Research Article

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Evaluation of Marginal Bone Around Dental Implants Supported by Fixed Partial Prosthesis: An In-Vivo Study

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ABSTRACT

Aim: To systematically evaluate the radiographic marginal bone level changes around dental implants taking into consideration bleeding upon probing and probing depth.

Materials and Methods: Fifteen implants were placed in this study. Radiographic investigations and evaluations of the implant site were carried out at intervals of 0, 3 and 6 months' time. The radiographic findings were also co-related with the clinical findings. The subjective and objective criteria was used to evaluate the success of the implant process.

Results: Marginal boneloss is seen in mesial and distal sides of implant. Continuous reduction was observed in bleeding index, while pocket probing depth (mesial buccal, lingual and distal sides) at each time interval is increasing.

Conclusion: The present study suggests that marginal boneloss is more towards mesial side than distal side. Pocket probing depth was increased by the time interval.

Keywords: Implant, Boneloss, probing depth.

INTRODUCTION

Over the years, traditional methods of tooth placement are slowly and steadily being replaced by newer modalities. The placement and restoration with endosseous dental implants have become routine dental procedures that offer high success rates when suitable planning and protocols are followed.

Implants get attached to bone through a complex phenomenon of osseointegration and this process occurs due to continuous modelling and remodeling of bone. During this modelling and remodeling of bone, marginal bone loss takes place. Marginal bone loss is evaluated radio graphically and is usually no greater than 1.5 mm in the first year. The timing of radiographic evaluation is important. In some studies the first X ray is obtained on placing the prosthesis, while other studies it is obtained on placing the implant. Bone loss may depend upon the location of the upper part of the implant in relation to the alveolar crest, the creation of an interface (micro gap) between the implant components and the type of neck and platform of the implant.

Tooth restorations using implant-supported prostheses for functional and esthetic rehabilitation

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of patients has become an established and widely used treatment modality in modern dentistry. Only with careful considerations of the biological principles of the peri-implant soft and hard tissues, as well as an appropriate selection of implant type and position, can a functional and esthetic treatment result be achieved.

MATERIALS & METHODS

Patients were selected from the Department of Prosthodontics &Implantology, DJ College of Dental Sciences and Research, Modinagar, irrespective of socio-economic status, religion, age and sex.

INCLUSION CRITERIA:

1. Partially edentulous posterior mandibular arches
2. Healed extraction socket
3. Stable and functional occlusion
4. Sufficient interocclusal space for placement of implants

EXCLUSION CRITERIA:

1. Presence of any local or systemic diseases which contraindicates surgery example uncontrolled diabetes, cardiac or neuromuscular diseases.
2. Use of drugs such as steroids, need to be carefully considered.
3. Pregnant or lactating females.

The implant size was predetermined both in width and length and they were selected according to the bone mapping and with the help of radiographic evaluation after taking into account the magnification error with the help of radiographic template having a ball bearing embedded in it. The screw type implants (two piece implants) were used. The implant used in this study were of **ADIN**.

After 14 days of second stage surgery soft tissue healing was assessed. Then impression was made with the impression coping attached to the implant using the closed tray impression technique. The impression was made with rubber base impression material consisting of putty, universal activator and light body activator. Following complete setting of the impression material. The tray was removed from the mouth. After careful inspection of the impression, stability of the impression, copying and accurate recording of relevant hard and soft tissues were confirmed. The shade of the prosthesis was taken with VITA 3D shade card. Then the impression coping was fixed in the impression and implant analogue was fitted on this coping. Now the impression was poured with die stone after inserting impression post and dispatched to lab. After receiving the metal ceramic crown from the lab, the crown was cemented with glass ionomer luting cement on the abutment after establishing proper occlusion.

RESULTS

The difference from baseline to 3 months, 3 months to 6 months Boneloss was measured and its significance was assessed by paired' test.

