Original Research Article

A Comparative Study Evaluating the Effects of Crestal Bone Change Following Immediate and Delayed Implant Placement

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ABSTRACT

For the rehabilitation of the single-tooth space, a number of prosthodontic techniques have been known and are well established. Fixed and removable partial dentures being the easiest are associated with the major drawbacks of loss of tooth structure and vitality. Though replaced by implant supported rehabilitations, crestal bone loss has been reported as the one of the major factor affecting the long term prognosis. Thus the main **aim** of the study was to assess and compare the reverberations of immediate and delayed placement of implant on crestal bone height. **Material and methodology:** 30 patients aged between 18-60 years were selected on the basis of inclusion criteria and divided randomly into two groups of 15 each. In Group A immediate implant placement was done while in Group B delayed implant placement was done. In both the groups, Crestal bone height (Buccolingual width + interproximal height), keratinized mucosa index, Jemt papilla fill index, Plaque index, Gingival index and Periodontal attachment levels were analyzed at baseline, after 3, 6 and 12 months. **Results:** The parameters were recorded and analyzed statistically. Categorical values were analyzed using mean, frequency and percentage while descriptive analysis was done using student t test. It was observed that mean changes in crestal bone height, papilla filled index, periodontal attachment levels, gingival and plaque index was statistically significant in both the groups from baseline to 12 months, while keratinized mucosa index represented no change between the two groups. **Conclusion:** The study came to the conclusion that placing an immediate implant rather than a delayed should be significantly preferred. Though in immediate implant placement, crestal bone is preserved and gingival architecture is prevented from collapsing along with time of treatment, preservation of aesthetics and patient comfort being the other major advantages.

Keywords: Aesthetics, Crestal Bone Height, Delayed Implant, Extraction Socket, Immediate Implant, Periodontal Parameters.

INTRODUCTION

The final outcome of any oral disease over the course of a person's life is eventually tooth loss. Even though it is not mandatory to always replace a missing tooth but a number of situations where there is a desirable occasion to enhance speech, masticatory function, or appearance calls for the treatment phase.[1] A number of techniques though frequently employed including traditional removable and fixed substitutions along with orthodontic therapy according to the requirements of the patients. However, a few of these methods have inherent drawbacks, particularly in young adults, such as the loss of tooth structure and sometimes even the vitality of the associated teeth. The progression of preexisting dental caries, periodontally compromised abutment teeth, mechanical

failure due to retention loss, and fractured abutment or bridge constituents all have the potential to impede the rehabilitation prognosis.[2]

Through a coincidental discovery and subsequent research, Swedish orthopedic surgeon Branemark discovered a phenomenon that he later referred to as osseointegration.[3] As a prerequisite for osseointegration, the original implant dentistry protocols recommended a non-loaded healing period of four to six months. However, this has since been modified to shorten treatment times and increase patient comfort. The timing of the implant's placement and the onset of function thus plays a crucial role in this context.[4]

Placement of implants soon after extraction of tooth offers a number of benefits to both the patient and the doctor, pleasing aesthetics along with prevention of bone loss amongst the all (Immediate implants).[5,6] However, this approach frequently results in a residual gap between the implant's coronal portion and the remaining bone walls, causing an increased risk of infections[7] and ultimately failure if the socket becomes infected. In order to address this issue and lessen the likelihood of infection and soft tissue healing, it is possible to postpone implant placement for six to eight weeks following extraction (Delayed implants).[8] However, the primary purpose of immediate implant placement is to shorten the time between the placement of the implant and the prosthetic in order to improve the patient's comfort and enable an earlier return to their normal socioeconomic life, according to research. One of the significant factors that influence the long-term prognosis of implant-supported restoration has been identified as crestal bone loss.[9] Remodeling, which is characterized by a decrease in bone dimension both horizontally and vertically following implant surgery, has been demonstrated.[10] The use of a smaller-diameter abutment on a larger-diameter implant collar, introduced by Lazzara and Porter, which further contributed to the reduction of bone loss, is referred to as platform switching.[11] Although implants that are placed after the healing period have greater biologic stability, they also come with the inherent disadvantage of taking longer to treat.[12] The purpose of this study was to evaluate and compare crestal bone height along with various periodontal parameters alterations following immediate and delayed clinical implant placement.

