

Evaluation of Clinical Outcomes Involving Soft Tissue Healing and Crestal Bone Levels Following Immediate Versus Delayed Placement of Implants: A Clinico-Radiographic Study.

¹Harmesh Chouhan, Senior Lecturer, Deptt. of Periodontology & Oral implantology, Swami Devi Dyal Hospital & Dental College, Barwala, Panchkula

²Preetinder Singh, Professor, Deptt. of Periodontology & Oral implantology, Swami Devi Dyal Hospital & Dental College, Barwala, Panchkula

³Yashpaul Dev, Principal & Head of Department, Deptt. of Periodontology & Oral implantology, Swami Devi Dyal Hospital & Dental College, Barwala, Panchkula

⁴Ankur Wahi, Deptt. of Periodontology & Oral implantology, Swami Devi Dyal Hospital & Dental College, Barwala, Panchkula

Corresponding Author: Harmesh Chouhan, Senior Lecturer, Deptt. Of Periodontology & Oral implantology, Swami Devi Dyal Hospital & Dental College, Barwala, Panchkula

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Abstract

Aim: To evaluate and compare clinical outcomes involving Gingival status (Bleeding on Probing), Probing Depth, Crestal bone levels around implants, Implant mobility and Papilla fill Index following Immediate Placement versus Delayed placement of implants.

Materials and Methodology: 20 subjects were selected and were divided into two groups (Group A and Group B). The surgical procedure was carried and immediate implant placement was done after extraction in case of Group A and delayed implant placement was done in case of Group B and sutures were placed.

Observations and results: The observation and results on following criteria: Gingival status (Bleeding on Probing), Probing Depth, Crestal bone levels around implants, Implant mobility and Papilla fill Index and concluded that they was statistically significant difference between Group A and Group B.

Introduction

A number of techniques are available for the rehabilitation of the single – tooth space which involves common techniques like conventional fixed prosthetics, removable partial dentures and orthodontic intervention. These methods are associated with disadvantages such as loss of tooth substance and tooth vitality, especially in young individuals.¹

The introduction of endosseous implant-supported prostheses has contributed to a significant improvement in restoring the masticatory function of partially or completely edentulous patients. Several studies have demonstrated that treatment by means of titanium dental implants is a safe method for oral rehabilitation with high success rates.²⁻⁴ The coincidental discovery and work done by Swedish orthopaedic surgeon “P.L. Branemark” led to discover that commercially pure titanium fixed in place due to close bond that develop between the two, a phenomenon that later described as osseointegration.⁵

The additional time required to allow for healing of the extraction sites according to standard protocols, further extends the treatment period until the final reconstruction of the dentition is completed which is known as delayed loading of implant.⁶ As a result, immediate implantation, which is the placement of implants directly into the socket immediately after extraction, has become widespread because it eliminates the delay required to allow for socket healing prior to fixture placement. In addition, it also reduces the number of surgical procedures, as the extraction and the fixture placement are done at the same time. During the first 3 to 6 months after tooth extraction significant resorption of the alveolar ridges could influence the quality and prognosis of the final restoration. Placing fixtures immediately after extraction theoretically prevents this resorption.⁷⁻¹¹

Hence the aim of this clinical study was to evaluate and compare clinical outcomes involving Gingival status (Bleeding on Probing), Probing Depth, Crestal bone levels around implants, Implant mobility and Papilla fill Index following Immediate Placement versus Delayed placement of implants.

Materials and Methodology

For this proposed study, a total of 20 subjects were selected from the Out Patient Department of Periodontics and Implantology, Swami Devi Dyal Hospital and Dental College, Barwala (Panchkula) Haryana, India. An ethical approval for the study was obtained from the ethical committee of the institution. Each subject was given a detailed verbal and written description of the study and all the selected subjects were required to sign an informed consent form prior to commencement of the study.

In this study 20 partially edentulous subjects were selected and randomly divided into two groups on the basis of inclusion and exclusion criteria (Table 1): **Group A-** In this group Immediate implant surgery was performed after

the extraction of root stumps/tooth indicated for extraction and **Group B-** In this group Delayed implant surgery was performed in previous cases of over a period of extraction (minimum 6 months).

