



RESEARCH ARTICLE

ALLOPLASTIC BONE GRAFT FOR POCKET REDUCTION AFTER THIRD MOLAR SURGERY

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ABSTRACT

There is high incidence of periodontal pocket formation and gingival recession on distal side of second molar after surgical removal of third molar. The periodontal pocket formation is commonly seen in mesioangular and horizontal impacted third molars. Scaling and root planning is not sufficient to reduce the distal pocket formation. In this study 20 patients requiring bilateral transalveolar mandibular third molar extractions which are mainly mesioangular or horizontal were included after written informed consent. One side was randomly chosen as a test and the other side was the control. Commercially available alloplastic bone graft material placed in the extraction site and primary closure was obtained. The patient was called for follow up on the 1st day, 2nd day, 7th day, 3rd month & 6th after third molar surgery. The patients were evaluated for pocket depth and postoperative wound healing. Results and conclusion: There was decreased pocket depth was observed after 6 month distal to third molar. Third molar socket grafting with alloplastic graft material may be a predictable procedure to reduce the pocket formation after third molar surgery. Further follow up of present cases and larger sample size is required needed to evaluate the bone remodeling & maintenance of bone height distal to second molar. Research is required to use his bone graft material with corticocancellous bone & platelet rich plasma to evaluate osteogenic potential of the graft material.

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INTRODUCTION

Surgical removal lower third molar is most commonly performed surgery in dentistry (Thomas Dodson, 1996). Various techniques and procedures have been tried to eliminate or prevent distal pocket formation after third molar surgery. Some procedures failed to achieve desirable effects some techniques like change in flap design, socket preservation or grafting with different type of bone graft materials like hydroxyl appetite, xenograft platelet rich plasma have been prove to beneficial. (Munhoz, 2006; Dugrillon *et al.*, 2002) The aim of the present study was to evaluate effect of bone grafting after third molar surgery on periodontal condition, wound healing distal to second molar.

MATERIALS AND METHODS

This prospective study was performed in department of maxillofacial surgery and the study was approved by ethical

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committee of college. A total of twenty patients who required bilateral transalveolar third molar extraction were included. Before the surgical procedure, all patients were informed about the surgery, postoperative recommendations, and possible complications and the informed consent was taken. Before surgery, a panoramic radiograph was taken for each patient. All patients were treated and observed by the same surgeon. Patients who were lactating, pregnant, smoking, consuming drugs interfering with healing process, had periodontal disease or prosthesis on second molar teeth, or reported systemic disorders excluded from the study. To evaluate the effect of surgery on periodontal indices, probing depth (PD), Leo and Sillness' gingival index of (GI), and clinical attachment level (CAL) were assessed in distobuccal, middistal and distolingual surfaces of second molar tooth before the surgery (baseline) and 6 months later (follow-up). Surgical procedure : Scaling and polishing was done in all patients before undergoing surgery all the impacted teeth were extracted under local anesthesia under all aseptic precaution. On test side graft material was taken & placed in the extraction socket. The other side was treated as control. Surgery on the control side was performed after 15 days of test side. All patients were given routine postoperative instructions. All patients were given Tab.

Amoxicillin 500 mg and Tab. Diclofenac sodium thrice a day for 5 days. The data were collected on forms and entered into a Microsoft Excel Worksheet and analyzed using SPSS (version 7.5) statistical package.

RESULTS

In this split mouth study periodontal health of the adjacent 2nd molar- bleeding index and the probing pocket depth, wound healing and the horizontal and vertical components of the swelling & pain were assessed. A total number of 20 cases with mean age of 24.20 yrs \pm 3.12 were studied to compare for the bony graft in a bony defect after impacted lower third molar removal. Majority of the patients in this study were between 21-33 years. Out of 20 patients 11 were males (65%) and 12 were females (45%). Bleeding index measured preoperatively, 3rd month & 7th month postoperatively. No significant differences between test (grafted) and control (nongrafted) groups were found with respect to bleeding index. There is no statistically significant difference between probing depth distal to second molars of test & control sites preoperatively.