MATERIAL AND METHODOLOGY

Systemically healthy 30 subjects visiting the Dr. Raziya's Dental Clinic, Jammu and Kashmir for the replacement of missing teeth were selected for the study. The subjects included were of the age 18-60 years with an inclusion criterion of at least one missing tooth in the anterior region of the jaw (canine to canine) and with good oral hygiene and/or grossly carious tooth or root stump which required extraction. The sites with missing tooth should have more than 5 mm of bone beyond root apex for primary stability of implant; subjects with healthy, sufficient form and architecture of soft tissue, motivated co-operative subjects who were well aware about the maintenance of oral hygiene were included in the study. The exclusion criteria of the subjects were specifically related to the systemic diseases which would hamper the healing process for osseointegration. Smokers, subjects with any site of oral infection, allergic to local anesthetics or close proximity of vital anatomic structures to implant sites were excluded for the study.

Before inclusion in the study, the subjects were brief informed about the study and an informed consent was signed by them. The subjects were made well aware about the surgical procedure; follow up time period of 12 months along with instructions to be followed for maintenance of oral hygiene. The subjects who fulfilled the complete criteria list and were ready for the study were included and were free to exit the study whenever required. All the patients were performed by the same prosthodontist and periodontal parameters were performed

by a single observer to avoid inter examiner bias. The study was carried out in accordance with the World Medical Association's Declaration of Helsinki (2008).

A complete dental and radiographic examination of the site was done before any surgical procedure. Pre-surgical preparation of each patient was followed by proper draping and application of antiseptics. Following the proper protocol of sterilization, an infiltration of local anesthetic was administered using 2% lignocaine hydrochloride containing 1:200,000 adrenaline on both sides of the involved area. The patients were then divided into two groups on the basis of their inclusion criteria.

In group A (Immediate Implant Placement), following administration of local anesthesia, the involved tooth should be atraumatically extracted using periotomes preventing the socket wall from any damage or fracture. The extraction site should be carefully and completely obliged to degranulation using curettes followed by proper irrigation using a solution of povidone iodine and saline. The extraction was followed by drilling of the site using specific implant drills and the length and diameter of the site was established using UNC-15 probe.

In group B (Delayed Implant Placement), once anesthetic effect was achieved, a crestal incision was made about 2-3 mm lingually for proper elevation of the muco-periosteal flap. The incision was extended to the sulcus of the adjoining teeth by employing an intra-sulcular incision followed by placement of implant. The area was properly sutured using 3-0 silk interrupted sutures after completion of implant placement.

Thirty threaded root form implants (Dentium GENOSS Implant System) were placed, one in each patient and implant body was inserted using a torque controlled wrench. Osteotomy sites were prepared using conventional drills with walls of the sockets as guidance with maximal application of bone apical to extraction sites. Eventually the parallelism was verified using parallelism pins and reconfirmation was done using radiographs followed by pilot drill. With sequential drilling order and abundant irrigation, the drill was advanced 3-4 mm further from the apex of the socket to guarantee the primary stability of the implant following placement. A well established stability was attained by all the implants succeeding placement. The surgery site was thoroughly irrigated before suturing. All the patients were instructed on post-surgical instruction with 0.2% chlorhexidine mouth wash and a 5 day analgesic and antibiotic regimen. After 6 months, with complete healing phase, final prosthetic stage was initiated and final impressions were made directly onto the abutment and placement of porcelain fused to metal splinted restorations was made.

PERIODONTAL PARAMETERS:
Immediately after placement of implant in every patient in both the groups, following parameters were assessed at baseline, after 3, 6 and 12 months.

Crestal bone height was assessed using radiographs. It is measured as the distance between apical end of the first step of implant and the most coronal portion of the inter-proximal crestal bone height. The baseline value used to determine the amount of bone loss was the inter-proximal crest bone height measured on radiographs taken immediately after implant placement.[9]

Width of attached gingiva was measured using Keratinized mucosa index.[13]The width was measured using UNC-15 periodontal probe and is the distance from the gingival margin to the mucogingival junction.

Jemt papilla fill index was used to determine the interdental papillary volume.[14] An imaginary line is drawn by joining the most cervical points of the gingival border of the teeth adjacent to the inter-proximal area from which the height of the inter-dental gingival papilla was measured with reference to the point of contact in the inter-proximal area. According to these measurements

classification of the inter-proximal gingival papilla was done as Index 1, 2, 3 and 4 respectively.

