the Bio-Oss bone graft socket, then a resorbable collagen membrane (Collaplug) is placed and placed on this isodent, this will allow guided bone regeneration without the need for a flap or a primary closure [47].

4. Conclusions

One of the most common procedures in dental practice are dental extractions, where bone reabsorption of the alveolar walls will always occur, mostly in a horizontal direction, however, vertical loss is more affected in the alveolar face of the mouth. As a consequence, a narrower and shorter bone will be reflected in the oral cavity. Preserving the alveolar ridge is a technique in which studies have been shown to significantly reduce bone resorption as a result of exodontia. Analyzing periodontal status of the patient is of great importance.

5. References

1. Kim JJ, Ben Amara H, Schwarz F, Kim HY, Lee JW, Wikesjö UME *et al.* Is ridge preservation/augmentation at periodontally compromised extraction sockets safe: A retrospective study. *J Clin Periodontol.* 2017; 44(10):1051-1058.
2. Degidi M, Nardi D, Daprile G, Piattelli A. Buccal bone plate in the immediately placed and restored maxillary single implant: a 7-year retrospective study using computed tomography. *Implant Dent.* 2012; 21(1):62-6.

3. Troiano G, Zhurakivska K, Lo Muzio L, Laino L, Ciccù M, Lo Russo L. Combination of Bone Graft and Resorbable Membrane for Alveolar Ridge Preservation: a Systematic Review, Meta-analysis and Trial Sequential Analysis. *J Periodontol.* 2018; 89(1):46-57.
4. Schnutenhaus S, Edelmann C, Rudolph H, Dreyhaupt J, Luthardt G. 3D accuracy of implant positions in template-guided implant placement as a function of the remaining teeth and the surgical procedure: a retrospective study. *Clin Oral Investig.* 2018; 22(6):2363-2372.
5. Castro AB, Meschi N, Temmerman A, Pinto N, Lambrechts P, Teughels W *et al.* Regenerative potential of leucocyte- and platelet-rich fibrin. Part B: sinus floor elevation, alveolar ridge preservation and implant therapy. A systematic review. *J Clin Periodontol.* 2017; 44(2):225-234.
6. Troiano G, Zhurakivska K, Lo Muzio L, Laino L, Ciccù M, Lo Russo L. Combination of Bone Graft and Resorbable Membrane for Alveolar Ridge Preservation: a Systematic Review, Meta-analysis and Trial Sequential Analysis. *J Periodontol.* 2017; 12:1-17.
7. Araujo MG, da Silva JC, de Mendonça AF, Lindhe J. Ridge alterations following grafting of fresh extraction sockets in man. A randomized clinical trial. *Clin Oral Implants Res.* 2015; 26(4):407-412.
8. Fickl S, Zuhr O, Wachtel H, Bolz W, Hürzeler MB. Hard tissue alterations after socket preservation: an experimental study in the beagle dog. *Clin Oral Implants Res.* 2008; 19(11):1111-1118.
9. Bartee BK. Extraction Site Reconstruction for alveolar ridge preservation. Part 1: Rationale and materials selection. *Journal Oral Implantol.* 2001; 27(4):187-193.
10. Betz T, Dehnert C, Bärtsch P, Schommer K, Mairbäurl H. Does High Alveolar Fluid Reabsorption Prevent HAPE in Individuals with Exaggerated Pulmonary Hypertension in Hypoxia. *High Alt Med Biol.* 2015; 16(4):283-9.
11. Guglielmotti MB. y Cabrini RL. Alveolar wound healing and ridge remodeling. After tooth extraction in the rat: a histologic, radiographic and histometric study. *J Oral Maxillofac Surg.* 1985; 43(5):359-364.
12. Ashman A. Y Bruins, P. Prevention of alveolar bone loss postextraction with HTR grafting material. *Oral Surg.* 1985; 60(2):146-153.
13. Atwood DA. Some clinical factors related to rate of resorption of residual ridges. 1962. *J Prosthet Dent.* 2001; 86(2):119-25.
14. Vargas L, Serrano CA, Estrada JH. Preservación de alvéolos postexodoncia mediante el uso de diferentes materiales de injerto. Revisión de la literatura. *Univ Odontol.* 2012; 31(66):145-183.
