



Influence of Customized Gingival Former on Dental Implants Placed in Healed Alveolar Ridges & Extracted Sockets: An in Vivo (Original Research) Study

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ABSTRACT:

Most patients have an emotional response regarding anterior missing tooth. For this esthetic anterior implant supported prosthesis is the best available treatment to provide artificial analog of natural tooth. The interface between dental restorations and the surrounding soft tissue is of critical importance for restorative success. The esthetic appearance of the dentition is determined to a considerable extent by the shape, contour, colour, and health of the labial gingiva and the interdental papillae. In this study, subjects were divided into the 4 following groups, 5 patients in each group, according to the treatment modality being carried out in the best interest of the study: Group I & II- Healed alveolar ridges with customized gingival former as compare to traditional gingival former. Group III & IV- Extracted sockets with customized gingival former as compare to traditional gingival former. In this study, it was noticed that final outcome at the time of prosthesis was better with customized gingival former in group I, II, and IV as compared to the conventional gingival former with slight decrease in aesthetic outcome in group III patients.

Introduction

The elusive dream of replacing missing teeth with an artificial analogue has been a part of dentistry for a thousand years. The coincidental discovery, by Dr. P.I. Branemark and his co-worker (1952), of the tenacious affinity between living bone & titanium oxides termed 'Osseointegration' propelled dentistry into a new age of reconstructive dentistry¹. Contrary to what is felt concerning missing posterior teeth, most patients have an emotional response regarding anterior missing tooth. The most common causes of anterior single-tooth loss include endodontic failure, fracture, partial anodontia, trauma, resorption, and caries (usually of an abutment). For this esthetic anterior implant supported prosthesis is the best available treatment to provide artificial analog

of natural tooth without tooth preparation of adjacent teeth, and prevent bone loss to a great extent. Current concepts in implant dentistry include a spectrum of loading schedules that includes immediate, early, conventional, and delayed loading of dental implants² placement in healed and freshly extracted sockets.

The interface between dental restorations and the surrounding soft tissue is of critical importance for restorative success. The esthetic appearance of the dentition is determined to a considerable extent by the shape, contour, colour, and health of the labial gingiva and the interdental papillae. Hence, healing abutment must therefore flow from a round shape into a crown shape to develop a natural-looking replacement. Emergence profile is also related to implant placement.



The vertical length of the sub gingival portion of the restoration is particularly important because guided gingival growth is particularly important because guided gingival growth is indirectly proportional to the submergence depth of the implant.³ A different technique is also introduced in which customized gingival former is used in place of traditional gingival former to gain optimal emerging profile that is hygiene, gingival health and appearance.⁴ An attempt has been made in this article to compare & evaluate the clinical efficacy of the same.

Aim and Objectives

This study was conducted with the following aims and objectives: 1) To compare the influence of customized gingival former on patient with dental implant placed in healed alveolar ridge and freshly extracted sockets with clinical assessment. 2) To assess plaque, gingival and bleeding both in freshly extracted sockets and healed alveolar ridges. 3) To evaluate bone parameters at specific points of loading of dental implant in healed alveolar ridges and extracted sockets with radiographs.

Study Population

Patients were selected from Outdoor Patient Ward of the Department of Prosthodontics & Implantology, DJ College of Dental Sciences and Research, Modinagar, irrespective of socio-economic status, religion, age and sex. Patients with missing anterior teeth or with teeth which cannot be restored by any other dental treatment procedures like conservative or endodontic, periodontic or orthodontic procedures, or by any other treatment modality were selected.

Study Design

The selected subjects were divided into the 4 following groups according to the treatment modality being carried out in the best interest of the study: Group I & II- Healed alveolar ridges with customized gingival former as compare to traditional gingival former. Group III & IV- Extracted sockets with customized gingival former as compare to traditional gingival former. Use of Cohen Kappa score for inter-rating difference between two observer i.e. between observer A and observer B at the time of prosthesis placement (i.e. after 3 months of follow-up) and after 3 months of prosthesis placement (i.e. after 6 months of follow-up) in all the seven