Selected subjects had undergone routine blood and radiographical (IOPA and OPG) examination prior to surgery. The diagnostic casts were made and OHI-S was recorded. After then, subjects were then undergone with complete oral prophylaxis and restoration of carious teeth. Surgical procedure was performed under local anaesthesia with 2% lidocaine (1:100,000 epinephrine) and a mid-crestal incision (Figure 1) was made and full thickness mucoperiosteal flap was reflected to expose the underlying bone. After reflecting the flap, in case of Group A, the existing root stumps/ tooth present at the site of implant placement were extracted as atraumatic as possible taking special care to preserve the bone (Figure 2). Implant placement was then performed as per the surgical module. The mucosal flaps were closed with sutures and implants were submerged (Figure 3). And in case of Group B, Implant placement was performed as per the surgical module (Figure 4). The mucosal flap was closed with sutures and implants were submerged (Figure 5).

In both groups, the sutures were removed after 1 week and the Loading of implant was initiated after 3 months in case of mandible and 4 months in case of maxilla after implant installation (Figure 6 1,2).

Observations and Results

All the subjects were analysed on the following criteria:

1. BLEEDING ON PROBING (Table 2,3 and Graph 1,2)

The mean bleeding on probing score for the Group A at the 3 months interval was 1.4 ± 0.70 . The bleeding on probing score decreased to 2 ± 0.67 at 6 months interval and the mean change in bleeding on probing scores was

recorded. There was statistical significant decrease in the bleeding on probing scores from the baseline at each interval as the p value was 0.024 ($p < 0.05$).

The mean bleeding on probing score for the Group B at the 3 months interval was 0.9 ± 0.74 . The bleeding on probing score decreased to 1.5 ± 0.71 at 6 months interval. There was statistical significant decrease in the bleeding on probing scores from the baseline at each interval as the p value was 0.024 ($p \leq 0.05$).

The difference between the groups at the 6 months was also analyzed using Independent "t" Test (t value = 1.627) it was found to be statistically non-significant ($p = 0.121$).

2. HEIGHT OF CRESTAL BONE (Table 4,5 and Graph 3,4)

Group A had a mean height of crestal bone of 0.18 ± 0.10 mm at the baseline. The score increased at loading stage (1.38 ± 0.18 mm) and 6th month (1.45 ± 0.18 mm). The difference between baseline, loading stage and 6 months was statistically significant ($p < 0.001$).

Group B had a mean height of crestal bone of 0.18 ± 0.07 mm at the baseline. The score increased at loading stage (1.17 ± 0.17 mm) and at 6th month (1.31 ± 0.16 mm). The difference between the baseline, loading stage and 6 months was statistically significant ($p < 0.001$).

When the inter group comparison was made, there was statistically non-significant difference in the mean height of crestal bone scores between the Group A and Group B at baseline and 6th month ($p > 0.05$) but it was statistically significant difference between the Group A and Group B at loading stage, analyzed using the Independent t Test as p value was 0.015 ($p < 0.05$).

3. IMPLANT STABILTY (Table 6 and Graph 5)

The mean implant mobility scores for the both the groups i.e. Group A and Group B were 1.00 ± 0.00 . The difference between the groups for the implant mobility when

analyzed using Independent t Test was statistically non-significant ($p = 1.000$).

4. PAPILLA FILL INDEX SCORE (Table 7,8 and Graph 6,7)

Group A had papilla index scores of 0.6 ± 0.52 at the baseline. The score increased at 3 month (1.5 ± 0.53) and 6 months interval (2 ± 0.67). The difference between the baseline, 3rd month and 6th month interval was statistically significant.

The mean papilla index scores were 0.5 ± 0.53 at baseline, 1.7 ± 0.48 at 3rd month and 2.4 ± 0.52 at 6th month interval. The difference from the baseline at 3rd month and 6th month interval was statistically significant at $p < 0.05$.

When the inter group comparison was made, there was statistically non-significant difference in the papilla index scores between the Group A and Group B ($p > 0.05$).

5. PROBING DEPTH SCORE (Table 9,10, Graph 8,9)

Group A had Probing Depth scores of 2 ± 0.47 mm at the baseline. The score increased at 3rd month (2.9 ± 0.32 mm) and 6th month interval (3.6 ± 0.97 mm). The difference between baseline, 3rd month and 6th month was statistically significant ($p < 0.001$).

Group B had mean Probing Depth scores was 01.9 ± 0.74 mm at baseline, 3 ± 1.15 mm at 3rd month and 3.7 ± 1.16 mm at 6th month interval. The difference between baseline, 3rd month and 6th month was statistically significant ($p < 0.05$).

When the inter group comparison was made, there was statistically non-significant difference in the Probing depth scores between the Group A and Group B all the intervals ($p > 0.05$).

