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EFFECTIVENESS OF CONVENTIONAL/DELAYED LOADING, EARLY LOADING AND IMMEDIATE NON OCCLUSAL LOADING OF SINGLE IMPLANTS BY ASSESSING PERI-IMPLANT MARGINAL BONE LEVEL, WIDTH OF ATTACHED GINGIVA AND PROBING DEPTH

Dental Science

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ABSTRACT

Aim: To compare the effectiveness of conventional/delayed loading, early loading and immediate non occlusal loading of single implants by assessing peri-implant marginal bone level, width of attached gingiva and probing depth.

Material and Method: Twenty one patients requiring single tooth replacement were selected from the OPD of Department of Periodontics. In group I, 7 implants were placed at healed sites following standard two stage procedure of implant placement. In group II, 7 implants were placed at healed sites following which a healing abutment was placed at stage I surgery. Following which a definitive restoration was placed on definitive abutment 3 weeks after surgery. In group III, 7 implants were placed at healed sites following which a definitive abutment was placed at stage I surgery. Following which a provisional restoration was placed on definitive abutment a day after surgery. The soft tissue evaluation was done after 6 months in all the three groups.

Results: Probing depth change from baseline to 6 months the mean ± SD for group I was -0.25±0.59 mm, for group II -0.35±0.24 mm and for group III -0.35±0.34 mm was observed. Change in width of attached gingiva was statistically insignificant among the groups.

Conclusion: The results are conclusive of the fact that the placement of definitive abutment at stage I surgery leads to better results.

KEYWORDS

Implant, Delayed Loading, Peridontal Health

INTRODUCTION:

The goal of modern dentistry is to restore the normal contour, function, comfort, esthetics, speech and health, regardless of the loss of hard and soft tissue atrophy, disease or injury of stomatognathic system. Implant dentistry is the second oldest discipline in the dentistry; Exodontia being the first. History shows that it has always made sense to replace a tooth with an implant in the approximate shape of a tooth[1].

Initially implant protocol involving two stage surgeries was recognized as providing reproducible and reliable results. Later a single stage surgical procedure became acceptable. Further, the waiting period for bone healing was shortened; instead of 3 to 8 months, no more than 6 to 8 weeks were deemed necessary. Implant loading, are immediate, early or conventional delayed loading[2].

It is therefore important to evaluate whether predictable results can also be obtained when loading dental implants immediately or early in more critical situations, such as in the replacement of single teeth[3]. Thus, the aim of this study is to compare the effectiveness of conventional/delayed loading (group I), early loading (group II) and immediate non occlusal loading (group III) of single implants by assessing peri-implant marginal bone level, width of attached gingiva and probing depth.

MATERIAL AND METHODOLOGY:

Twenty one patients requiring single tooth replacement were selected from the OPD of Department of Periodontics. Patients irrespective of gender were selected following the inclusion and exclusion criteria of the study.

Inclusion Criteria:

Patient having age between 18-50 years, having single tooth missing with adjacent and opposing teeth present and having intact adjacent teeth (restored with functionally & esthetically good restorations; restored with prosthesis precluding the addition of the missing tooth).

Exclusion Criteria:

Patients with history of smoking, active infection in site intended for implant placement, psychoses or dental history of bruxism & parafunctional habits, systemic disease that compromise osseointegration (e.g. uncontrolled diabetes), pregnancy/lactating mother, patients on intravenous bisphosphonates and patients with recent history of radiotherapy.

In group I, 7 implants were placed at healed sites following standard two stage procedure of implant placement. In group II, 7 implants were placed at healed sites following which a healing abutment was placed at stage I surgery. Following which a definitive restoration was placed on definitive abutment 3 weeks after surgery. In group III, 7 implants were placed at healed sites following which a definitive abutment was placed at stage I surgery. Following which a provisional restoration was placed on definitive abutment a day after surgery.

Assessment:

Pre-operative analysis of surgical site was done clinically and by using an OPG. Diagnostic impressions were made of maxillary and mandibular arch using irreversible hydrocolloid material (Plastalgin, Septodont, France) and casts were made using dental stone (Type III). The following parameters were assessed from the diagnostic models:

1.Length of edentulous span (Mesiodistal and buccolingual width)
2.Interocclusal distance

A wax-up was done on articulated diagnostic models over which a template was fabricated using clear autopolymerising acrylic resin. The purpose of fabrication of surgical template was to provide sufficient information about the desired crown contour and it facilitated three dimensional fixture placements.

Surgical Procedure:

The surgical site was prepared following surgical protocol and was anesthetized using 2% lignocaine hydrochloride with epinephrine (1:200,000). A full thickness mucoperiosteal flap was raised at the site of implant placement. Following elevation of flap surgical stent was placed at the site of implant placement and optimal implant location was then marked using a surgical round bur with the guidance of surgical template. After the site was correctly marked, surgical template was used to guide the pilot drill to prepare an osteotomy site of appropriate designated length. After confirmation of depth and angulation, the osteotomy site was prepared by a series of gradually wider drills (D2.8, D3.2, D3.65, D4.3, and D5.2) to the requisite width with a speed of 1200–1400 rpm at 1:20 reduction torque as per the manufacturer instructions. Paralleling pin was placed to check for the parallelism. The implant was placed into the osteotomy site 0.5mm-1mm subcrestally as the implant collar is not polished. For Group I cover screws were placed following implant placement and the site was sutured (4-0 Vicryl Ethicon, Johnson & Johnson).

