Comparative Evaluation of Flap Versus Flapless Implant Surgery Along With Immediate Loading Over An 8 Month Period: A Pilot Study

Abstract

Purpose: To evaluate and compare flapless and conventional implant surgery along with immediate loading during a eight month period.

Materials and Methods: Twelve patients having single tooth edentulous site, desiring and indicated for implant, were divided in Group A (Flapless Group) and Group B (Flap Group). All the implants were placed with a minimum torque of >35 Ncm and were immediately loaded. The final prosthesis was delivered on the 14th day. Outcome measures were implant mobility, postoperative swelling and pain, probing pocket depth, plaque index, and crestal bone level.

Results: There were no statistically significant differences for probing pocket depth, plaque index and mean crestal bone level. However, statistically significant result was found while comparing pain and swelling. Patients experienced less pain and swelling in Group A compared to Group B.

Conclusions: Implants can be successfully placed using flapless technique and loaded immediately, reducing treatment time and patient discomfort.

Keywords - Crestal bone level; conventional implant surgery; dental implant; flapless surgery;immediate loading

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Introduction

Dental implants have undoubtedly been one of the most significant scientific breakthroughs in dentistry over past 30 years.[1] It has now become the first choice of replacement of missing teeth. Treatment success are high and post-operative complications relatively modest.[2]

Development of newer and finer techniques is a hallmark of all surgical specialities. Implant dentistry is nonetheless behind when advances are concerened. Over the years, there has been an inclination towards minimally invasive implant techniques. The dental literature has documented that the more invasive the surgical procedure, the higher the likelihood of loosing both alveolar bone and soft tissue, including dental papilla.

Flapless surgery as a method of dental implant placement is gaining popularity among dental surgeons. The increase use of this method can be attributed to improvements in radiologic technologies and dental implant treatment planning software, as clinicians can now acquire 3-dimensional images of potential implant sites before surgery.[3] By using 3 dimensional (3D) radiographic techniques, such as cone beam computed tomography (CBCT), anatomic limitations, bone morphology and the surgical site underneath the soft tissue can be evaluated precisely.

Therefore, it is now possible to pre-surgically determine with a high degree of accuracy and with 3D views, the best position for implant placement and to plan the implant position and inclination, based on the final prosthetic outcome.[4]

Osseointegrated dental implants have traditionally been placed in accordance with a 2-stage protocol. Early attempts to load the implant earlier were associated with increased failure rates. This meant the patient had to wait a significant time before prosthesis placement and often had to wear suboptimal provisional prosthesis[5]. The benefits of "Immediate Function" are shortened treatment time, better clinical efficiency and less trauma to the patient and better patient acceptance.

Immediate loading of dental implants in selected patients can be as successful as waiting for a conventional healing time when implants of adequate lengths are placed with insertion torques superior to 32 Ncm.[6]

From a patient's perspective it would be ideal to obtain a functional fixed prosthesis on the same day of implant placement, with a minimal surgical intervention as it would reduce discomfort, treatment time and costs if the risk of implant failures is not increased.[5]

Hence, the aim of this study is to evaluate and compare flapless and conventional implant surgery along with immediate loading during an eight month period.

II. Materials and Methods:

The study was conducted on patients with single tooth edentulous sites desiring and indicated for dental implants for rehabilitation. The patients were selected irrespective of their caste, creed and sex from the Department of Periodontics and Oral Implantology, Santosh Medical & Dental College and hospital, Ghaziabad, NCR Delhi.

A total of twelve single tooth edentulous sites in twelve patients were selected for the proposed study. The sites were randomly divided into 2 groups. Group A: Implants placed using Flapless technique. Group B: Implants placed using conventional Flap technique. Patients were not accepted into the study if any of the following exclusion criteria were present:

Local

a) Need for simultaneous hard or soft tissue grafting.
b) Active infection or severe inflammation in the areas intended for implant placement.
c) Treatment with therapeutic radiation to head and neck region within past 12 months.
d) Lack of opposing occluding dentition/prosthesis in the area intended for implant placement.
e) Severe bruxism or clenching.
f) Absence of adequate keratinized mucosa at the site of implant placement.
g) Unable or unwilling to comply with study procedures and visits.
h) Smokers.

Systemic

a) A medical history that would complicate the outcome of the study, or any other medical, physical, or psychological reason that might affect the surgical procedure or the subsequent prosthodontic treatment that require follow ups.

All patients understood and signed a written informed consent form in order to be enrolled in this trial. All patients received prophylactic antibiotic therapy of amoxicillin (1gms) one hour prior to the surgery. Patients allergic to penicillin were advised 500mg azithromycin. The surgical field was prepared using povidone iodine solution and the areas were anesthetized using 1:2,00,000 local anes-thesia.

