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A Prospective clinical study of soft tissue conditions and marginal bone changes around dental implants after flapless implant surgery

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Abstract

Background: Despite several reports on the clinical outcomes of flapless implant surgery, limited information exists regarding the clinical conditions after flapless implant surgery.

Objective*:* The objective of this study was to evaluate the soft tissue conditions and marginal bone changes around dental implants 1 year after flapless implant surgery.

Study design: For the study, 23 implants were placed in 21 patients by using a flapless 1-stage procedure. In these patients, peri-implant soft tissue conditions and radiographic marginal bone changes were evaluated 1 year after surgery.

Results:The overall results of our study demonstrate a success rate 93.34%, with 21 out of the 22 implants with flapless surgery successfully osseointegrating .The mean probing depth was 1.62mm. P value for implant probing

depth is 0.847 .The average bleeding on probing index score was 0.956. P value for implant bleeding index is >0.05, and the mean marginal bone loss was 0.5mm. Two implants exhibited bone loss of more than 3mm. whereas 21 implants experienced no bone loss at all.

Conclusion*:* The results of this study demonstrate that flapless implant surgery is a predictable procedure. In addition it is advantageous for preserving crestal bone and mucosal health surrounding dental implants.

Keywords: Flapless Surgery, Marginal Bone, Soft Tissue, Dental Implant.

Introduction

The goal of reconstruction in maxillo-facial region is to restore normal contour, function, comfort, aesthetics, speech and health regardless of the disease and injury. The problem of edentulous/ partially edentulous has troubled mankind ever since times immemorial. With Advancements in material sciences and improvement in our understanding of occlusion and the gnathostomatic system, better modalities of tooth replacement came into existence. “Dental implant is a device of biocompatible material placed within/against the mandibular/maxillary bone to provide additional/enhanced support for a prosthesis”

The science of dental implantology today has become highly evolved, and today it is regarded as a highly effective and predictable modality of tooth replacement. Flapless surgery involves using a tissue punch device to gain access to the alveolar ridge for implant placement or abutment connection.Flapless surgery as a method for dental implant placement is gaining popularity among implant surgeons. Flapless surgery has numerous advantages, including preservation of the vessels around the implants,maintenance of the original mucosal form around the implants,and retention of hard tissue volume at the surgical site.This method also shortens the length of the surgery, improves patient comfort, and accelerates recovery.[7]

So a prospective study has been designed to evaluate the soft tissue conditions and marginal bone changes around dental implants up to one year after flapless implant surgery.

Materials And Methods

In this study, 22 single tooth implants were placed in 21 partially edentulous patients. For study, the edentulous spaces in both maxillary and mandibular region are considered. Patient selection is done above 18 years and irrespective of sex. Inclusion criteria included subjects undergoing good periodontal health, adequate amount of bone for implant placement, who were able and willing to provide informed consent.Pre operative and post operative evaluations were done by clinical and radiographic means.

Surgical Procedure

All implant surgeries were performed under local anesthesia. Local anesthesia (Lignocaine with 1:80,000 Adrenaline) was administered to block regional nerve supply and aid hemostasis. The soft tissue of the proposed implant site is punched with a 3.5mm or 4.5mm soft tissue punch. A core of soft tissue is then removed from over the crestal bone, and the process of implant osteotomy was performed at the core of the exposed bone. The angulation is checked once again with the paralleling pin, both clinically and radiographically. The osteotomy is then diametrically enlarged to desired width. All these steps are done under constant irrigation. Measurements are taken at osseous crest and maintain 1.5mm to 2.0mm from contact at crest to the edge of the implant. Maintain 3.0mm edge-to-edge All of the patients receive endosseous implants 3.5, 4.5, or 5.7mm in diameter and 9, 10.5, 12 or15mm in length via flapless surgery. After implant placement,

healing abutments are connected immediately to the fixtures, such that the coronal portion of the abutments remains exposed to the oral cavity. Immediately after implant placement, a plaque control procedure is performed daily.

All patients are prescribed Amoxicillin 500mg TID, Metronidazole 400 mg TID and a Diclofenac + Paracetamol preparation BID, Antacid along with Chlorhexidine 2% mouth rinse.