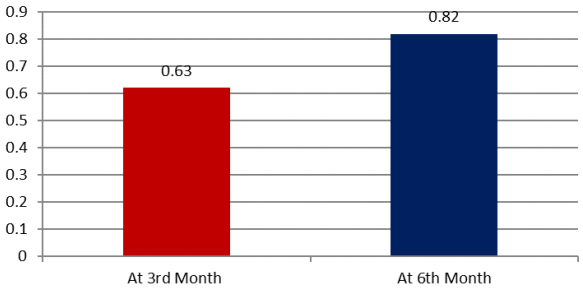
Table 1(a). Comparison of crestal bone loss on mesial side between two intervals

	Mean	Std. Deviation	Mean Diff	T value	P value	Significance
At 3rd Month	0.63	0.13	0.19	4.057	0.001	Significant
At 6th Month	0.82	0.10				

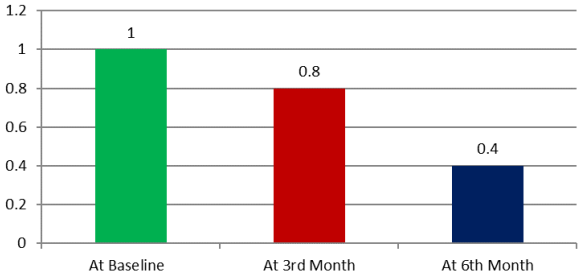
Table 3. Comparison of bleeding index scores between three intervals

	Mean	Std. Deviation	Mean Diff	T value	P value	Significance
At Baseline	1.00	0.53	0.200	1.876	0.189	Non-Significant
At 3rd Month	0.80	0.56				

	Mean	Std. Deviation	Mean Diff	T value	P value	Significance
At Baseline	1.00	0.53	0.200	1.876	0.189	Non-Significant
At Baseline	1.00	0.53	0.600	4.583	0.001	Significant
At 6th Month	0.40	0.50				
At 3rd Month	0.80	0.56	0.400	2.449	0.028	Significant
At 6th Month	0.40	0.50				



Graph 1: Bar Diagram of Mean values of Crestal bone loss (Mesial) at different time intervals.



Graph 2: Bar Diagram of Mean values of Bleeding Index at different time intervals.

DISCUSSION

The most important criteria for the success of dental implant is the presence of good amount and quality of bone around the implants, especially the crestal bone. However, early peri-implant bone loss have been commonly observed. Adell et al were the first to quantify and report marginal bone loss. Their study indicated greater magnitude and occurrence of bone loss during the first year of prosthetic loading.

Stellingsma et al (2004) described that the success criteria for implant include an acceptable bone loss of 1.5 mm within the first year of implant service, but subsequent resorption should be less than 0.2 mm annually to ensure that adequate bone remains to provide stability to the implant. Among the potential causes described above, many can be avoided by the clinician through proper treatment planning and patient management, while others can be evaluated/ avoided through engineering concepts. It is important to note that in most cases there is not a single factor but the synergy of various causes mediating the progressive mineralized tissue loss around dental implants.

The results obtained from the above study shows the **marginal bone loss** that has taken place mesially and distally from baseline to 3rd month postoperatively was 0.63 mm mesially and 0.62 mm distally, whereas the marginal bone loss that has occurred at mesial and distal sides from baseline to 6th month was 0.82 mm mesially and 0.76 mm distally. There was more bone loss at mesial side as compared to distal side. This may be because the tendency for stress concentration might have occurred at the mesial areas, rather than at the distal areas as **Loris Prosper et al (2009)** suggested. It was further observed that the enhanced stress occurred mainly at the bone crest adjacent to the mesial surface of the implant. Misch also mentioned that initial bone loss started at the mesial area, and only interproximal bone loss could be measured on radiographs.

Similar studies conducted by **Mertens Carone et al (2012)** determined mean bone loss of 0.78 ± 0.49 mm after 2 years of loading. Another study conducted by **Zhihui Tang et al (2000)** assessed crestal bone loss 1 years after loading by conducting a clinical and radiographic evaluation and the average crestal bone loss observed was 0.66 mm.

In our study the marginal bone loss that has occurred from baseline to 3rd month was 0.63 mm

on the mesial side and 0.82 mm on the distal side hence the marginal bone loss occurred during this period was found to be statistically highly significant, the marginal bone loss that has occurred from 3rd month to 6th month was 0.62 mm on the mesial side and 0.76 mm on the distal side, here we found that the marginal bone loss occurred during this period decreases with time but still it is significant.

Present study is in accordance with another study conducted by **Blanes et al (2007)** who assessed crestal bone loss 1 years after loading by conducting a clinical and radio graphic evaluation and the average crestal bone loss observed was 0.21± .38 mm. **Aj Flichy-Fernandez (2011)** evaluated marginal bone loss after 6 months after implant surgery shows also a significant bone loss with 0.72 mm mean value.

CONCLUSION

Fifteen implants were placed in different individuals. In the followup period it was concluded that marginal boneloss is more towards mesial side rather than in distal side. Continuously bleeding index score is decreased and probing depth increased as the followup time interval increases.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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