There is a statistically significant difference between probing depths of test (mean 2.60) & control sites (mean 3.35). Periodontal condition was better on the grafted site compared to the non-grafted site distal to the third molar. On the 1st postoperative day, the mean rank was 22.30 for the grafted site & 17.58 for the non-grafted site for pain. The p value was .026. On the 7th postoperative day, the mean rank was 24.87 for the grafted site & 14.13 for the non-grafted site. P value was .001, showing a significant difference between pain on the grafted site compared to the non-grafted site. On the 2nd postoperative day, the mean rank was 23.00 for the grafted site & 16.8 for the non-grafted sites. P value was .057, implying there is no statistically significant difference in pain on the grafted & non-grafted sites. The wound healing evaluated on the 7th postoperative day, there is no wound breakdown in 60% of patients of the grafted site while 15% of the control site showed no breakdown. 40% of control sites showed moderate wound breakdown, the test side showed nil. Severe wound breakdown in 10% of control sites; the test side showed nil. On subjecting these results to statistical analysis, the p value was 0.000, implying a statistically significant difference in terms of wound healing between graft & non-graft sites.

Table 1. Bleeding index on test & control sites

Days	GROUP	N	Mean Rank	Sum of Ranks	Mann-Whitney U values	Asymp. 'p' value	Inference
Preoperative	Test	20	21.55	431.00	179.000	.524	NS
	Control	20	19.45	389.00			
3 RD postoperative month	Test	20	19.25	385.00	175.000	.440	NS
	Control	20	21.75	435.00			
6 th postoperative month	Test	20	19.25	385.00	175.000	.440	NS
	Control	20	21.75	435.00			

p < 0.05 significant; NS- Not significant; S- Significant.

Table 2. Wound healing on test & control sites

	GROUP	N	Mean Rank	Sum of Ranks	Mann-Whitney U	'p' value
Wound healing	Test	20	14.00	280.00	70.000	.000
	Control	20	27.00	540.00		

WOUND * GROUP

WOUND	GROUP		Total
	Test	Control	
No wound breakdown	Number	12	3
	%	60.0%	15.0%
Slight wound breakdown explorable with blunt instrument	Number	8	7
	%	40.0%	35.0%
Moderate wound break down, socket exposed	Number	0	8
	%	.0%	40.0%
Severe wound break down, socket exposed and nonvital bone visible	Number	0	2
	%	.0%	10.0%
Total	Number	20	20
	%	100.0%	100.0%

Chi-Square Tests

	Value	df	'p' value	Inference
Pearson Chi-Square	15.467(a)	3	.001	S

p < 0.05 significant; NS- Not significant; S- Significant.

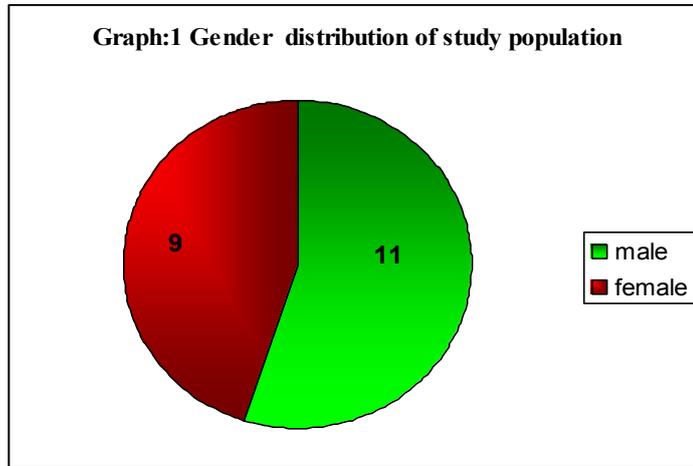
Table 3. Pocket depths on test & control sites

