Evaluation of Using Connective Tissue Graft as a Biological Barrier to Cover Immediately Placed Implants in Maxillary Anterior Region

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Abstract

Objective: The placement of dental implants immediately after tooth extraction has proven to be a predictable treatment protocol with a very high success rate. However, despite the high success rates achieved with osseointegrated implants, there are some disadvantages that could jeopardize the success of an immediate implant procedure. In particular, in the esthetic zone, bone morphology, level of crestal and interproximal bone, and morphology of the gingival tissues must be considered before initiating treatment. The aim of this study was to evaluate clinically and radiographically the effect of using connective tissue graft as a biological barrier to cover immediately placed dental implants in maxillary anterior region.

Subjects and Methods: Fourteen patients were selected from the Department of Oral medicine, and Periodontology, Faculty of Dentistry, Alexandria University, Egypt. All patients were indicated for tooth extraction and presence of sufficient apical bone to guarantee implant primary stability. They patients were undergo immediately placed implant after atraumatic tooth extraction and connective tissue graft is used to provide implant coverage. All patients were evaluated clinically at 1st and 3rd month after loading for modified plaque index (mPI), modified gingival index (mGI) and pre-implant probing depth (PPD).

Results: The results of this study showed that the mean mPI was 1.71 ± 1.11 and 1.29 ± 0.76 at 1 and 3 months respectively. The mean mGI was 0.89 ± 0.63 and 0.43 ± 0.43 at 1st and 3rd month respectively, this decrease in the mean modified gingival index score from the 1st to the 3rd month was statistically significant (Z= 2.39, p= 0.02). The mean PPD for was 1.75 ± 0.20 and 1.25 ± 0.19 at 1st and 3rd month respectively, this decrease in the mean probing depth score from the 1st to the 3rd month was found to be statistically significant (t= 6.41, p= 0.001). Radiographic result showed, the mean radiographic marginal bone height was 77.79 ± 1.11, 77.93 ± 1.08, 78.15 ± 1.01 and 78.42 ± 0.97 at immediate postoperative, 1st month of implant placement, 1st month after implant loading and 3rd month after implant loading respectively, the increase in the mean radiographic marginal bone height from the time of surgery to the 3rd month after loading was found to be statistically significant (t= 10.81, p<0.0001). The mean radiographic bone density for study group was 90.16 ± 2.01, 96.27 ± 1.98, 101.36 ± 2.33 and 108.27 ± 2.13 at immediate postoperative, 3rd month of implant placement, 1st month after implant loading and 3rd month after implant loading respectively, the increase in the mean radiographic bone density from the time of the surgery to the 3rd month after loading was found to be statistically significant (t= 43.80, p<0.0001).

Conclusion: using connective tissue graft to cover immediate placed dental implants provided clinical and radiographic improvement with no side effect on the healing process.

Keywords: atraumatic tooth extraction, connective tissue graft, immediate placed implant


1. Introduction

Considerable scientific evidence supports the long term success of osseointegrated implants according to the biological principles proposed by Brånemark [1]. Brånemark's protocol recommends complete healing of the alveolar bone before placing dental implants after tooth extraction; this process requires 6 to 12 months [1]. It has been observed that during this period 44% or even more of the alveolar crest may be lost as a consequence of bone resorption, with the majority of this resorption occurring after a 6 month period [2]. Scientific evidence exists demonstrating that early implantation may preserve the alveolar anatomy and the placement of a fixture in a fresh extraction socket may help to maintain the bony crest structure [3]. Furthermore, advantages for the patient...
derived from immediate implantation include a noticeable reduction of the comprehensive treatment time with less surgical procedures, an optimal esthetic result as a consequence of correct fixture position and angulations; and a reduction of treatment cost [4]. Despite the high success rates achieved with osseointegrated implants, there are some disadvantages that could jeopardize the success of immediate implant procedures especially different size between the extraction socket and the implant that result in a gap between the extraction socket and the implant surface, so Guided Bone Regeneration (GBR) techniques was suggested in association with the use of barrier membranes in immediate implant procedures [5]. Lazrza was the first to use a membrane to augment fresh extraction sockets another study showed successful results in both one stage and two stage implant procedures using barrier membrane [6,7]. Wilson et al stated that the use of barrier membrane is not necessary if the distance between the implant surface and the surrounding bone walls is ≤ 1.5 mm [8].