Periodontal attachment level was assessed using Hu-Friedy plastic probes. Gingival and plaque index were evaluated using UNC-15 periodontal probe.

Sutures were then removed 7 days after the surgery. In both the groups, a second surgery was performed after 3 months after implant placement to extract cover screw and healing abutment was placed. Clinical and radiographic parameters were made at 3, 6 and 12 months of implant placement.

Statistical analysis: The parameters were recorded and then transferred to the Microsoft excel sheet. The transferred data was then analyzed using SPSS software version 20.0. The categorical variable of the study was assessed using frequencies, percentages, mean and standard deviation while the inter group comparison was done using student t test. A p value of less 0.05 was considered as to be statistically significant.

RESULTS

In our study a total of 30 implants, 15 in each group were placed and evaluated for the periodontal parameters along with the crestal bone as the main parameter. In group A 15 immediate implants were placed while in group B, 15 delayed implants were placed and the periodontal parameters were evaluated at baseline and after a period of 3, 6 and 12 months.

Table 1 represents the demographic parameters of the study patients, out of 30 patients 40% of the total patients in group A belonged to the age group of 29-39, followed by 26.67 in 51-60 years, 20% in 40-50 and only 13.33% in the age group of 18-28. In group B 46.66% were present in the age group of 40-50 years followed by 40% in 51-60 range, 6.67 in both 18-28 and 29-98 years respectively. Intergroup comparison of crestal bone alterations among immediate and delayed implant placement is represented in Table 2. In Group B, a faintly advanced bone loss

(0.20±0.01, 1.24±0.10, 1.11±0.12, 1.02±0.02) when compared with Group A (0.15±0.07, 1.07±0.01, 0.87±0.04, 0.76±0.02) at baseline, after 3, 6 and 12 months. A statistically significant dissimilarity was present after 3 month interval between both the groups. No changes in keratinized mucosa index were found among the two groups at 3, 6 and 12 months of observational period (Table 3). The mean change in Jemt papilla fill index score value from baseline to 12 months for group A and group B which was found to be statistically significant for group A and group B after 6 and 12 months of treatment. Intergroup comparisons evaluated statistically non-significant differences between the mean values at baseline (p=nil), and after 3 months (p=0.408) between the two groups. In group B where delayed implants were placed, exhibited a delay in regeneration of papilla till 6 months (Table 4). On evaluating the mean changes in periodontal attachment levels (Table 5) for group A and group B from baseline to 12 months represented a statistically significant (p=0.001), (p=0.000), and (p=0.047) respectively. Table 6 represents the intergroup comparative evaluation for plaque index among immediate and delayed implant placements. The group receiving immediate implants depicted a higher mean baseline plaque scores (2.56±0.17, 3.81±0.01, 3.17±0.15, 2.12±0.14) when compared with delayed implant group (2.44±0.11, 3.64±0.03, 3.14±0.12, 2.02±0.11). However the difference at various time intervals among two groups was not found to be statistically significant. Table 7 represents the intergroup comparison of the gingival index among immediate and delayed implants. A higher mean score index was found at baseline, after 3 and 6 months (2.56±0.17, 3.81±0.01, 3.17±0.15, 2.12±0.14) in group A and (2.44±0.11, 3.64±0.03, 3.14±0.12, 2.02±0.11) in group B respectively. A statistically significant dissimilarity was obtained at baseline and 3 months interval among both the groups.

Table 1: demographic parameters of the study patients										
Parameter		Frequency		Percentage		Mean			Standard deviation	
		Group A	Group B	Group A	Group B					
						Group A	Group B		Group A	Group B
AGE	18-28	2	1	13.33	6.67	2.6	3.2		1.06	0.86
	29-39	6	1	40	6.67					
	40-50	3	7	20	46.66					
	51-60	4	6	26.67	40					
	TOTAL	15	15	100	100					
GENDER	MALE	8	9	53.33	60	1.466	1.4		0.52	0.51
	FEMALE	7	6	46.67	40					
	TOTAL	15	15	100	100					

Table 2: Representing the intergroup comparison of crestal bone changes between group A and group B					
Time period	Group A Mean ± sd	Group B Mean ± sd	t-value	P-value	significance
Baseline	0.15±0.07	0.20±0.01	1.317	0.103	Not significant
After 3 months	1.07±0.01	1.24±0.10	3.754	0.000	Highly significant
After 6 months	0.87±0.04	1.11±0.12	1.993	0.032	Significant
After 12 months	0.76±0.02	1.02±0.02	1.393	0.091	Not significant