15. Jung RE, Philipp A, Annen BM, Signorelli L, Thoma DS, Hämmerle CHF *et al.* Radiographic evaluation of different techniques for ridge preservation after tooth extraction: a randomized controlled clinical trial. *J Clin Periodontol.* 2013; 40(1):90-98.
16. Ford-Martinelli VL, Hanly G, Valenzuela J, Herrera-Orozco LM, Muñoz-Zapata S. Alveolar ridge preservation: Decision making for dental implant placement. *CES odontol.* 2012; 25(2):44-53.
17. Allen EP, Gainza CS, Farthing GG. y Newbold, D A. Improved technique for localized ridge augmentation. A report of 21 cases. *J Periodontol.* 1985; 56(4):195-199.
18. Abrams H, Kopczyk RA, Kaplan AL. Incidence of anterior ridge deformities in partially edentulous patients. *J Prosthet Dent.* 1987; 57(2):191-4.
19. Botticelli D, Berglundh T, Lindhe J. Hard-tissue alterations following immediate implant placement in extraction sites. *J Clin Periodontol.* 2004; 31(10):820-8.
20. David Gómez Thomas, Juan Carlos García Núñez, Blanca Nieves Rodríguez. Expansión de cresta maxilar y regeneración ósea guiada para la colocación de implantes. Reporte de caso. *Revista Mexicana de Periodontología.* 2017; VIII(1):11-15.
21. Al-Harbi SH. Minimizing trauma during tooth removal: a systematic sectioning approach. *Eur J Esthet Dent.* 2010; 5(3):274-87.
22. Ashman AY, Bruins P. Prevention of alveolar bone loss postextraction with HTR grafting material. *Oral Surg.* 1985; 60(2):146-153.
23. Cardaropoli G, Araújo M, Lindhe J. Dynamics of bone tissue formation in tooth extraction sites. An experimental study in dogs. *J Clin Periodontol.* 2003; 30(9):809-18.
24. Atwood DA. Postextraction changes in the adult mandible as illustrated by microradiographs of midsagittal sections and serial cephalometric roentgenograms. *J Pros Den.* 1963; 13(5):811-824.
25. Atieh MA, Alsabeeha NH, Payne AG, Duncan W, Faggion CM, Esposito M. Interventions for replacing missing teeth: Alveolar ridge preservation techniques for dental implant site development. *Cochrane Database Syst Rev.* 2015; 28(5):CD010176.
26. Atwood DA. Some clinical factors related to rate of resorption of residual ridges. 1962. *J Prosthet Dent.* 2001; 86(2):119-25.
27. Dibart S, Karima M. *Practical Periodontal Plastic Surgery.* Ed. Blackwell Munksgaard, 2006.
28. Saifi AM, Giraddi GB, Ahmed N. Healing of extraction socket following local application of simvastatin: A split mouth prospective study. *J Oral Biol Craniofac Res.* 2017; 7(2):106-112.
29. Vercellotti T. Technological characteristics and clinical indications of piezoelectric bone surgery. *Minerva Stomatol.* 2004; 53(5):207-14.
30. Ceccarelli-Calle JF, Delgado-Bravo M. Manejo de tejidos blandos para preservación de rebordes: Reporte de un caso. *Rev Estomatol Herediana.* 2010; 20(2):85-89.
31. Babbush CA. A new atraumatic system for tooth removal and immediate implant restoration. *Implant Dent.* 2007; 16(2):139-145.
32. Crespi R, Capparé P, Crespi G, Gastaldi G, Gherlone EF. Dimensional Changes of Fresh Sockets With Reactive Soft Tissue Preservation: A Cone Beam CT Study. *Implant Dent.* 2017; 26(3):417-422.
33. Dimitrios EV, Papadimitriou, Alessandro Geminiani, Thomas Zahavi MS, Carlo Ercoli. Harvard School of Dental Medicine, Harvard University, Boston, Mass; Eastman Institute for Oral Health, School of Medicine and Dentistry, University of Rochester, Rochester, NY. Sonosurgery for atraumatic tooth extraction: A clinical report. *Prosthet Dent.* 2012; 108:339-343.
34. Fickl S, Zuhr O, Wachtel H, Stappert CF, Stein JM, Hürzeler MB. Dimensional changes of the alveolar ridge contour after different socket preservation techniques. *J Clin Periodontol.* 2008; 35(10):906-913.
35. Atieh MA, Alsabeeha NH, Payne AG, Duncan W, Faggion CM, Esposito M. Interventions for replacing missing teeth: Alveolar ridge preservation techniques for