For Group A (flapless surgery) in the recipient implant sites, a core of soft tissue was removed from over the crestal bone, with the help of a tissue punch (Figure1).

In Group B (flap Surgery) a crestal incision was given (figure -2) and a Full thickness mucoperiosteal Flap was elevated To expose the Underlying alveolar bone.

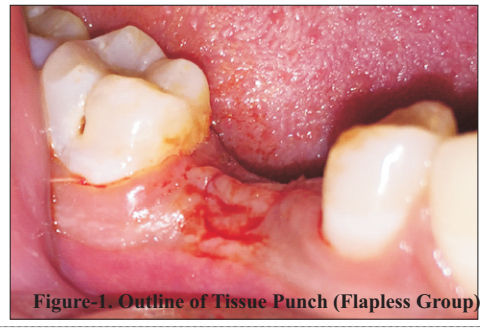

Figure-1. Outline of Tissue Punch (Flapless Group)

Figure 2: Incision (Conventional Flap Group)

For both the groups an implant osteotomy was performed, guided by a surgical stent (Figure-3) Pilot drill was used to establish the depth and align the long axis of the implant recipient site. Sites were subjectively felt at initial drilling to be characterized by medium or soft.

Figure3: Surgical Stent in Place

Then a series of drills were used sequentially according to manufacturer's instructions to widen the osteotomy site. To be immediately loaded implants had to be inserted at a minimum torque of 35Ncm. To achieve this resistance to implant insertion was objectively recorded with a motor torque device, which was set at 35Ncm. Once the motor stopped, the implant was manually inserted with torque wrench. Once the implant was inserted rigid abutment was placed and tightened at a torque of 30 Ncm (figure 4).For Group B sutures 3-0 (silk, vicryl) were given (Figure 5).

Figure 4: Rigid abutment tightened

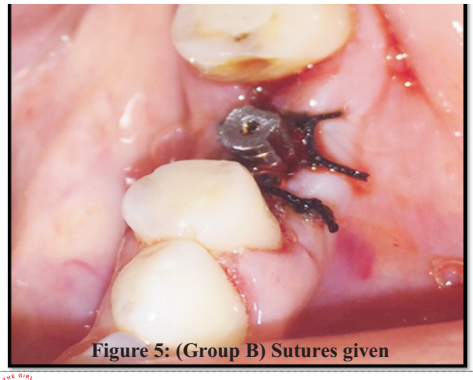

Figure 5: (Group B) Sutures given

The prosthetic procedure was similar for both the groups. Immediately after the surgery provisional crowns were fabricated with the help of a pre-fabricated surgical stent and temporization material (figures6a,b). Provisional restoration was immediately delivered and implant provisionally loaded (out of occlusion).

Figure 6a:Temporary prosthesis deli-vered(Group A)

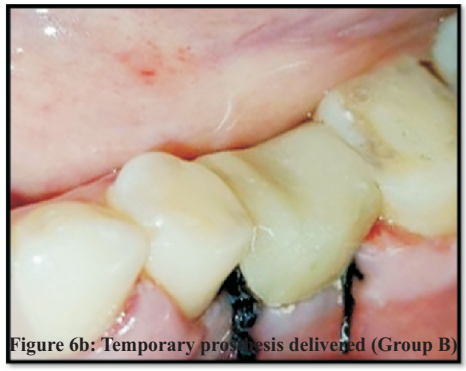

Figure 6b: Temporary prosthesis delivered (Group B)

Post-surgical instructions

After surgery patients were instructed to apply ice pack on the surgical site and were discouraged for spitting for 24 hours and for brushing at the site. Antibiotics were prescribed for 5 days post-operative. Analgesics were prescribed to be taken during meals twice a day. Along with this soft diet was advised.

Follow up

All the patients were called for a follow up the next day. For Group B patients the sutures were cut on the 10th day.