Table 3: Representing the intergroup comparison of keratinized mucosa index scores between group A and group B					
Time period	Group A Mean ± sd	Group B Mean ± sd	t-value	P-value	Significance
Baseline	2.31±0.26	2.05±0.42	0.169	0.434	Non significant
After 3 months	2.31±0.26	2.05±0.42	0.169	0.434	Non significant
After 6 months	2.31±0.26	2.05±0.42	0.169	0.434	Non significant
After 12 months	2.31±0.26	2.05±0.42	0.169	0.434	Non significant

Table 4: Representing the intergroup comparison of jemt papilla fill index scores between group A and group B					
Time period	Group A Mean ± sd	Group B Mean ± sd	t-value	P-value	Significance
Baseline	0.00±0.00	0.00±0.00	-	-	Not significant
After 3 months	0.67±0.43	0.43±0.53	0.235	0.408	Not significant
After 6 months	1.42±0.52	1.13±0.36	3.986	0.000	Significant
After 12 months	1.56±0.61	1.01±0.50	4.025	0.000	Significant

Table 5: Representing the intergroup comparison of periodontal attachment levels between group A and group B					
Time period	Group A Mean ± sd	Group B Mean ± sd	t-value	P-value	significance
Baseline	0.00±0.00	0.00±0.00	-	-	Not significant
After 3 months	0.51±0.21	0.50±0.40	3.429	0.001	Significant
After 6 months	0.77±0.25	0.62±0.36	4.695	0.000	Significant
After 12 months	0.64±0.22	0.52±0.37	1.779	0.047	Significant

Table 6: Representing the intergroup comparison of plaque index between group A and group B					
Time period	Group A Mean ± sd	Group B Mean ± sd	t-value	P-value	significance
Baseline	2.56±0.17	2.44±0.11	0.441	0.332	Not significant
After 3 months	3.81±0.01	3.64±0.03	0.058	0.477	Not significant
After 6 months	3.17±0.15	3.14±0.12	0.108	0.457	Not significant
After 12 months	2.12±0.14	2.02±0.11	0.298	0.384	Not significant

Table 7: Representing the intergroup comparison of gingival index between group A and group B					
Time period	Group A Mean ± sd	Group B Mean ± sd	t-value	P-value	significance
Baseline	2.56±0.17	2.44±0.11	1.842	0.042	Significant
After 3 months	3.81±0.01	3.64±0.03	2.422	0.014	Significant
After 6 months	3.17±0.15	3.14±0.12	1.218	0.121	Not significant
After 12 months	2.12±0.14	2.02±0.11	1.329	0.101	Not significant

DISCUSSION

Implantology has known to be improving since last 20 years providing clinicians with newer occasions in dental rehabilitations which were earlier considered to be unrealistic. The implant fixture must be inserted into a mature, healed edentulous alveolar ridge using standard procedures. One interesting question has been whether it is possible to insert the implant during the

same visit as the tooth removal with equally predictable success rates, or whether it is possible to shorten the time between tooth extraction and implant placement.[8] It has been demonstrated that one of the significant factors that influences the long-term prognosis of dental implants is the loss of crestal bone. Therefore, crestal bone preservation is considered prior to implant placement treatment planning. Though, platform switching has been recommended as one of the methods described in the literature.[15]

The placement and loading of dental implants in newer extraction sockets has been linked to numerous benefits, including shorter treatment times, fewer invasive procedures, and improved aesthetics. These were first described by Schulte and Heimke as a reduction in the number of surgeries, shorter treatment times, three-dimensional implant placement, preservation of alveolar bone following tooth extraction, and maintenance of soft tissues that are aesthetically appealing.[16] According to Slagter et al., immediate provisioning and implant placement resulted in excellent short-term therapy outcomes due to the aesthetics of the hard and soft tissue levels surrounding the implant.[17] Tonetti et al. have also recommended immediate implant placement in selected cases.[18] Compared to the delayed implant group, the immediate implant group had a slightly higher mean probing depth score at baseline and twelve months later. The delayed implant group had a greater mean probing depth at twelve months than the immediate implant group. This could have been because immediate implants frequently lost their attached gingiva. Abou-Zeid et al. findings are consistent with the decrease in PD twelve months after implant placement in delayed implants.[19] However, the results were not statistically significant for either group, which was in line with the findings of Pellicer-Chover et al., who established that periodontal attachment level increased in both groups to some extent following implant loading, with differences that were