parameters which includes mesial papilla, distal papilla, level of soft tissue margin, soft tissue contour, alveolar process, soft tissue color and soft tissue texture. Two observers are as following: Observer A: Reader Dr. Sahil Narula (Prosthodontics), Observer B: Reader Dr. Jitender Kumar (Orthodontics). The study protocol involved a screening appointment to verify eligibility based on inclusion and exclusion criteria. In addition to a thorough clinical examination radiographic assessment will be done to estimate the morphologic characteristic of the proposed implant site and the location of surrounding anatomic land marks. A total of 20 patients (5 in each group) were chosen for the study which requires placement of implants in the missing tooth region. Radiographic assessment of available bone was done based on Intra Oral Periapical Radiographs and Orthopantomogram. Radiographs revealed mesiodistal and apico-coronal dimensions of the available bone at the implant site as well as the trabecular pattern of the bone. The clinical examination was done to diagnose oral infections in the form of periodontal or periapical infection. Implant sites were evaluated for gingival architecture, adjacent tooth morphology and osseous architecture. Pretreatment planning included preparation of study and working cast models to record occlusal relationships as well as for wax up of the proposed prosthesis. Bone width gauge was used for the assessment of buccolingual thickness of bone. The implant size was selected both in width and length according to the bone mapping and with the help of radiographic evaluation after taking into account the magnification errors with the help of radiographic template having a ball bearing embedded in it. The implant used in this study belongs to ALPHA BI, SPI.

Inclusion Criteria 1) All patients are subjected to the panoramic radiographs as a screening procedure. 2) Intra oral periapical radiographs are attached to it. 3) Free of calculus and marginal gingivitis. 4) Adjacent teeth, intact, restored with functionally and esthetically good restorations. 5) Tooth indicated for extraction. 6) Patient willing for implants over other treatment available to either save the tooth preparation or replace missing tooth/teeth.

Exclusion Criteria 1) Inability to undergo a minor oral surgical procedure. 2) Patients with poor compliance and other addictive habits. 3) Patients with known history of diabetes mellitus or other bone pathologies.



4) Insufficient bone quality or comprised health of the local site as determined by radiographs and clinical inspection before implant placement. 5) Patients with Para-functional habits. Assessment of oral health, Extra and Intra oral examination like vital signs, lab investigations were also done.

Implants Placed In Healed Alveolar Ridges and Freshly Extracted Sockets with Modified Gingival Former

Implant was placed in freshly extracted sockets or after ensuring complete healing of socket i.e. waiting 3 months for mandibular and maxillae, implants were placed at the selected sight with missing tooth/teeth. Surgery was done under local anesthesia in an aseptic field under proper antibiotic cover. Second Stage Surgical Technique: The second stage surgery was done after healing period of 3 months in mandible and maxilla after implant insertion. The implant was exposed without damaging the surrounding bone and modified gingival former with light-cure composite was placed for 1 week considering the cervical portion of the prosthesis of the concerned tooth/teeth to gain good emergence profile. An impression was taken using indirect technique with this modified healed sight. For this abutment analog was properly seated at the sight. Once full seating was verified the abutment screw was tightened using recommended level of force i.e. 35 N, using a torque wrench. The torque wrench was rotated in clockwise direction. 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 shade

of the prosthesis was taken with VITA 3D shade card. Then the impression post was fixed in the impression and implant analogue was fitted on this post. 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. Post fixture placement a radiographic follow up was conducted during the following periods: Immediately post operative, 3 and 6 months. Conventional IOPA: The radiographic examination was conducted on a Planmeca Prostyle intraoral X-ray machine using a parallel cone technique with a Dentsply® film positioning device. Image Analysis: The image data was retrieved and analyzed on the Adobe photoshop® Ver 8 software. Prior to the analysis the image characteristics were enhanced (contrast, density, brightness) to optimal levels by the software itself. Metric analysis was performed on an mm scale using the measuring tool available in the software. Points were selected as follows: Mesial- Distance from the first thread (coronal) on the implant fixture to the most coronal point on mesial alveolar bone crest. Distal- Distance from the first thread (coronal) on the implant fixture to the most coronal point on distal alveolar bone crest. The determined values of each fixture were compared over the follow up period of one year separately for the mesial and the distal aspects to arrive at the following results. The radiographic findings will be also co-related with the clinical findings. The criteria both subjective and objective were used to evaluate the success of the implant process.



