



Original Research

A Clinico-Radiographic Evaluation of Single Tooth Replacement by Immediate Implants Covered With and Without Connective Tissue Grafts As A Biological Barrier- A Comparative Study

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Abstract

Background: Immediate implant placement into fresh extraction sites is the most advanced treatment modality. The use of a connective tissue graft will be first described for immediate implants, as a biological barrier to cover the residual alveolar defect with an immediate implant, allowing for the undisturbed healing of Peri-implant deep tissues. Hence; the present study was undertaken for clinically and radiographically evaluating crestal bone level around immediate implants with and without connective tissue graft. **Materials & Methods:** 30 patients were randomly allocated to the immediate implant without connective tissue graft group (n-15) or the immediate implant with connective tissue graft group (n-15). The implants in the immediate group were placed on average immediately following tooth extraction. The tooth in question was extracted using a method involving minimal trauma to the bone and surrounding soft tissues. Asulcular incision along the buccal aspect of the planned implant site and a vertical bevelled releasing incision to spare the adjacent papillae were given. A full-thickness flap was elevated and extended beyond the anticipated apical extension of the pre-planned implant length. The stability of the implant and health of the peri-implant soft tissue were clinically evaluated at baseline, three months and six months and nine months after implant placement.

Results: Mean values of plaque index showed an increase from third to sixth month and then decreased in ninth month. This pattern was observed in both the control (without CTG) and test (with CTG). Results showed slightly higher mean difference of width of keratinized gingiva in baseline to third month than in baseline to sixth month and baseline to ninth month intervals and this difference were found to be statistically significant. **Conclusion:** Immediate implant placing reduces alveolar resorption. The use of connective tissue graft (CTGs) has improved the esthetic outcome of dental implants, mainly due to enhancing alveolar bone contours.

Key words: Dental, Implant, Graft

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INTRODUCTION

Advances in technology have contributed to a decrease in edentulism worldwide; yet tooth loss is still a reality. In this context, the number of partially edentulous individuals requiring prosthetic treatment has been increasing. There are various treatment modalities available of replacement of missing teeth. Among which dental implant placement is the most advanced treatment modality. In Delayed implant placement bone healing, the patient undergoes two surgical procedures.¹⁻³

Immediate implant placement into fresh extraction sites is the most advanced treatment modality. It has been demonstrated that the immediate implant reduces the alveolar resorption. When jumping distance greater is greater than 2mm the use of barrier membrane has been recommended to obtain bone regeneration and to prevent soft tissue growth, at the bone – implant interface. Soft-tissue grafting

techniques have often been proposed for use during immediate implant placement to augment soft-tissue deficiencies, including the use of either palatal connective tissue grafts (CTGs) or collagen-derived scaffolds.⁴⁻⁶

The use of a connective tissue graft will be first described for immediate implants, as a biological barrier to cover the residual alveolar defect with an immediate implant, allowing for the undisturbed healing of Peri-implant deep tissues. It is considered to be gold standard as it provides a dual blood supply thus increasing the healing capacity of tissue thereby increasing the aesthetic outcomes. Thus, the present study was designed to evaluate the efficacy of surgical protocol using immediate implant with or without sub epithelial connective tissue graft for single tooth replacement.⁷ Hence; the present study was undertaken for clinically and radiographically evaluating crestal bone level around immediate implants with and without connective tissue graft.

MATERIALS & METHODS

A prospective randomized comparative study was conducted in total of thirty fresh extraction implant sites, in both 8 male and 7 female patients within the age group of 18 to 65 years, comprising of both male and female visiting the Out-Patient Department of Periodontics, Himachal Dental College, Sunder Nagar H.P. Approval for the study had been obtained from institutional ethical committee. The patients were randomly allocated to the immediate implant without connective tissue graft group (n-15) or the immediate implant with connective tissue graft group (n-15). The implants in the immediate group were placed on average immediately following tooth extraction; Each patient was explained in detail about the risk and benefits of participation in this study. The patient was scheduled for implant surgery after phase I therapy. All the surgical procedures were performed under local anesthesia and strict aseptic conditions (Fig. 1 and 2). Facial skin all around the oral cavity was scrubbed with Povidone iodine solution (5%) and the patient was made to rinse with 0.12% Chlorhexidine digluconate mouthrinse for one minute prior to surgery. The area of surgery was anesthetized using 2% lidocaine with adrenaline concentration of 1:80000. The tooth in question was extracted using a method involving minimal trauma to the bone and surrounding soft tissues. A sulcular incision along the buccal aspect of the planned implant site and a vertical bevelled releasing incision to spare the adjacent papillae were given. A full-thickness flap was elevated and extended beyond the anticipated apical extension of the pre-planned implant length. Lindermann drill was put to use for creating the osteotomy site of approximate depth for implant