not statistically significant at any of the time intervals that were observed.[20] In a similar vein, Gokcen-Rohlig et al. reported statistically insignificant differences in mean periodontal attachment between the immediate and delayed groups (p > 0.05).[21]
This study included the plaque and gingival index because they are thought to be one of the causes. Plaque is also one of the main etiological causes of peri-implant tissue destruction, according to Sekar et al.[22] As a result, plaque indices can be used to assess peri-implant tissue damage by monitoring oral hygiene. However, either group had higher mean gingival index values than at baseline. According to Donati et al., the level of plaque was significantly linked to gingival inflammation. As a result, a higher plaque score might have led to a higher mean gingival index value.[23]
The example of coronal bone rebuilding, with restricting of buccolingual bone width was practically comparative for both the groups. Delayed group displayed more osseous recontouring that likely starts immediately after tooth extraction and went on through the time period till implants placement.[10] Comparative outcomes have been accounted for by Covani et al who moreover noticed huge decrease in crestal bone (buccolingual width) among first and at the time of second a surgical procedure.[24]
On comparing groups A and B statistical non significant mean values of crestal bone level at baseline, 3, 6 and 12 months was noticed (Table 2). Normalized radiographs were taken utilizing IOPAs with paralleling cone strategy to find exact implant position. The crestal bone level was characterized as the deliberate distance (in mm) between apical end of first step of implant and the most coronal point of interproximal crestal bone level. Comparative outcomes were accounted for by Heinemann et al. who presumed that there was no significant distinction between immediate and delayed implants in approximal bone level changes during first year.[25] Similar comparative results were seen by Cox,[13] Sanivarapu[26], and Anand[27] who likewise revealed that

width of keratinized gingiva remain consistent all through the study which were in consistent with the results of the study conducted. The mean changes in Jemt papilla fill list score esteem from baseline to one year for Group A and B with statistically significant results in both (table 4). Comparative finding was accounted for by Evans CDJ, Chen ST[28], Jemt[14], Cleric[29], noticed spontaneous papilla regeneration to happen regardless of use of temporary restorations. In our study on intergroup examination showed a statistically non-significant contrast in mean values of Jemt papilla fill list score at baseline, after 3, 6 and 12 months respectively between both group A and group B. delayed implant exhibit defer in recovery of papilla at 6 months perception period. Comparable discoveries were done by Schropp, who evaluated that the risk of presenting no papilla or a negative papilla was seven times more prominent at baseline for delayed cases than for immediate cases.[30]

CONCLUSION
The study came to the conclusion that placing an implant earlier rather than later is significantly preferable. Through immediate implant placement, crestal bone is preserved and gingiva architecture is prevented from collapsing. Other benefits include reduced therapy time, the preservation of aesthetically acceptable gingiva, and improved patient comfort.

REFERENCES
1. Ohrnell LO, Hirsch JM, Ericsson I, Brånemark PI (1988) Single tooth rehabilitation using osseointegration. A modified surgical and prosthodontic approach. Quintessence Int 19: 871-876.
2. Pal US, Dhiman NK, Singh G, et al. Evaluation of implants placed immediately or delayed into extraction sites. Natl J MaxillofacSurg 2011;2(1):54–62.
3. Per-Ingvar B (1983) Osseointegration and its experimental background. Journal of Prosthetic Dentistry 50: 399-410.
4. Mohindra K (2017) Comparative Evaluation of Crestal Bone Changes after Delayed and Immediate Implant Placement. Dent Implants Dentures 2: 120.
5. Becker W, Clockle C, Sennerby L, Urist MR, Becker BE (1998) Histologicic findings after implantation and evaluation of different grafting materials and titanium microscrews into fresh extraction sockets. Case Reports 69: 743-750.
6. Schwartz-Arad D, Chaushu G (1997) The ways and wherefores of immediate placement of implants into fresh extraction sites. A literature review. JPeriodontol 68: 915-923.
7. Esposito MA, Grusovin MG, Polyzos IP, Felice P, Worthington HV (2010) Interventions for replacing missing teeth: dental implants in fresh extraction socket (immediate, immediate-delayed and delayed implants).
8. Covani U, Cornelini R, Barone A (2003) Bucco-lingual bone remodeling around implants placed into immediate extraction sockets: a case series. Journal of Periodontology 74: 268-273.
9. Sunitha RV, Ramakrishnan T, Kumar S, Emmadi P (2008) Soft tissue preservation and crestal bone loss around single-tooth implants. J OralImplantol 34: 223-229.
10. Cavallaro JS Jr (2011) Implant survival and radiographic analysis of proximal bone levels surrounding a contemporary dental implant. Implant Dent 20: 146-56.
11. Lazzara RJ, Porter SS (2006) Platform switching: a new concept in implant dentistry for controlling postrestorativecrestal bone levels. Int J Periodontics Restorative Dent 26: 9-17.
12. Simunek A, Kopecka D, Brazda T. Development of implant stability during early healing of immediately loaded implants. Int J MaxillofacImplants 2012;27(3):619–627.
13. Cox JF, Zarb GA (1987) The longitudinal clinical efficacy of osseointegrated dental implants: a 3-year report. Int J Oral Maxillofac Implants 2: 91-100.
14. Jemt T (1999) Restoring the gingival contour by means of provisional resin