Primary flap closure has been reported to be important in immediate implant placement and in certain delayed procedures, Since many complications may arise due to lack of complete flap closure over the implant. Early exposure of the implant has a detrimental effect on the process of bone regeneration. Non-tension primary flap closure over the implant fixture is vital for successful treatment results [9].

Connective tissue graft was introduced as a tool to increase the width of keratinized gingiva as well as treatment of root recession [10]. In 1995, Edel suggested, for the first time, the use of the connective tissue graft as a biologic membrane to cover the residual alveolar bone defect associated with an occlusive graft [11].

The purpose of this study was to evaluate the effect of using connective tissue graft as a biological barrier to cover immediately placed dental implants in maxillary anterior region.

2. Subjects and Methods

2.1. Patients selection

Fourteen patients having non restorable maxillary single rooted teeth had been included in this study. After approval from the ethical committee, patients were selected from the Department of Oral medicine, and Periodontology, Faculty of Dentistry, University of Alexandria with the following criteria:

**Inclusion criteria**

- Age range from 20-45 years.
- Teeth indicated for extraction (tooth fracture, endodontic failure with an insufficient crown to root ratio, endodontic surgery failure, non-restorable caries and root resorption).
- The recipient site of the implant was free from any pathological conditions and away from any vital anatomical structures with adequate bone quantity, quality and interocclusal space to accommodate the available restorative components.
- Patients were all systemically healthy as indicated by history taking and clinical examination.
- Good oral hygiene with ol'eary index < 10% [12].
- Psychological acceptance to dental implant and to the procedures.

**Exclusion criteria**

- Parafunctional habits such as bruxism and clenching.
- Localized or generalized aggressive periodontitis.
- Smoking and alcoholism.
- History of drug abuse.
- History of psychiatric illness.
- Patients suffering from serious generalized bone pathology as osteoporosis.

All patients had underwent an immediate implant placement with connective tissue graft was used to provide implant coverage. Verbal and written informed consent was obtained from all patients before the commencement of the study. All experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

2.2. Methods

2.2.1. Presurgical Phase

Patient's preliminary evaluation, including: clinical evaluation with comprehensive history taking to assess oral hygiene condition of the patient, the condition of the tooth or remaining root to be extracted, the recipient site and the interocclusal space. Also radiographic evaluation with standardized radiographic evaluation of the implant recipient site, including periapical films using XCP (Rinn corporation Elign, Illinois, USA) and orthopantomogram (O.P.G) films. Figs. All patients were undergoing initial periodontal therapy Including, oral hygiene instruction, scaling and root planning.

2.2.2. Surgical Phase

Stage I surgery, including tooth extraction, implant placement with connective tissue harvesting and implant coverage using a connective tissue graft (Fig.1.a-z). Under local anesthesia (Mepecaine hydrochloride with adrenaline 1:00,000, Alexandria Co. for pharmaceuticals, Alexandria, Egypt), Partial thickness full reflected mucoperostial labial flap were performed to provide bed for the connective tissue graft for proper vascular supply. (Figure 1-c).

Figure 1.a show non-restorable fractured central incisor.
The tooth was atraumatically extracted using Anterior Periotome (Hu-Friedy manufacture, Chicago, USA) which act by severing the surrounding periodontal ligament with less trauma to the surrounding bone (Figure 1-d).

The implant site was prepared according to manufacturer’s instructions (Implant Microdent system. Co. Barcelona, Spain) into the periapical bone using the bony walls as a guide under copious saline irrigation (Figure 1-e). The Trylogic implant system (Implant Microdent system. Co. Barcelona, Spain) was seated submerged in the extraction socket 2mm below crest of the socket wall (Figure 1-f).

Trap door flap for harvesting the palatal connective tissue graft as follows: Connective tissue graft of 1.5mm thickness was harvested from the palate of the same site of implant placement, following local anaesthesia, a "trap door" split thickness flap, consisting of 1 horizontal and 2 vertical incisions, was elevated [13]. The donor site was chosen between the maxillary first canine and the maxillary first molar, 2 mm below the gingival margin. The underlying connective tissue was harvested using a periosteal elevator (Figure 1-g). The palatal flap was then sutures back into position to provide adaptation by interrupted and criss cross sling sutures.

