

Research Article

Bone Density after Mandibular Posterior Tooth Socket Preservation, Comparative Evaluation of Multiple Techniques

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ABSTRACT

Introduction:Socket preservation or alveolar ridge preservation (ARP) is a procedure to reduce bone loss after tooth extraction to preserve the dental alveolus (tooth socket) in the alveolar bone. There are two procedure that effect the site preservation:1-Atraumatic tooth extraction 2-socket debridement. This Study focused on the healing pattern of sockets and evaluated bone density with and without the use of regenerative materials.

Method:This randomized clinical trial recruited 125 patients who included 5 groups of patient candidate for mandibular molar extraction and implant placement. The difference in bone density values was calculated between the post-extraction and postoperative 4 month follow- up visit. The increase of difference after surgery indicated the increase in bone density in the extraction site (increased opacity on the radiograph). The data were statistically analyzed by SPSS software (version PASW 18 . P value <0.05 was considered as significant.

Results:A total of 125 patients evaluated in this study. P value for mean difference of bone density was greater than 0.05 indicating no notable difference between control and study groups (p>0.05).

Discussion:this Study showed although, it is better to use socket preservation techniques to reduce alveolar bone loss and prevent dimensional changes after dental extraction but, there wasn't any significant difference between control and study groups in bone density index.

Keywords :socket preservation, collagen membrane, bone graft, bone density.

INTRUDUCTION:

Socket preservation or alveolar ridge preservation (ARP) is a procedure to reduce bone loss after tooth extraction to preserve the dental alveolus (tooth socket) in the alveolar bone. A platelet rich fibrin (PRF) membrane containing bone growth enhancing elements is placed in the wound or a bone grafting material or scaffold is placed in the socket of an extracted tooth at the time of extraction.The socket is then directly closed with

stiches or covered with a non-resorbable or resorbable membrane and sutured(1,2,3). There are two procedure that effect the site preservation:1-Atraumatic tooth extraction 2-socket debridement

1): The key to successful site preservation is minimizing trauma to the hard and soft tissues around the tooth being extracted. The use of a perioste and luxator is critical to achieving

atraumatic tooth extractions. The periosteum should NOT be used as an elevator. The luxator is used to widen the PDL space and get some mobility of the tooth root being extracted. Teeth with a severe coronal fracture extending subgingivally or teeth with multiple roots may require additional efforts to ensure an atraumatic extraction. By sectioning the tooth root and carefully removing root fragments, there is a reduced risk of trauma to the surrounding alveolar bone, which may otherwise result in fracture of the labial/ buccal plate of bone(4,5).

2): Once the tooth root has been extracted, it is imperative to thoroughly debride the socket walls. This is best undertaken with a surgical spoon curette. This part of the procedure should not be rushed; each area within the extraction socket needs to be curetted and all remnant periodontal ligament tissues removed from the socket walls (6). A dental implant (also known as an endosseous implant or fixture) is a surgical component that interfaces with the bone of the jaw or skull to support a dental prosthesis such as a crown, bridge, denture, facial prosthesis or to act as an orthodontic anchor. A variable amount of healing time is required for Osseointegration before either the dental prosthetic (a tooth, bridge or denture) is attached to the implant or an abutment is placed which will hold a dental prosthetic.(7)Trisi and colleagues(8) examined the posterior maxilla, where bone is generally of poor quality, investigating the BIC at 2 and 6 months. For rough-surfaced implants (dual acid-etched), there was 48% BIC at 2 months and 72% BIC at 6 months, compared with only 19% and 34%, respectively, for machined-surface implants. Similar results were noted in an animal study, in which there was 74% BIC in type IV bone (poor-quality bone) at 6 months on titanium porous oxide (TiUnite, Nobel Biocare, Gothenburg, Sweden) implants(9). In a different study(10) in which DFDBA was used, the rate at which graft material was replaced by new vital bone was very slow and incomplete even at 4 years; however, from a clinical point of view, the load-bearing capacity of the regenerated bone appeared to be

similar to that of normal bone. In this study, the histologic core samples were taken within 3–6 months of extraction when it is common to wait 6–9 months to place implants when using these materials. Thus, the cores may have been taken too early to provide appropriate information. This Study focused on the healing pattern of sockets and evaluated bone density with and without the use of regenerative materials.