crowns after single implant treatment. International Journal of Periodontics & Restorative Dentistry 19: 21-29.

15. Prasad KD, Shetty M, Bansal N, Hegde C (2011) Platform switching: An answer to crestal bone loss. Journal of Dental Implants 1: 13-17.

16. Schulte W, Heimke G. The Tubinger immediate implant. Quintessenz 1976;27(6): 17–23.

17. Slagter KW, den Hartog L, Bakker NA, et al. Immediate placement of dental implants in the esthetic zone: a systematic review and pooled analysis. J Periodontol 2014;85(7): 241–250.

18. Tonetti MS, Cortellini P, Graziani F, et al. Immediate versus delayed implant placement after anterior single tooth extraction: the timing randomized controlled clinical trial. J Clin Periodonto 2017;44(2): 215–224.

19. Abou-Zeid AW, Hassan K, Zayed M. Densitometric and clinical evaluation of immediate versus delayed implants. Life Sci J 2014;11:220–227.

20. Pellicer-Chover H, Peñarrocha-Oltra D, Bagán L, et al. Single-blind randomized clinical trial to evaluate clinical and radiological outcomes after one year of immediate versus delayed implant placement supporting full-arch prostheses. Med Oral Patol Oral Cir Bucal 2014;19 (3):e295–e301.

21. Gökçen-Röhlig B, Meriç U, Keskin H. Clinical and radiographic outcomes of implants immediately placed in fresh extraction sockets. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2010;109(4):e1– e7.

22. Sekar S, Suthanthiran T, Thangavelu A, et al. Clinical and radiological evaluation of delayed and early loading of single-tooth implant placement: a 6-month, prospective, randomized, follow-up clinical study. J Pharm Bioall Sci 2019;11(Suppl 2): S278–S284.

23. Donati M, La V, Billi M, et al. Immediate functional loading of implants in single tooth replacement: a prospective clinical multicenter study. Clin Oral Implants Res 2008;19(8):740–748.

24. Covani U, Crespi R, Cornelini R, Barone A (2004) Immediate implants supporting single crown restoration: a 4-year prospective study. J Periodontol 75: 982-988.

25. Heinemann F, Hasan I, Schwahn C, Biffar R, Mundt T (2010) Crestal bone resorption around platform-switched dental implants with fine threaded neck after immediate and delayed loading. Biomed Tech 55: 317-321.

26. Sanivarapu S, Dwarakanath CD, Ramesh AV (2010) Immediate Implant Placement Following Tooth Extraction: A Clinical and Radiological Evaluation International Journal of Oral Implantology and Clinical Research 67: 67-76.

27. Anand S, Gambhir RS, Aggarwal J, Kaushik A, Nanda (2013) Bone platform switching: Perpetuating crestal bone preservation- A pilot study. Journal of Dental Implants 3: 9-15.

28. Evans CD, Chen ST (2008) Esthetic outcomes of immediate implant placements. Clin Oral Implants Res 19: 73-80.

29. Priest G (2003) Predictability of soft tissue form around single-tooth implant restorations. Int J Periodontics Restorative Dent 23: 19-27.

30. Schropp L, Isidor F, Kostopoulos L, Wenzel A (2005) Interproximal papilla levels following early versus delayed placement of single-tooth implants: A controlled clinical trial. Int J Oral Maxillofac Implants 20: 753-761.

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