placement. After the final drill the corresponding countersink depth guide was used. The implant site was generously irrigated with sterile saline to remove any residual bone chip/other residue following preparation. Primary stability was assessed with the torque controlled ratchet. All implants were placed within the alveoli confines and were clinically stable at the time of insertion. Connective tissue graft was done with Bruno's technique developed by John F Bruno. At the end of the surgery, patients were given postoperative instructions and were prescribed antibiotics. The second stage surgery was performed 3 months after the initial procedure for prosthetic care. The stability of the implant and health of the peri-implant soft tissue were clinically evaluated at baseline, 3 months and 6 month and 9 months after implant placement.

RESULTS

For Group I, mean plaque index difference at third month was found to be (0.0167 ± 0.05) , at sixth month was found to be (0.280 ± 0.08) , at ninth month (0.180 ± 0.08) . (Table 1, Graph 1) Intragroup comparison revealed that the Plaque index increases significantly at baseline level to third month, from third month to sixth month but after that it decreases significantly in ninth month. (Table 2, Graph 2). The mean difference of plaque index scores of Group I was found to be statistically highly significant at sixth month with (p -value <0.001) and statistically significant at ninth month with (p-value <0.05). For Group II, mean plaque index difference at third month was found to be (0.113 ± 0.04) , at sixth month was found to be (0.533 ± 0.19) , at ninth month (0.333 ± 0.02) . Intragroup comparison revealed that



FIG 1 :Surgical Armamentarium

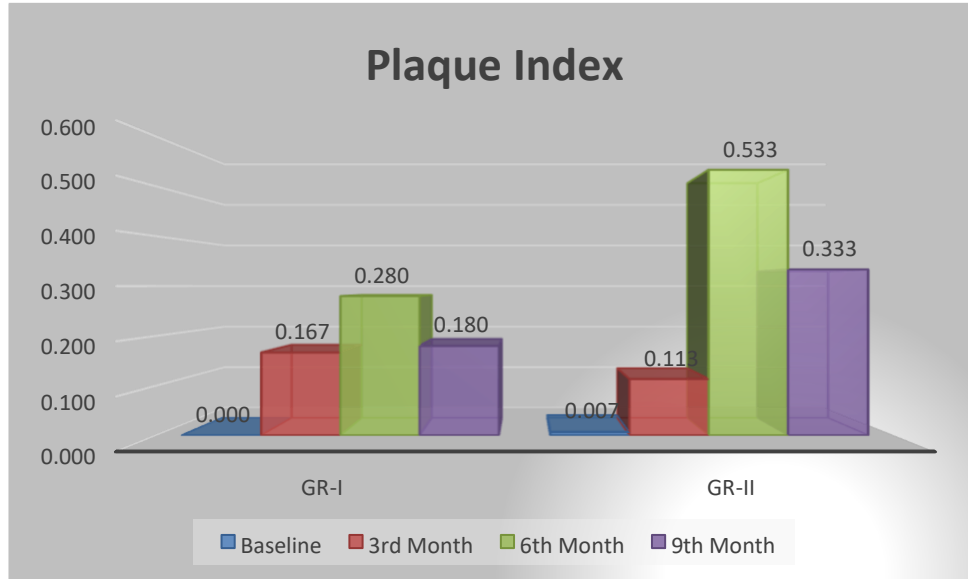


FIG 2: Dental Kit With Implants

Group	Time Interval	Values at designated time interval		t	p	Sig
		Mean	SD			
Group I (Control)	Base					
	3 months	0.167	0.05	-		
	6 months	0.280	0.08	-4.79	0.000	Sig
	9 months	0.180	0.08	3.54	0.001	Sig
Group II (Test)	Base					
	3 months	0.113	0.04			
	6 months	0.533	0.19	-8.60	0.000	Sig
	9 months	0.333	0.02	3.09	0.004	Sig

p < 0.001- Highly significant, p < 0.05- Significant, p > 0.05 Not significant (NS)