Evaluation of Crestal Bone:
The crestal bone was evaluated around the definitive abutment after placement of provisional/definitive restoration, at baseline (after loading) and 6 months using CBCT.
T0: After loading
T1: After 6 months of implant loading

Evaluation of Soft Tissue:
The soft tissue evaluation was done after 6 months in all the three groups. The soft tissue evaluation included width of attached gingiva and probing pocket depth (PPD) measured at four points (mesio-buccal, mid-buccal, disto-buccal and mid-lingual) of each implant to be recorded.

RESULTS:
In group I the change in mean crestal bone level change from baseline to 6 months on buccal, lingual, mesial and distal sites were 0.47±0.14mm, 0.49±0.15mm, 0.49±0.14mm and 0.49±0.14mm respectively, in group II 0.50±0.09mm, 0.43±0.07mm, 0.45±0.08mm and 0.44±0.06mm respectively and in group III 0.43±0.08mm, 0.43±0.06mm, 0.39±0.06mm and 0.46±0.08mm respectively.

Probing depth change from baseline to 6 months the mean ± SD for group I was -0.25±0.59 mm, for group II -0.35±0.24 mm and for group III -0.35±0.34 mm was observed. Statistically non-significant difference was observed (table 1).

Table 1: Intergroup comparison of pocket probing depth between group I, group II and group III at baseline, 6 months and change from baseline to 6 months

Time	Level	Group I		Group II		Group III		p-value
		Mean	SD	Mean	SD	Mean	S.D.	
Baseline (At The Time Of Loading)	Pocket Probing Depth	1.10	.32	1.3	.350	1.75	.540	0.103
6 Months (After Loading)	Pocket Probing Depth	1.35	.41	1.65	.242	2.1	.510	0.094
Change From Baseline To 6 Months	Pocket Probing Depth	-.25	.589	-.35	.242	-.35	.337	0.826

Change in width of attached gingiva from baseline to 6 months the mean ± SD for group I was 0.45±0.15 mm, for group II 0.45±0.15 mm and for group III 0.40±0.21 mm was observed. Statistically non-significant difference was observed (table 2).

Table 2: Intergroup Comparison Of Width Of Attached Gingiva Between Group I, Group Ii And Group Iii At Baseline, 6 Months And Change From Baseline To 6 Months

Time	Level	Group I		Group II		Group III		p value
		Mean	SD	Mean	SD	Mean	SD	
Baseline (At The Time Of Loading)	Width Of Attached Gingiva	1.80	.48	1.7	.422	1.8	.483	0.857
6 Months (After Loading)	Width Of Attached Gingiva	1.35	.41	1.25	.354	1.4	.394	0.681
Change From Baseline To 6 Months	Width Of Attached Gingiva	.45	.158	.45	.158	.4	.211	0.769

DISCUSSION:
During the course of the study, wound healing was uneventful in all the three groups. All 21 implants remained stable and showed no signs of pain, suppuration or peri-implant infection throughout the study.

In this study, in group I the change in mean crestal bone level from baseline to 6 months on buccal, lingual, mesial and distal sites were 0.47±0.14mm, 0.49±0.15mm, 0.49±0.14mm and 0.49±0.14mm respectively, in group II 0.50±0.09mm, 0.43±0.07mm, 0.45±0.08mm and 0.44±0.06mm respectively and in group III 0.43±0.08mm, 0.43±0.06mm, 0.39±0.06mm and 0.46±0.08mm respectively. The statistical analysis shows non-significant difference with p-value more than 0.05. The mean statistical difference of all the sites between group I, group II and group III are 0.42mm, 0.45mmand 0.49mm respectively. The difference in bone level change between group I and group III is 0.07 which is statistically non significant. This statistical result was in accordance with the study carried out Francesco P et al in 2009[4] and Degidi et al in 2011[5].

In the present study, the increased amount of bone loss seems to be as a result of disuse atrophy caused due to lack of stimulation of periimplant tissues. Tiziano T and coworkers reported that extraneous lateral loads and stresses on the nonloaded, covered implants could be responsible for increased bone loss in the control group in the first 12 months after implant placement. In fact, the provisional removable denture is responsible for a "mucosal load" on the unsplinted implants[6]. Immediately loaded implants showed approximately 0.6 mm bone loss in the first 12-month period, and the same amount or more in the second year. In contrast, conventionally loaded implants exhibited almost the same loss as immediately loaded implants in the first year but smaller magnitudes of loss in the second year. Early-loaded implants showed the least amount of bone loss in the first and second 12-month periods[7].

CONCLUSION:
The results are conclusive of the fact that the placement of definitive abutment at stage I surgery i.e. immediate loading results in a lesser vertical bone loss around implants followed by early loading and then by delayed loading i.e. by standard two stage procedure of implant placement after 6 months from the time of loading.

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