METHOD AND MATERIAL:

This randomized clinical trial recruited 125 patients (68 females and 57 males with the age range 23 to 55 years old, mean 33) who included 5 groups of patient candidate for mandibular molar extraction and implant placement. All the patients were in good general health (American Society of Anesthesiologists physical status I), nonsmokers, and non-addicts, besides being cooperative with the study and postoperative follow-up. There was no local problem such as gingival or periodontal diseases, nor any need for soft tissue regeneration and graft. The surgical procedures were all performed by the same operator. The cases were randomly divided into five groups. One-stage and two-stage surgical approach. The former group included 9 patients with 17 implants and the latter consisted of 5 patients with 14 implants to be placed. The patients were fully informed about the treatment protocol and signed a consent form. All procedures started by anesthetizing with 2% Lidocaine and epinephrine 1/100000. After extraction and taking panoramic radiographs, the plates were scanned in their respective scanners. After that, in group 1 we had normal dental socket healing without any intervention. In groups 2, 3, 4 and 5, sulcular incision and mucoperiosteal triangular flap reflection were done. Then the empty dental socket was covered only by mucoperiosteal flap in group 2. In group 3, after dental extraction, socket preservation was done by allograft bone graft and buccal mucoperiosteal flap. In group 4, socket covered by collagen membrane and flap without any bone graft. Finally, in group 5 we reconstructed tooth socket with allograft bone graft in addition with collagen membrane

and flap. Follow- up included radiographic examination at 4 months after surgery to evaluate the bone density at the extraction site. Bone density was measured on the radiographs using the Medecom software and a personal computer through a gray scale of 254 tonalities. The measurement areas were obtained using density tool at three sites of extraction site (at the crest, in the coronal, and middle third of the panoramic radiograph) The mean of the three measurements were attributed to the bone density of extraction site. The difference in bone density values was calculated between the post-extraction and postoperative 4 month follow- up visit. The increase of difference after surgery indicated the increase in bone density in the extraction site

(increased opacity on the radiograph). The data were statistically analyzed by SPSS software (version PASW 18 . P value <0.05 was considered as significant.

RESULTS:

A total of 125 patients (68 females and 57 males aged 23-55 years old) were evaluated in this study. The mean difference of bone density in control group was 1736. , flap group 1660. , flap+bone 1733., collagen 1665.andcollagen+bone 1746. P value for mean difference of bone density was greater than 0.05 indicating no notable difference between control and study groups (p>0.05).

Demonstrated p value and comparative evaluation of groups

Group(I)	Group(J)	Mean difference(I-J)
NONE	Flap	76.08000
	Flap+bone	3.68000
	Collagen	71.44000
	Collagen+bone	-9.32000
FLAP	None	-76.08000
	Flap+bone	-72.40000
	Collagen	-4.64000
	Collagen+bone	-85.40000
Flap+bone	None	-3.68000
	Flap	72.40000
	Collagen	67.76000
	Collagen+bone	-13.00000
Collagen	None	-71.44000
	Flap	4.64000
	Flap+bone	-67.76000
	Collagen+bone	-80.76000
Collagen+bone	None	9.32000
	Flap	85.40000
	Flap+bone	13.00000
	Collagen	80.76000

DISCUSSION:

Socket preservation has always been an important issue for maintaining soft and hard tissue and it has always been considered to prevent dimensional change of alveolar ridge before implant placement.

Results showed the higher bone density in group with collagen and bone graft and the least bone density in group using only flap that was significantly different. Interestingly, we observed that control group was the second group in bone

density ranking and didn't have any significant difference with others.

In addition, after that the control group, patients underwent bone graft and flap had better bone density than collagen group. A systematic review assessing the influence and potential benefit of socket preservation procedures after tooth extraction in nonmolar regions of the mouth (Ten Heggeler et al. 2010)(11).in agree with two studies (Barone et al. 2008; Serino et al. 2008)(12).

CONCLUSION:

In this meta-analysis, the bone horizontal changes in the control group were heterogeneous, ranging from 0.16 to 4.50 mm. These differences may be due to different factors, such as the socket location and the thickness of the socket walls. Recent studies in humans have shown the influence of the location and the thickness of the socket walls in the ensuing modeling and remodeling processes after tooth extraction (Ferrus et al. 2010; Januario et al. 2011)(13) One major limitation of this systematic review is that no meta-analyses could be performed on implant-related outcomes, due to the lack of sufficient data. This fact is important as there is no clear evidence that the occurrence of bone resorption after tooth extraction may significantly limit the placement of dental implants. Only one study assessed the possible influence of the socket preservation therapy on the need of further augmentation therapies and in fact, the study group reported reduced needs of bone augmentation (Fiorellini et al. 2005)(14). Many choices are available to the clinician and success is based on the care at the time of extraction to preserve the remaining walls of the alveolus (extraction socket) through minimal trauma. Ridge preservation is merely one aspect of successful implant therapy, but one that needs to be considered early in the treatment plan by the restorative doctor. It is a cost-effective measure when compared to the need for guided bone regeneration as an additional surgical procedure to treat the resulting ridge defect through augmentation. In conclusion: this Study showed although, it is better to use socket preservation techniques to reduce alveolar bone loss and prevent dimensional changes after dental extraction but, there wasn't any significant difference between control and study groups in bone density index.

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