Table 1: Intragroup comparison of Plaque index at different time interval

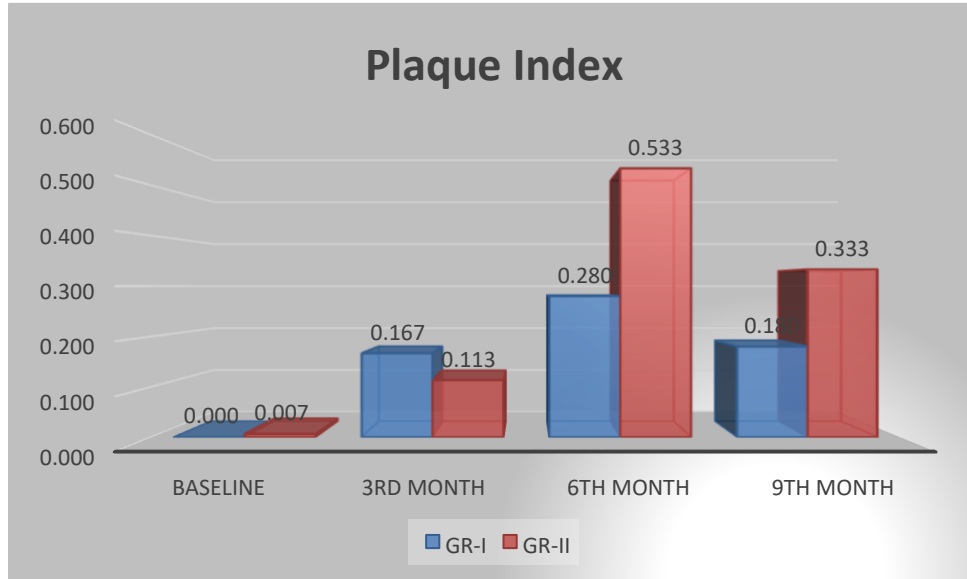


Graph 1: Intragroup comparison of Plaque index at different time interval

Time interval	Treatment	Mean	SD	t	Sig. (2-tailed)
Baseline	Gr- I	0.00	0.00		
	Gr - II	0.00	0.00	0	1.00
3 months	Gr- I	0.167	0.05		
	Gr - II	0.113	0.04	-3.43	0.002
6 months	Gr- I	0.280	0.08		
	Gr - II	0.533	0.19	4.87	0.000
9 months	Gr- I	0.180	0.08		
	Gr - II	0.333	0.12	4.11	0.0003

p < 0.001- Highly significant, p < 0.05- Significant, p > 0.05 Not significant (NS)

Table 2: Inter group comparison of Plaque index at different time interval



Graph 2: Inter-group comparison of Plaque index at different time intervals.

Group	Time Interval	Values at designated time interval		t	p	Sig
		Mean	SD			
Group I (Control)	Base	2.37	0.29			
	3 months	2.76	0.23	-4.09	0.000	Sig
	6 months	3.04	0.17	-3.77	0.001	Sig
	9 months	3.36	0.26	-4.07	0.000	Sig
Group – II (Test)	Base	2.66	0.28			
	3 months	3.19	0.37	-4.39	0.000	Sig
	6 months	3.67	0.33	-3.75	0.000	Sig
	9 months	4.04	0.20	-3.74	0.000	Sig

p < 0.001- Highly significant, p < 0.05- Significant, p > 0.05 Not significant (NS)

Table 3: Intragroup comparison width of keratinized gingiva at different time intervals

Parameter		Mean	SD	t	p
Width of Keratinized Gingiva at baseline	Gr - I	2.373	0.29		
	Gr-II	2.660	0.28	2.72	0.0005
Width of Keratinized Gingiva at third month	Gr - I	2.763	0.23		
	Gr-II	3.189	0.37	3.80	0.0007
Width of Keratinized Gingiva at sixth month	Gr - I	3.037	0.17		
	Gr-II	3.666	0.33	6.65	0.000
Width of Keratinized Gingiva at ninth month	Gr - I	3.358	0.26		
	Gr-II	4.036	0.20	8.08	0.000

p < 0.001- Highly significant, p < 0.05- Significant, p > 0.05 Not significant (NS)

Table 4: Intergroup comparison of Width of Keratinized Gingiva at different time interval

the Plaque index increases significantly at baseline level to third month, from third month to sixth month but after that it decreases significantly in ninth month. The mean difference of plaque index scores of Group II was found to be statistically highly significant at sixth month with p value<0.001 and statistically significant ninth month with p-value<0.05. The mean difference of gingival index of Group I was found to be statistically not significant at third month with p-value>0.05 but statistically highly significant at sixth and ninth month interval with p-value<0.001. The mean difference of gingival index of Group II was found to be statistically not significant at sixth month with p-value>0.05 but statistically significant at ninth month with p-value < 0.05. Intragroup comparison revealed that the Probing depth index increases significantly from baseline level to third month, from third month to sixth month and sixth month to ninth month. The mean difference of probing depth index of

Group I was found to be statistically not significant at different time interval with p-value>0.05. Intragroup comparison revealed that the Probing depth index increases significantly from baseline level to ninth month. The mean difference of probing depth index of Group II was found to be not significant at different time interval with p-value>0.05.