- dental implant site development. Cochrane Database of Systematic Reviews. 2015; 28(5).
36. Salgado J. Efectividad de las técnicas de preservación alveolar sobre alvéolos postexodoncia comparados con alvéolos sin preservar: Revisión sistemática de la literatura. *Univ Odontol.* 2014; 33(70):203-216.
 37. Chiapasco M, Casentini P, Zaniboni M. Bone augmentation procedures in implant dentistry. *Int J Oral Maxillofac Implants.* 2009; 24:237-59.
 38. Adriaens P. Preservation of bony sites. *Proceedings of the 3rd European Federation of Periodontology: Implant Dentistry.* Chicago: Quintessence; 1999, 266-80.
 39. Iasella JM, Greenwell H, Miller RL, Hill M, Drisko C, Bohra AA *et al.* Ridge preservation with freeze-dried bone allograft and a collagen membrane compared to extraction alone for implant site development: a clinical and histologic study in humans. *J Periodontol.* 2003; 74(7):990-9.
 40. Hammerle CH, Araujo MG, Simion M. Evidence-based knowledge on the biology and treatment of extraction sockets. *Clin Oral Implants Res.* 2012; 23(Suppl 5):80-2.
 41. Betz T, Dehnert C, Bärtsch P, Schommer K, Mairbürl H. Does High Alveolar Fluid Reabsorption Prevent HAPE in Individuals with Exaggerated Pulmonary Hypertension in Hypoxia. *High Alt Med Biol.* 2015; 16(4):283-9.
 42. Fickl S, Zuhr O, Wachtel H, Bolz W, Hürzeler MB. Hard tissue alterations after socket preservation: an experimental study in the beagle dog. *Clinical Oral Implants Research.* 2008; 19:1111-1118.
 43. Darby I, Chen ST, Buser D. Ridge preservation techniques for implant therapy. *Int J Oral Maxillofac Implants.* 2009; 24:260-271.
 44. Vignoletti F, Matesanz P, Rodrigo D, Figuero E, Martin C, Sanz M. Surgical protocols for ridge preservation after tooth extraction. A systematic review. *Clinical Oral Implants Research.* 2012; 23:22-38.
 45. Wang RE, Lang NP. Ridge preservation after tooth extraction. *Clinical Oral Implants Research.* 2012; 23:147-156.
 46. Hämmerle CHF, Araújo MG, Simion M. On Behalf of the Osteology Consensus Group 2011. Evidence based knowledge on the biology and treatment of extraction sockets. *Clinical Oral Implants Research.* 2012; 23:80-82.
 47. Barry K. Bartee. Extraction Site Reconstruction for Alveolar Ridge Preservation. Part 2: Membrane-Assisted Surgical Technique. *Journal of Oral Implantology.* 2001. XXVII:4
 48. Anthony G. Sclar. Strategies for Management of Single-Tooth Extraction Sites in Aesthetic Implant Therapy. *J Oral Maxillofac Surg.* 2004. 62(2):90-105.