Discussion

The original treatment protocol has been challenged within the last decade by reducing the time between tooth extraction and implant placement and by reducing the time

between implant placement and implant loading.¹² Placement of an implant into a fresh alveolus will usually result in a gap between the occlusal part of the implant and the bone walls. To ensure osseointegration of the entire implant, synthetic bone substitutes, membranes, bone grafting, osteoinductive substances, or a combination of these have been used to achieve bone formation in such defects.¹³ Animal studies have indicated that osseointegration of immediately placed implants in extraction sockets can be achieved without bone augmentation procedures, and with a success rate comparable to that of delayed implant placement **Barzilay I et al (1996)**.¹⁴ **Lazzara RJ (1989)**,⁹ **Parel SK et al (1990)**,¹⁵ **Werbit MJ et al (1992)**¹⁶ did various studies and stated that placing an implant immediately or a short time after tooth extraction offers several advantages for the patient as well as for the clinician, including shorter treatment time, less bone resorption, fewer surgical sessions, easier definition of the implant position, and perhaps better opportunities for osseointegration because of the healing potential of the fresh extraction site. Another study was conducted by **Schropp et al (2008)**¹⁷, **Canullo (2010)**¹⁸, **Giovanni E. Salvi (2013)**¹⁹, who concluded that there was no significant difference between immediate and delayed implants. **Kesteren et al (2010)**²⁰ compared immediate implant placement and ridge preservation with delayed implant placement in maintaining the position of the soft tissue margins following tooth extraction. This result showed no significant differences between immediate and delayed placements. **Schou et al (2002)**²¹ compared probing depth around teeth and implants, reporting that probe penetration was deeper in implants if mild inflammation was present. However, it is reasonable to assume that probing depth not exceeding 4.0 mm is preferable to facilitate the patient's

ability for self-performed plaque control as well as accessibility for proper professional peri-implant cleaning.

Summary and Conclusion

The present study depicted that there was no significant difference between immediate and delayed implants. Within the limits of present of study, a definitive conclusion can be drawn, further longitudinal studies are recommended to evaluate the proper clinical parameters and biological osseointegration, a study design of larger sample size with proper selection of the patient.

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Legends Figure and Tables

	Group A	Group B	Significance of Difference Using Independent “t” Test		
			t	P value	Significance
3 months	1.4±0.70	0.9±0.74	1.555	0.137	Non-Significant
6 months	2±0.67	1.5±0.70	1.627	0.121	Non-Significant

Table 1: Intergroup Comparison of Bleeding On Probing Between Group A and Group B

	Group A	Group B	Significance of Difference Using Independent “t” Test		
			t	P value	Significance
At Baseline (after surgery)	0.18±0.10	0.12±0.07	1.621	0.125	Non-Significant
At Loading stage	1.38±0.18	1.17±0.17	2.694	0.015	Significant
At 6 months	1.16±0.20	1.05±0.17	1.339	0.197	Non-Significant

Table 2: Intergroup Comparison Of Crestal Bone Between Group A And Group B

	Group A	Group B	Significance of Difference Using Chi-square test		
			Chi-square value	P value	Significance
Implant Stability					
Baseline Normal Stability	10 (100)	10 (100)	-	-	-
3 months Normal Stability	10 (100)	10 (100)	-	-	-
6 months Normal Stability	10 (100)	10 (100)	-	-	-

Table 3: Intergroup Comparison of Implant Stability between Group A and Group B

	Group A	Group B	Significance of Difference Using Independent “t” Test		
			t	P value	Significance
Baseline	0.6±0.52	0.5±0.53	.429	0.673	Non-Significant
3 months (after prosthesis)	1.5±0.53	1.7±0.48	-.885	0.388	Non-Significant
6 months (after prosthesis)	2±0.67	2.4±0.52	-1.500	0.151	Non-Significant

Table 4- Intergroup Comparison of Papilla Index between Group A and Group B

	Group A	Group B	Significance of Difference Using Independent "t" Test		
			T	P value	Significance
Baseline	2±0.47	1.9±0.74	0.361	0.723	Non-Significant
3 months	2.9±0.32	3±1.15	-.264	0.797	Non-Significant
6 months	3.6±0.97	3.7±1.16	-.210	0.836	Non-Significant

Table 5- Intergroup Comparison of Probing Depth between Group A and Group B

Figures



Figure 1



Figure 2



Figure 3



Figure 4



Figure 5