Figure 1: Pre-Operative View (Case 1)

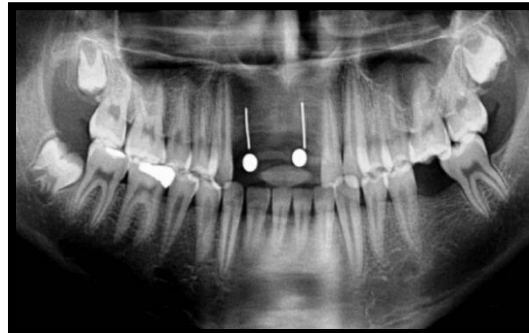


Figure 2: Pre-Operative OPG

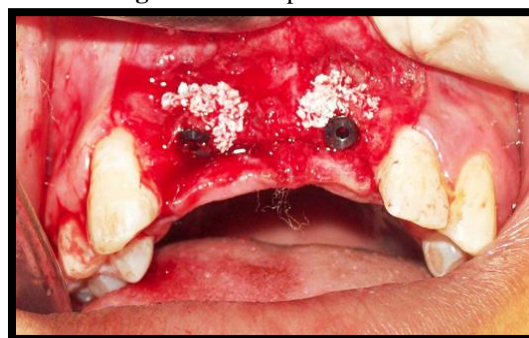


Figure 3: Graft Placed on Labial Cortical Plate

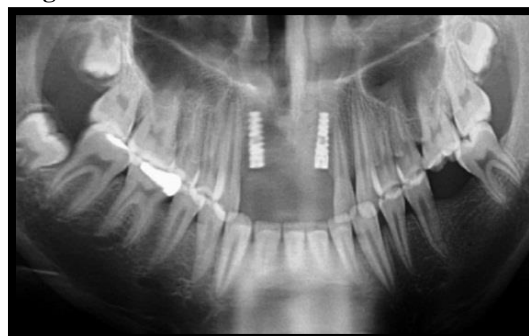


Figure 4: Post-Operative OPG

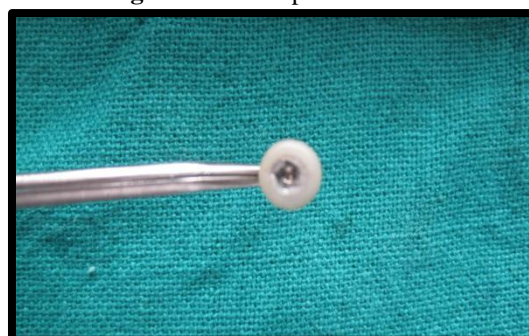


Figure 5: Modified Gingival Former with Composite

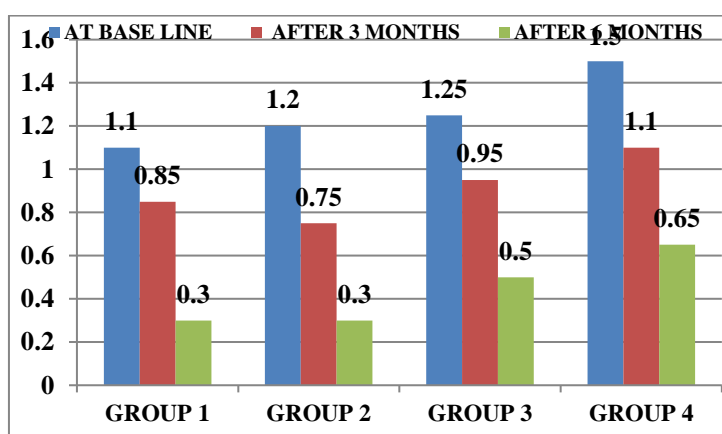


Figure 6: Final Prosthesis in Mounted Cast (Case 1)

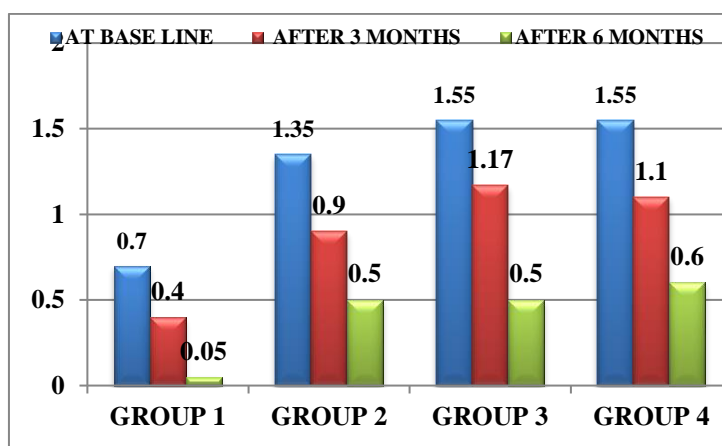
Statistical Analysis and Results

Following statistical formulas were used for analysis of the data obtained. Arithmetic means, Standard