The harvested connective tissue graft was used to provide implant coverage (Figure 1-h). After implant placement the connective tissue graft was secured over the implant using 4-0 horizontal mattress sutures with the partial thickness mucoperiosteal labial flap. Closure of the partial thickness mucoperiosteal flap using interrupted sutures (Figure 1-i).
Post-operative care including Antibiotic prescription (Augmentin 1gm, Smith Kline Beecham Pharmaceuticals, England) twice daily for one week. Non-steroidal anti-inflammatory drug was prescribed twice daily for one week (Biprofenid 150mg, Rhone-Poulenc-Roper Pharmaceuticals, France). 0.12% Warm chlorhexidine gluconate mouthwash twice daily in the second postoperative day and to be continued for one week (Antiseptol mouthwash, Kahira Pharmaceuticals and Chemical Industries Co., Egypt).

Sutures were removed after one week post-surgically. All patients were followed up for the first 4 weeks for monitoring implant and donor sites healing.

Stage II surgery. After 6 months healing period, the implant fixture was exposed by using punch technique. (Figure 2.b). The implant gingival former was inserted for 1-2 weeks to develop a per mucosal seal around the implant. (Figure 2.c) Abutment was then inserted and porcelain fused to metal fixed prosthesis was constructed. (Figure 2.d).

2.3. Evaluation Phase

All patients included in the present study were followed carefully and were monitored to motivate the patient for oral hygiene instructions and for maintenance of good oral hygiene.

2.3.1. Clinical evaluation

All patients were examined at 1st and 3rd month after implant loading for the following criteria:
- Modified plaque index (mPI) [14].
- Modified gingival index (mGI) [14].
Peri-implant probing (PPD) [15], measurements are carried out with plastic periodontal probe (KerrHawe SA, Via Strecce) with minimum force (Figure 3).

Figure 3. Kerr plastic periodontal probe

2.3.2. Radiographic evaluation

Standardized periapical x-ray films were taken immediately after implant insertion to ensure proper angulation, position, and relation to adjacent teeth. This x-ray was considered as a baseline x-ray.

Digitalization of the processed radiographs with the following guidelines:
- 800 dpi high quality resolution.
- 100% (1:1) scaling.
- Fixed brightness and color settings.
- No filter or other modifications were selected.

Standardized periapical x-ray films were taken at immediately postsurgical and 3rd month after implant placement and at 1st and 3rd months after loading.

Figure 4. show measurement of marginal bone height using image J software

Figure 5. show measurement of bone density using image J software

A special X-ray analysis software Image J (Image J software version 1.31V, Image processing and analysis in Java) was used to analyze [16]:
- Assessment of marginal bone height around the implants (Figure 4).
- Measurement of bone density around the implants. Probing depth refers to the distance from gingival margin to the bottom of the clinical pocket (Figure 5).

2.4. Statistical Analysis

Descriptive statistics are displayed as means and standard deviations. Normality was checked for all variables using Kolmogrov Smirnov test. Paired sample t-test was used for comparison of bone height and density for immediate and 3rd month postoperative and at 1st and 3rd months after loading and for peri-implant probing depth at 1st and 3rd month after loading. Values of plaque and gingival indices were compared using Wilcoxon Signed Rank test at 1st and 3rd month after loading. Significance was set at the 5% level. Statistical analysis was done using SPSS version 20.0. bar charts were used for graphical presentation.

3. Results

A total of fourteen patients (10 females and 4 males) having non restorable maxillary single rooted teeth had been included in this study. Their ages ranged from 20 years to 45 years with a mean age of 33 years. They were free from any systemic or local health conditions that may compromise implant success, non-smokers, with good oral hygiene, good periodontal status, favorable occlusion and adequate interocclusal space that could accommodate the implant abutment and the future crown restorations.

All the implants used were ranged from 3.8-5.0 mm diameter and 12-14 mm length. Six implants were placed in the upper left central region, three implants were placed in the upper left canine region, two implants were placed in the upper right central incisor region, and two implants were placed in the upper right lateral incisor region and one implant in the upper right canine region.