T-Test

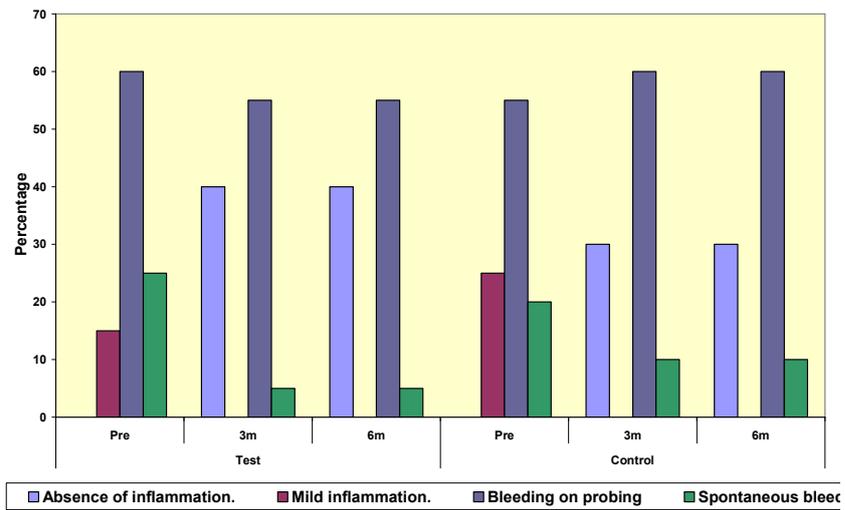
	GROUP	N	Mean	SD
PD_PRE	Test	20	3.0750	1.35991
	Control	20	3.0500	1.14593
PD3MPOP	Test	20	2.6000	.68056
	Control	20	3.3500	.98809
PD6MPOP	Test	20	2.6000	.68056
	Control	20	3.3500	.98809

	t	df	'p' value
PD_PRE	.063	38	.950
PD3MPOP	-2.796	38	.008
PD6MPOP	-2.796	38	.008

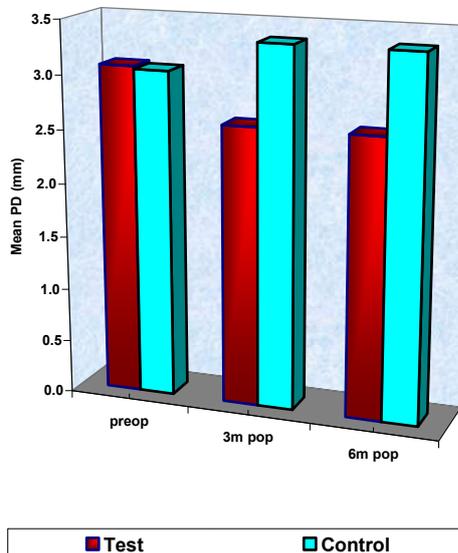
p < 0.05 significant; NS- Not significant; S- Significant.