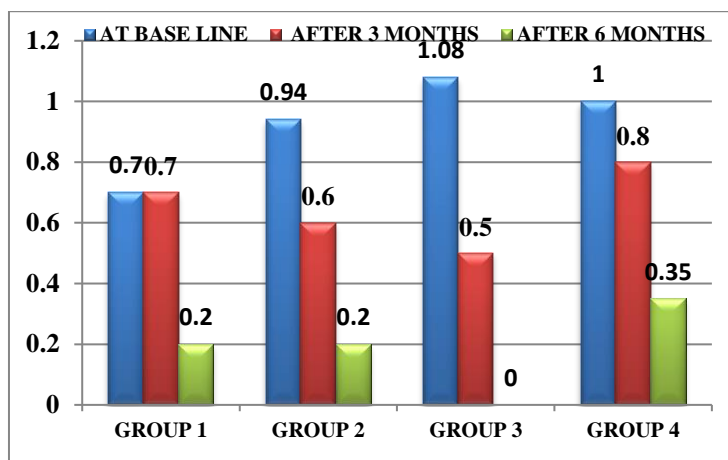
deviation, Paired t-test, Level of Significance (p-value), Analysis Of Variance (ANOVA), Cohen's Kappa Test



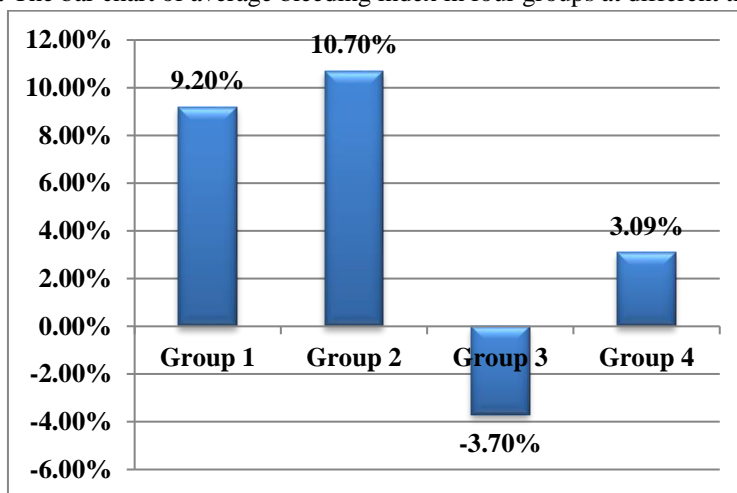
Graph 1: The bar chart of average plaque index in four groups at different time-points



Graph 2: The bar chart of average gingival index in four groups at different time -points



Graph 3: The bar chart of average bleeding index in four groups at different time -points



Graph 4: % Change in PES

Discussion

The most important criterion 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 has 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 first year of prosthetic loading.⁵ This is in accordance with the study done by Rohlig BG, Meric U, Keskin H considering outcome of immediately placed Implants in freshly extracted sockets. Ten patients were presented a treatment protocol in this study which involves the extraction of remaining mandibular teeth and immediate placement of 4 Implants, and differences between baseline and follow-up values were assessed. None of the Implant lost osseointegration .They concluded that placement of Implants in freshly

extracted sockets is a reliable Treatment Alternative.⁶ Thus it is postulated from the study that high success can be achieved with both the implant site that is implant placed in freshly extracted sockets and healed alveolar ridges. There is slight increase in aesthetic outcome with modified gingival former as compared to the commercially available gingival former. It is recommended that further studies be conducted with larger sample size and with a long term follow up of bone loss, plaque index, gingival index, bleeding index, and change in soft tissue outcome after prosthesis insertion with or without customized gingival former.

Summary and Conclusion

The highly esthetic zone often requires hard (bone and teeth) and soft tissue restoration. The soft tissue drape is often the most difficult aspect of treatment. As a result, posterior single-tooth replacement with an implant is



one of the easiest and most predictable treatments. Anterior single-tooth (mainly maxillary) replacement is often a challenge, regardless of the experience and skill of the dentist. With the limitations of this study it might be concluded that distribution and changes in PES values from 3 to 6 months in all the four groups shows that PES total between 9 to 14 also shows that final mean values (after 6 months of follow-up) are higher in healed alveolar ridges (i.e. 11.89 in group I and 12.4 in group II) in comparison to freshly extracted sockets cases (i.e. 11 in group III and IV each) at the time of prosthesis placement i.e. after 3 months of implant placement. It is also noticed that final outcome at the time of prosthesis was better with customized gingival former in group I, II, and IV as compared to the conventional gingival former with slight decrease in aesthetic outcome in group III patients. Further research with more number of patients and long term follow-up is required to get the final outcome of this innovative study.

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