3.1. Clinical Evaluation

All patients were examined at 1st and 3rd month after implant loading for the following criteria

3.1.1. Modified Plaque Index (mPI)

Modified plaque index was assessed using Mombelli modified gingival index [14]. The changes in mPI of the study group over the follow up period are shown in Table 1 and Chart 1.

<table>
<thead>
<tr>
<th>Table 1. Comparison of the mPI at 1st and 3rd month after loading</th>
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<tr>
<td></td>
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<tr>
<td>Mean ± SD</td>
</tr>
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</table>

WSR test: Wilcoxon signed ranks test.
On the 1st month after loading, the mean mPI score of all patients was 1.71 ± 1.11. On the 3rd month, the mean modified plaque index score of all patients was 1.29 ± 0.76, this decrease in the mean modified plaque index score from the 1st to the 3rd month was statistically insignificant (Z= 1.73, p= 0.08).

3.1.2. Modified Gingival Index (mGI)

Modified gingival index was assessed using Mombelli modified gingival index [14]. The changes in mGI of the study groups over the follow up period are shown in Table 2 and Chart 2.

On the 1st month after loading, the mean modified gingival index score of all patients was 0.89 ± 0.63. On the 3rd month, the mean modified gingival index score of all patients was 0.43 ± 0.43, this decrease in the mean modified gingival index score from the 1st to the 3rd month was statistically significant (Z= 2.39, p= 0.02).

### Table 2. Comparison of modified gingival index at 1st and 3rd month after loading

<table>
<thead>
<tr>
<th></th>
<th>1st Month</th>
<th>3rd Month</th>
<th>WSR test</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean ± SD</td>
<td>0.89 ± 0.63</td>
<td>0.43 ± 0.43</td>
<td>2.39</td>
<td>0.02*</td>
</tr>
</tbody>
</table>

WSR test: Wilcoxon signed ranks test
*Statistically significant at P≤ 0.05.

3.1.3. Peri-implant Probing Depth (PPD)

Peri-implant probing depth was measured for all axial surfaces of all implants according to the standard procedure described by Glavind and Löe [15].

The changes in PPD of the study group over the follow-up period are shown in Table 3 and Chart 3.

On the 1st month after loading, the mean PPD score of all patients was 1.75 ± 0.20. On the 3rd month, the mean PPD score of all patients was 1.25 ± 0.19. This decrease in the mean probing depth score from the 1st to the 3rd month was found to be statistically significant (t= 6.41, p= 0.001).

### Table 3. Comparison peri-implant probing for at 1st and 3rd month after loading

<table>
<thead>
<tr>
<th></th>
<th>1st Month</th>
<th>3rd Month</th>
<th>Paired t test</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean ± SD</td>
<td>1.75 ± 0.20</td>
<td>1.25 ± 0.19</td>
<td>6.41</td>
<td>0.001*</td>
</tr>
</tbody>
</table>

3.2. Radiographic Evaluation

Standardized periapical x-ray films were taken at immediately postoperative and at 3rd month after implant placement and at 1st and 3rd months after loading and special X-ray analysis software Image J* was used to analyze [16].

3.2.1. Assessment of Marginal Bone Level around the Implants

The changes in marginal bone height of the study group over the follow-up period are shown in Table 4 and Chart 4.

The mean radiographic marginal bone height of all patients was 77.79 ± 1.11, 77.93 ± 1.08, 78.15 ± 1.01 and 78.42 ± 0.97 at immediately postoperatively, at the 3rd month after placement, at the 1st month and the 3rd month after loading respectively. The increase in the mean radiographic marginal bone height from the time of surgery to the 3rd month after loading was found to be statistically significant (t= 10.81, p< 0.0001).

### Table 4. Comparison peri-implant probing for at 1st and 3rd month after loading

<table>
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<tr>
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<th>3rd Month</th>
<th>Paired t test</th>
<th>P value</th>
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<tr>
<td>Mean ± SD</td>
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<td>77.93 ± 1.08</td>
<td>10.81</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

3.2.2. Measurement of bone density around the implants

The changes in the bone density around the implants of the study group over the follow-up period are shown in Table 5 and Chart 5.
Table 4. showing comparison of marginal bone height in mm throughout the study period

<table>
<thead>
<tr>
<th></th>
<th>Immediate postoperative</th>
<th>3rd month after placement</th>
<th>1st month after loading</th>
<th>3rd month after loading</th>
<th>Paired t test (between 3rd month after loading and immediate postoperative)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean ± SD</td>
<td>77.79 ± 1.11</td>
<td>77.93 ± 1.08</td>
<td>78.15 ± 1.01</td>
<td>78.42 ± 0.97</td>
<td>10.81</td>
<td>&lt;0.0001*</td>
</tr>
</tbody>
</table>

* Statistically significant at P≤ 0.05.