Prosthetic phase

For both the groups on the 12th day the provisional restoration was removed and an abutment level impression was taken with silicone rubber base impression material for fabrication of final prosthesis. The final prosthesis was delivered on the 14th day and kept in centric contact with no excursive contacts. (Figure 7a, b)

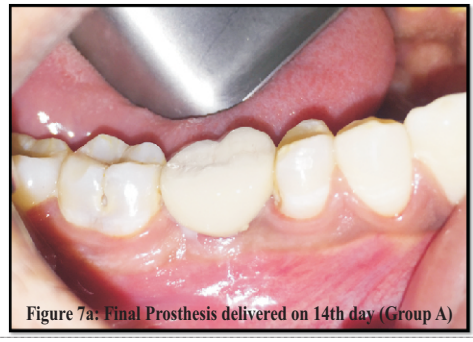

Figure 7a: Final Prosthesis delivered on 14th day (Group A)

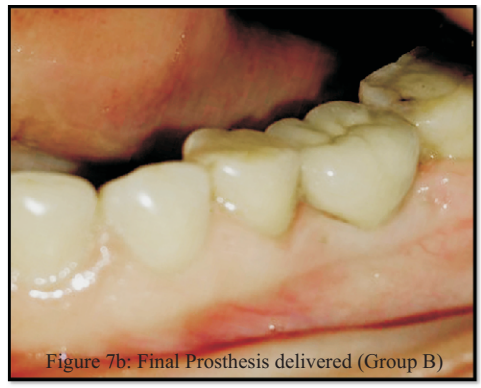

Figure 7b: Final Prosthesis delivered (Group B)

The outcome measures evaluated for the present study were:

Clinical parameters:

Implant Mobility: It was measured at the time of loading using two dental instruments handles placed on the buccal and palatal aspects of the crown by a method described by Ericsson et al.[7]

Postsurgical pain and postsurgical swelling: Patient self reported postoperative pain and swelling: the level of postoperative pain and swelling was recorded. The patients were seen 3 days after implantation procedure for a check up to assess the degree of pain that they felt. Pain and swelling was scored according to the following ordinal scale.[5]

0 No pain/swelling
1 Mild pain/swelling
2 Moderate pain/swelling
3 Severe pain/swelling

Plaque Index (PI).

Probing Pocket Depth (PPD)

PI and PPD was evaluated at the time of loading, 4 months and 8 months.

Radiographic parameter

Crestal bone level on buccal, lingual, mesial and distal aspects of the implants were measured considering using the apex of the implant as the reference point upto the crest, with the help of a CBCT. Radiographic parameters were assessed at the time of loading, at 4 and 8 months

Statistical analysis

Statistical analysis was done using Unpaired or independent t-test.

Results

The success rate of our study was 100% in both the groups.The probing pocket depth at end of 8 months for Group A was 1.51± 0.71 and for Group B 1.47± 0.75(Figure 8).The plaque index at the end of 8 months for Group A was 0.34 ±0.17 and for Group B was 0.40±0.19 (Figure 9). Comparison of plaque index and probing pocket depth was done between both the groups and the values were found to be non-significant ($p>0.05$). The mean of patient reported pain for Group A is 0.20±0.47 and for Group B is 1.0±1.0. The mean of patient reported swelling for Group A is 0.40±0.55 and for Group B is 1.0±1.23 (Figure 9,11).The results for both are statisticallysignificant (p-value ≤ 0.05).

The mean crestal bone loss for Group A at 8 months was 11.50±0.25 and for Group B was11.43±0.24 (Figure 10). The difference is non-significant (p-value ≤ 0.05).

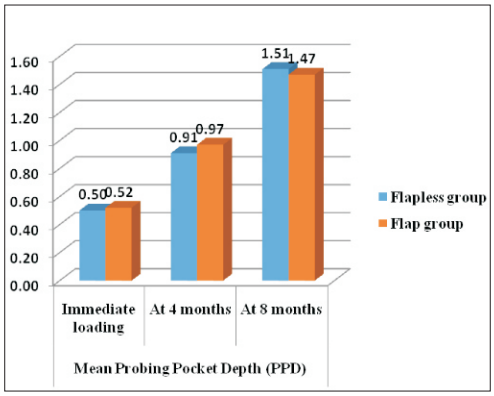

Figure 8:Graph showing Difference in Mean Pocket Depth

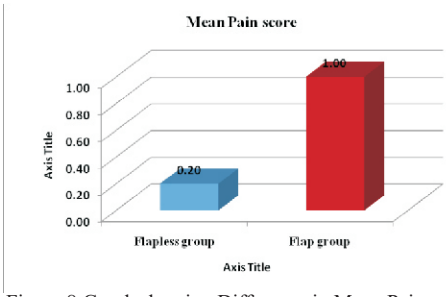

Figure 8:Graph showing Difference in Mean Pain score in both groups

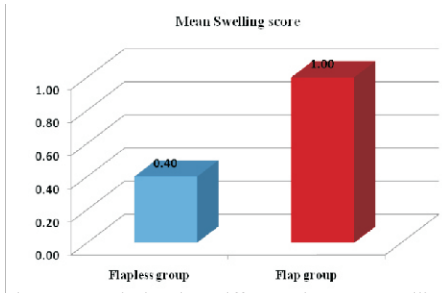

Figure9: Graph showing Difference in Mean Swelling score in both groups

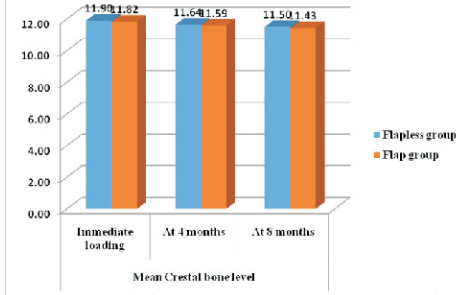

Figure 9: Graph showing Difference in Mean Crestal Bone Level in both groups.