Prosthetic reconstruction: After 6 months of soft tissue healing, the patient is referred to prosthodontist. The procedures for fabricating the permanent prosthesis were performed in the 6th month following placement. The patients were given a choice of a full ceramic or metal fused to ceramic crown.

Clinical evaluation: For each implant, a clinical evaluation was performed 12 months after the implant insertion. Once clinician performed the clinical evaluation, which involved measuring the probing pocket depth, assessing the gingival index (GI), and recording the presence of bleeding on probing (BOP).The presence or absence of keratinized gingiva around the implants was also recorded. Pocket depths were measured using probes with a probing force of 0.2 N. The probe was calibrated for a 0.2-N probing force. The mean pocket probing depth for each implant site was obtained from averaging the measurements taken at 4 different sites around the implant.

To assess postsurgical changes in the crestal bone level, conventional dental radiographs were taken immediately after surgery and 12 months after implant placement (Fig. 1).

Figure 1: Periapical radiograph taken immediately (A) and 1year (B) after implant placement.

The images were digitized, and the distance between the fixture shoulder and the apical level of the marginal bone that was in contact with the implant was measured at 8 magnification using implant height (a known measurement) for calibration. Measurements were made at the mesial and distal aspects of each fixture, and the mean for each case was calculated. All measurements were performed by 2 examiners who were blinded to the methods used in the study; when these examiners disagreed, the values were rechecked and discussed until an agreement was made.

Statistical analysis: The data were processed using a statistical softwarepackage. Descriptivestatistics were used to evaluate the soft tissue conditions and any bone changes. Bone loss was analyzedusing the student*t* test for comparison between the thick, soft tissue (ε3 mm) and the thin, soft tissue (Fig. 2). Clinical features after punching the soft tissue at the proposed implant sites with a 3-mm soft tissue punch. (Fig.3). Clinical features after healing abutments were connected to the fixtures. Groups (3 mm). A Pvalue of .05 was considered to be statistically significant.

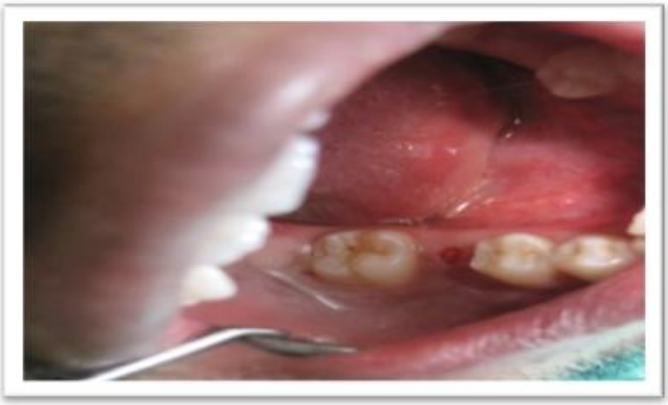


Figure 2: Clinical features after punching the soft tissue at the proposed implant sites with a 3-mm soft tissue punch.

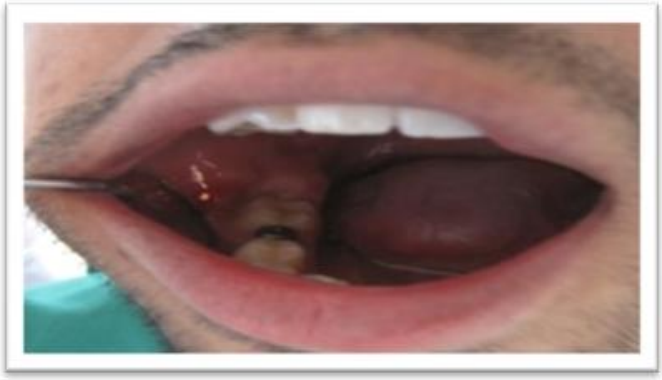


Figure 3: Clinical features after healing abutments were connected to the fixtures.