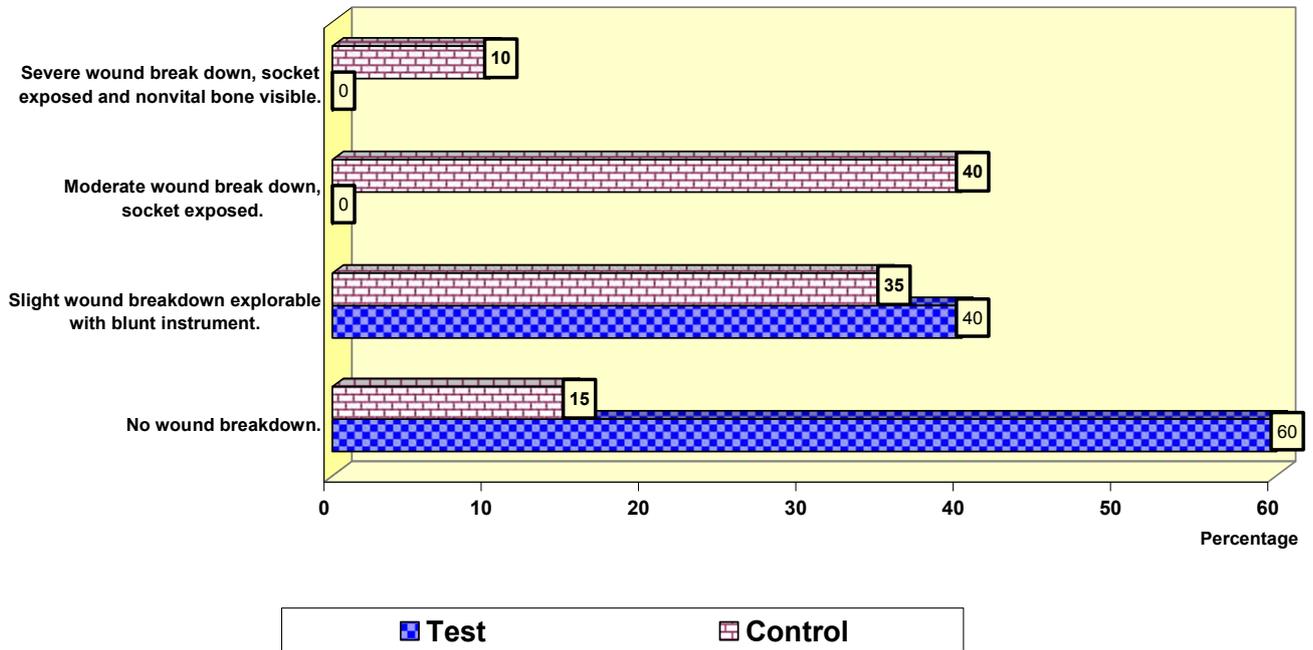
Graph 2: Bleeding Index in Test and Control



Graph 3 :Pre and post Operative Probing Depth in Test and Control Cases



Wound Healing



DISCUSSION

A split-mouth designed study was used because it allowed for intraindividual comparison and the assessment of postoperative complications following impacted third molars can be done with greater confidence. We chose to deal with impacted teeth, complete soft tissue closure over the material was possible. Guided bone regeneration membrane were not included to eliminate another variable. Due to ethical consideration to determine the quality of bone formed histopathological examination was not possible. Reentry in the surgical site after 6 months is not advocated as that increases the chances of bone resorption during healing period. Several factors influence the postoperative sequel after third molar surgery. (Osborn *et al.*, 1985; Sisk *et al.*, 1986; Van Gool *et al.*, 1977; Hellem *et al.*, 1973) There are various methods to assess pain as given in the literature. (Bruce, 1980) In the this study, pain is assessed using verbal rating scale as this method of pain assessment is simple and easily understandable. Severe pain observed in 20% of the patients on grafted site on 1st postoperative day. No pain observed in most of the patients in the control group; slight pain was observed on the grafted site on 7th postoperative day. This may be due to extractions socket obliterated by graft material which provoked inflammatory process also the wound was closed primarily which may be predisposing factor for pain & swelling. These results are in contradiction to Petri (Roger Thronson, 2002) & Roger Thronson (Amin and Laskin, 1983)