Discussion

There was no statistically significant difference when PPD was compared for both the groups over 8 month period. The reason for this could be that the patients in our study followed post-operative instructions given to them.

The assessment of post-operative pain and swelling was patient reported, as there is a risk of bias when the operator assess their own interventions. This is similar to the method described by Cannizaro (2011)[8].Patients reported statistically significant less post-operative pain (p-value≤0.05) and swelling (p-value≤0.05) in flapless surgery group. Esposito et al. conducted a meta-analysis and concluded that flapless implant placement is feasible and reduces patient postoperative discomfort, emphasiz-ing the importance of correctly selecting the patients, which is also the conclusion of our study. The results of our study is in substantial agreement with previous trials by Fortn T et al. (2006)[9], Cannizaro G (2008)[5], Van De Velde T(2010)[10].That suggested patients treated with flapless approach had less post-operative morbidity than those subjected to flap elevation. In contrast, one trial by Lindeboom JA(2010)[11]including only 16 patients with fully edentulous maxilla, 8 treated with the flapless approach and 8 after flap elevation, suggested that patients subjected to flapless surgery suffered more and this reference is very difficult to explain.

According to Alberktsson's success criteria, the average marginal bone loss should be <1.5 mm during the first year of functional use of implant. The comparison of mean crestal bone loss between Group A and Group B was found to be statistically insignificant. In Group A the mean crestal bone loss at 8 months was 0.3mm and for Group B also was 0.3mm. This means that flap elevation does not negatively affect the peri implant marginal bone loss. These results were similar to a study done by Cannizaro G et al. (2011)[8] in which he found no statistically significant difference in mean crestal bone loss between both the groups. In Flapless group they reported 0.2mm and in flap group 0.3mm bone loss in the first year. However, in another study conducted by Malo P and Nobre M(2008)[12] flapless technique revealed more marginal bone resorption compared to flap technique. However, none of these studies used CBCT as a prime criteria to evaluate bone loss as done in our study.

Conclusion

The results of our study indicate that patients treated with flapless approach had less postoperative morbidity than those subjected to flap elevation. Thus, from a patient's perspective flapless implant placement is a more comfortable procedure. Taking together the result of the present study and other trials, it can be concluded that flapless placement of dental implants can be successful, if the case is properly selected and planned.

Our study did not follow a split mouth design which would have ensured minimizing the effects of interpatient variability. Other limitations include short sample size, the number of included patients, which may be too low to detect statistically significant difference in prosthesis/implant failure, short-term follow up. The major limitation of the study is the implants in flapless group in our study were placed free hand. However, if the implants in the flapless group would have been placed using a guided surgical stent the risk of fenestration would have been reduced.

References:

References are Available on Request At editor@healtalkht.com

"ZEST- 2015" by Jamia Milia Islamia was held on October 3rd -6th 2015, Participated by Manav Rachna Dental College Students.

On first day i.e 3rd October , in Jamia Sports Complex, MRDC- cricket team participated and scored a score of 58 runs against MAIDS, MAIDS won the match by four wickets. Kanika Kanodia Won 1st prize in table tennis singles, Lisha won 2nd prize in carom singles, Nitin Bhadana won 3rd prize in chess, In Rangoli. Theme was festive India, in which Varsha, Neha kumari, lakshmi won 1st prize. Second competition was Hindi Debate in which Nida Ansari stood 3rd. In Dental Material Art competition, Varsha & kanika won 1st prize. Student coordinators, Aman Thapliyal & Vikas swami managed all the participants under the supervision of Dr Sridhar Kannan & Dr Nipun.

"ZEST- 2015" by Jamia Milia Islamia was held on October 3rd -6th 2015, Manav Rachna Dental College students participated with full spirit under the able guidance of Dr Naresh Sharma, Reader, Deptt of Pedodontics.

Dr Arundeep Singh, Principal congratulated all the participants. He has also shared their experiences & motivated them to excel in future Endeavour's too .Indeed a Proud moment for MRDC.