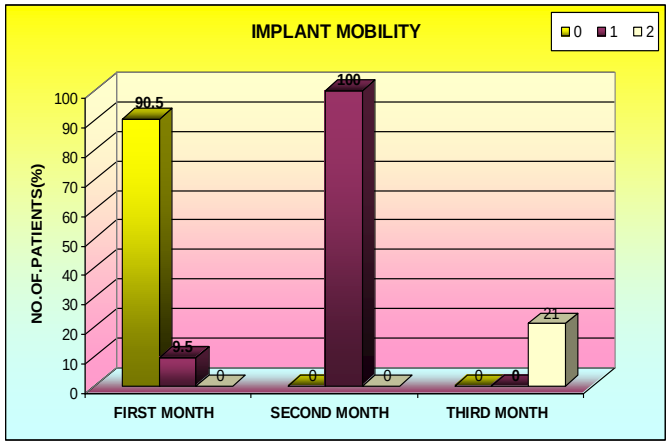
Results

Most patients 95.24% (n=21) received a single implant, and 4.76% (n=1) received 2 implants, Mandibular molar implants were most commonly performed. 45.45% wereleft mandibular 1st molar (n=10), 40.90% were right mandibular 1st molar (n=9), and 9.09% were left mandibular 2nd molar (n=2) followed by mandibular premolar implants 4.54% were 35(n=1). The predominant implant site was the mandibular first molar position, where 86.36% of the implants were placed. The period of edentulousness ranged from 7-15 months, the mean duration being 10.4 months. In all the cases, implants of 3.5, 4- and 5-mm diameter and lengths 9, 10.5, 12, and 15 mm were used.

Table 1. Probing depth, , bleeding on probing index, and crestal bone loss when implants were placed without a flap.

	1 Year
Probing depth (mm)	1.5 – 2.0
Bleeding on probing index	0.1 _ 1.0
Crestal bone loss	0.3 _ 0.5

Graph 1: Distribution of No. of. Patients According Implant Mobility Scores In Different Months

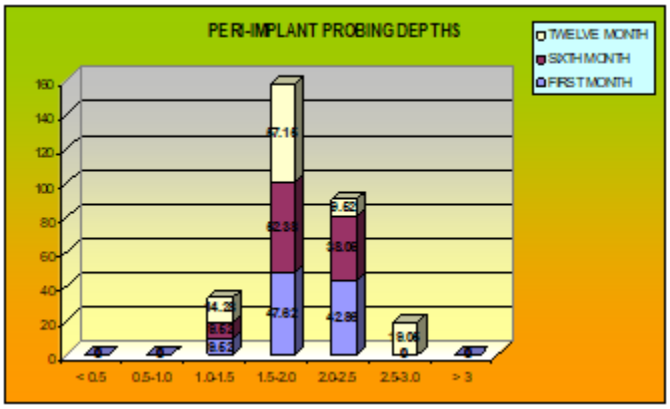


To assess the outcomes of dental implants with flapless implant surgery, we have focused our follow-up on 3 clinical and 1 radiographic parameters; namely, implant mobility, periimplant probing depths, bleeding index, and mean marginal bone levels respectively. The values were recorded over follow-up appointments scheduled at 1st Month, 6th Month, and 12th month of implant placement surgery.

Implants 38.09% (n=8) had a probing depth in the range of 2-2.5mm. In the 12th month, 14.28% (n=3) implants showed a probing depth in the range of 1-1.5 mm, 57.15% (n=12) showed a probing depth in range of 1.5-2mm, 9.52 (n=2) had depths between 2-2.5 mm, and 19.05% (n=4) had a probing depth in the range of 2.5-3 mm. On an individual note, only four implants showed an increase in probing depth, three of which were in

acceptable limits. The median probing depth recorded for these 22 implants was calculated and depicted. The values were found to be 1.87mm, 1.5mm, and 1.5mm in the 1st, 6th and 12th month respectively. P value for implant probing depth is 0.847, indicating that differences are not significant between the months.

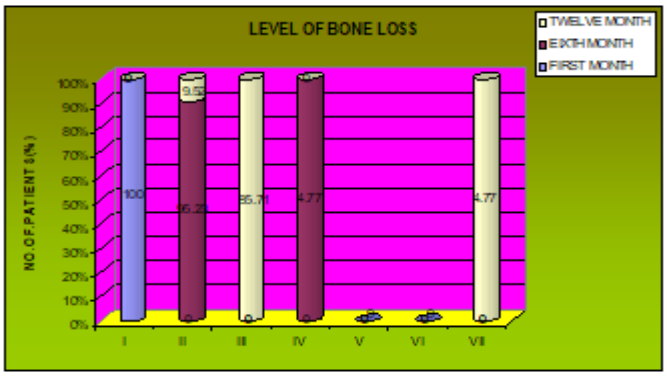
Graph 2: Distribution no.of.implants according to probing depths in different depths.