Mean Probing depth index observed at baseline was 1.980±0.46 in Group I and 2.03 ± 0.11 in Group II, at third month was 2.287±0.41 in Group I and 2.220±0.14 in Group II but at sixth month it was found to be 02.720±0.46 in Group I and 2.367±0.12 in Group II and at ninth month it was found to be 2.840±0.42 in Group I and 2.527± 0.16 in Group II, thus showing not statistically significant difference between baseline and third month with p- value >0.05 and statistically significant difference between sixth and ninth month intervals with p-value<0.05 between both groups.

For Group I mean width of keratinized gingiva at third month was found to be (2.26 ± 0.23) , at sixth month was found to be (3.0 ± 0.17) , at ninth month (3.36 ± 0.26) (Table 3). Intragroup comparison revealed that the width of keratinized gingiva increases significantly from baseline to third month, from third month to sixth month and sixth month to ninth month. The width of keratinized gingiva between third months, sixth months and ninth month in each group was found to be statistically significant with p -value < 0.05 (Table 4).

For Group II mean width of keratinized gingiva at third month was found to be (3.19 ± 0.37) , at sixth month was found to be (3.67 ± 0.33) , at ninth month (4.04 ± 0.20) Intragroup comparison revealed that the width of keratinized gingiva increases significantly from baseline to third month, from third month to sixth month and sixth month to ninth month. The width of keratinized gingiva between third months, sixth months and ninth month in group II was found to be statistically significant with p -value < 0.05 .

DISCUSSION

The present study was conducted to evaluate periodontal parameters clinically and radiographic crestal bone loss following immediate implant placement. A total of 30 fresh extraction sites in the age group of 18-65 years visiting the out-patient department of periodontics, Himachal Dental College, Sundernagar (H.P) were selected for the present study. All subjects satisfying the inclusion criteria were informed about the nature of the study and their informed consent were taken.

The mean plaque index in third month for test group was significantly lower ($p <$

0.01) than the mean plaque index for control group. This is in accordance with the studies done by Quirynen M et al (1993), Sanivarapu S et al (2010) Gangar R et al (2013), Viswambaran M et al (2014).¹⁰⁻¹³ There was increase in the Plaque Index from third to sixth month in both the groups.

In the present study, the mean gingival index in third month for test group was lower to the control group (However, a significant difference was observed when the mean values obtained during sixth month were compared; mean for test group was significantly lower ($p < 0.001$) than the control group mean. Results of the present study are consistent with the findings of Adell R et al (1986) Nakous M et al (1987), who reported that marginal tissue around titanium fixtures, in most examined patients had no gingivitis throughout the study.^{14, 15}

In the present study, the increase in the probing depth after third month signifies the bone loss which could be the result of physiologic response to the micro-gap/interface at the connection to the superstructure i.e. between implant and abutment, it has been demonstrated that bacteria are present in such micro-gaps (interfaces), may form a reservoir and that the host reacts with an inflammatory response which may have resulted in the tissue remodelling IshaBhardwaj et al. (2016).¹⁶ Many studies reported that the probing depth (PD) alone is not reliable enough to follow the peri-implant soft tissue levels over time, since it can be influenced by changes in the gingival anatomy.^{14- 16}

In the present study, results showed slightly higher mean difference of width of keratinized gingiva in baseline to third month than in baseline to sixth month and

baseline to ninth month intervals and this difference were found to be statistically significant. S.G Jyothi (2013) (the width of keratinized gingiva was adequate (i.e.>2mm) at different time intervals for both groups at different time intervals. Albrektsson et al. (1986) reported that dental implants may have high survival rate irrespective of keratinized tissues. In the present study, all the sites in which implant were placed had an adequate width of keratinized gingiva throughout the healing period of implant contributing to aesthetically pleasing and biologically sound results.¹⁷

CONCLUSION

Immediate implant placement into extraction socket seems to be safe and predictable method. Main advantages of immediate implants were that it can reduce the time interval from tooth extraction into implant support restoration. Immediate implant placing reduces alveolar resorption. The use of connective tissue graft (CTGs) has improved the esthetic outcome of dental implants, mainly due to enhancing alveolar bone contours.

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