As these authors used antibiotic supplemented bone allograft, demineralized bone powder & bioactive glass. There are other factors with an influence on the postoperative pain level perceived: the surgeon, the sex of the patient and some psychological factors. Amin and Laskin found no relation between pain and the duration of surgery, the depth or the angulations of the third molar (Fisher *et al.*, 1998). Fisher *et al.* (Norholt, 1998) and Northolt (Daliz, 1964) demonstrated that the duration of surgery has nothing to do with the postoperative pain. We cannot forget that each patient shows a different response to surgery. Several factors affect the swelling after third molar surgery, (Amler, 1993; Kugelberg *et al.*, 1985) and this can be assessed by various methods. (Amler, 1993; Van Gool *et al.*, 1977) In the present study, swelling is assessed in terms of horizontal and vertical components & converted in to the percentage of facial swelling. (Van Gool *et al.*, 1977) This method of assessing swelling is simple, easier and economical. However, it can assess only the buccal aspect of the swelling. On the grafted site found more swelling on the 1st & 2nd day compared to control site. Interincisal distance has been a measure of trismus in a number of studies. (Sisk *et al.*, 1986; Marmary, 1986) This is not done in this study as both grafted & control site surgical removal of third molar done at same time. The results of this study showed difference regarding wound healing between grafted & non grafted sites. Moderate wound break down seen in 40% & severe wound break down seen 10 % of the nongrafted site. Grafted sites showed nil; as the bone graft used was completely covered by soft tissue flap. The grafting material used contains bovine collagen which acts as a scaffold for the growing cells. It is known to cause aggregation of platelets & is a matrix to strengthen the clot.

(Marmary, 1986; Chawet Mannai, 1986) The results of this study are in concurrence with those of previous studies. Periodontal pocket formation in the second molar is a usual postoperative complication in third molar surgery. Several explanations for this have been advanced. (Karapataki, 2000; Artzi, 2001) In a follow up study 4 years after third molar extraction, Kugelberg showed that 44.4 % of sample aged 26 years or older had intrabony defects exceeding 4 mm. Risk factors associated with bone loss after lower third molar extraction included age, direction of eruption, preoperative bony defects & resorption of second molar. (Peng, 2001; Kugelberg, 1990)

Multiple sources of bone used to graft bony defects in the head neck region. Autogenous sources include Iliac crest, rib, calvarial & vascularised bone grafts. Allogenic sources included freeze-dried or fresh frozen cadaveric bone demineralized bone. Except for demineralized bone, autogenous & allogenic bone grafts heal by direct transplantation of bone cells or osteoconduction. Various studies done to showed use of bone graft in regenerating bone to prevent the development of bony defects on the distal aspect of mandibular second molar after extraction of third molar. Based on the results of these study showed that there is decrease in the pocket depth distal to second molar at 6 month after placement of graft. Palcing the bone bone graft after third molar surgery decreases the chances of pocket formation. Various methods have been used in literature to measure bone height distal to second molar. (Artzi, 2001; Holland and Hindle, 1984) There is increase in the bone height on the graft site as compared to nongrafted site. Our results are in concurrence with the results showed by Petri (1993). In certain studies the bone graft was covered with GBR membrane. Nabil kazam used combination of autogenous bone chips harvested from the external oblique ridge and bovine porous bone mineral Bio-Oss (Geistlich Biomaterials) were used to fill the advanced periodontal pocket on the distal side of the lower second molar. Dodson in his randomized control study; compared use of demineralized bone powder or resorbable guided tissue regeneration therapy after surgical removal of mandibular third molar & suggested that neither demineralized bone powder nor GTR offered predictable benefits over no treatment. Also there was increased risk of inflammatory complications on the test side. Due to this reconstructive materials are not indicated for routine use. Patients who are increased risk for periodontal defect after mandibular third molar removal i.e. age \geq 26 pre-existing periodontal infection (pocket depth \geq 5mm) a horizontal or mesioangular impacted tooth; when these factors are present it is recommended use of bone grafts.

Conclusion

Bone grafting after third molar surgery may be a predictable procedure to prevent periodontal pocket distal to second molar. Long term follow up studies required to evaluate the bone remodelling & maintenance of bone height distal to second molar. Research is required to use his bone graft material with corticocancellous bone & platelet rich plasma to evaluate osteogenic potential of the graft material. Histologic studies as well as clinical studies with larger sample size are essential.

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