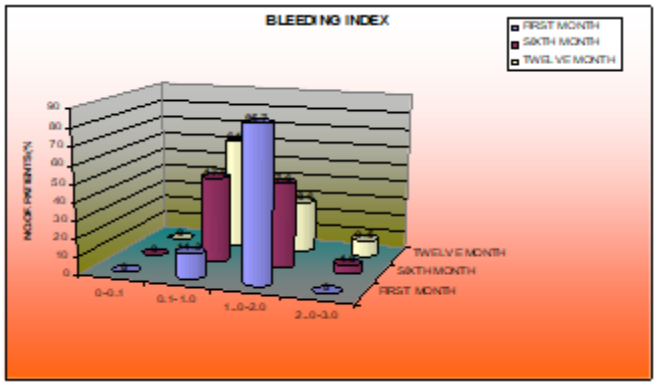
The bleeding index was calculated as per the method of Silness and Loe. Based on clinical findings obtained, scores of 0, 1, 2, and 3 were awarded to each of the four surfaces, and the mean value was calculated. In one case, for a 32-year-old female, we placed two implants (35,36) which is averaged to yield a mean value of those two implants. The interpretation of the values obtained, and the clinical findings obtained. In the 1st month, 14.3% (n=3) of the implants yielded a bleeding index of 0.1-1.0, which indicated the presence of a mild inflammation surrounding the implant. In 85.7% (n=18) of the cases, a score of 1.0-2.0 was obtained, correlating to a moderate inflammation surrounding the implant. In the 6th month, the bleeding index scores was 47.6% (n=10) implants scoring between 0.1-1.0 and 47.6% (n=10) scoring between 1.0 and 2.0 and 4.8%(n=1) implant scoring between 2.0-3.0 in the visits. In the 6th month, 1 implant (4.8%) showed signs of severe inflammation, which persisted even after the 6th month. The rest of the implants showed a general trend of a decrease in gingival bleeding, with 61.9% (n=13) of implants scoring between 0.1-1.0, and 28.6% (n=6) scoring between 1.0 – 2.0. Distribution number of implants according to Bleeding Index in different depths. The median of the bleeding scores of all the implants, recorded at each follow up visit was calculated, the values of which were 1.87, 0.5, and 0.5 in the 1st, 6th and 12th month respectively. P value for implant bleeding index is >0.05, indicating that differences are not significant between the months.

The level of the marginal bone loss was classified into groups of 0.5mm-3mm.The resultant data was classified and tabulated(Table-1). It was found that in the 1st month, all the implants (100%, n=21) showed a negligible bone loss, i.e. within 0.5mm. In the 6th month, 95.23% (n=20) of implants exhibited a mild loss of bone height of 0.5 to 1mm and 4.77% (n=1) implant exhibited moderate loss of bone height of 1.5-2.0mm. By the 12th month, 2 implants (9.52%) had bone loss levels below 1mm, and 18 (85.71%) implants had bone loss levels between 1-1.5mm and 1 implant (4.77%) had bone loss level > 3.0mm. The condition of this implant deteriorated subsequently, showing marginal bone loss between 1.5-2mm in the 6th month, and more than 3mm by the 12th month. It was also accompanied by the development of peri-implant and an apical.

Graph 3: Distribution Of Patients According Bleeding Index.



Graph 4: Level of Bone Loss in Different Months.



Conclusion

Within the limits of this study, the results demonstrate that, by following proper diagnostic treatment planning criteria, a flapless implant placement protocol achieves predictable results (95.46% cumulative success rate). The benefits of this procedure are lessened surgical time, perceived minimized bleeding, and minimal changes in crestal bone loss and probing depth. Although not measured, there was perceived lessened postoperative discomfort when compared with an open approach.

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