Table 5. showing comparison of marginal bone height in mm throughout the study period

<table>
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<tr>
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<th>Immediate postoperative</th>
<th>3rd month after placement</th>
<th>1st month after loading</th>
<th>3rd month after loading</th>
<th>Paired t test (between 3rd month after loading and immediate postoperative)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean ± SD</td>
<td>90.16 ± 2.01</td>
<td>96.27 ± 1.98</td>
<td>101.36 ± 2.33</td>
<td>108.27 ± 2.13</td>
<td>43.80</td>
<td>&lt;0.0001*</td>
</tr>
</tbody>
</table>

* Statistically significant at P≤ 0.05.

4. Discussion

The outcome of placing implants into tooth sockets immediately following extraction has been reported to be as predictable as placing implants into healed sites [17]. This technique is increasingly being applied to the replacement of teeth in the maxillary anterior region where esthetic outcomes are important [18]. However, some studies reported that recession of the marginal peri-implant mucosa may occur, which, in turn, may have an adverse effect on the final esthetic outcome [19,20]. Consequently, the present study was designed to evaluate clinically and radiographically the effect of using connective tissue graft on healing around immediately placed dental implants in maxillary anterior region. Fourteen patients (10 females and 4 males) having non restorable maxillary single rooted teeth have been included in this study. Their ages ranged from 20 years to 45 years with a mean age of 33 years. Patients were selected free from any systemic disease such as...
diabetes mellitus, blood dyscrasias and osteoporosis, this is further supported by Becker et al. [21], who documented that osteoporosis has been considered as a risk factor for implant failures due to low bone mass and a micro-architectural deterioration of bone leading to fragility.

All the patients in this study were nonalcoholic and nonsmokers as nicotine since it has been advocated that the major component of tobacco, is cytotoxic and prevents differentiation of osteoblasts like cells to osteoblasts and reduces alveolar bone quality [22]. This is in agreement with Feloutzis et al. [23] and Gruica et al. [24] who stated that smokers demonstrated a significantly increased risk for peri-implant bone loss when compared with non-smokers.

Furthermore, patients were selected free from parafunctional habits such as bruxism and clenching, because the magnitude of the forces are high, in such patients the duration of the forces are extensive, and the direction of the forces are more horizontal than axial to the implants [25]. Balshi and Wolfinger [26] reported that 75% of all failures, in immediate occlusal loading, occurred in patients with bruxism.

The selected surgical technique conducted in the present study was to place the implants immediately into fresh extraction socket. This technique offers significant advantages to both the patient and the clinician, including elimination of the second surgery reduces costs and chair time and eliminates the psychological discomfort for the patient [6]. This is in agreement with, Hahn [27] and, Campelo [28] who reported that immediate implants placement reducing the likelihood of resorption and results in less post-operative pain and discomfort.

Extraction of the tooth was doneatraumatically to preserve labial and palatal bones; this extraction was undergone using Anterior Periotome which acts by severing the surrounding periodontal ligament with fewer traumas to the surrounding bone. This is in agreement with study conducted by Thomson [29] which revealed that using a periotome luxator, for tooth extraction will limit the injury to the marginal bony socket walls that will preserve the natural gingival anatomy.

The implant cover screws were covered by an autogenous connective tissue graft to provide soft tissue closure over the implant [30]. An autogenous connective tissue graft 1.5 mm thickness was harvested from the palate using the "trap door" technique [13]. The connective tissue was placed above the implant and inserted under the buccal and palatal mucosal flap. Connective tissue graft was secured by horizontal mattress sutures.

In 2007, Covani and coworkers [31] reported using autogenous connective tissue graft for soft tissue closure over immediate placed implants. He stated that, the connective tissue graft seems to prevent the complications induced by the use of synthetic barrier membranes, and at the same time, it improves environment of the superficial soft tissues, thus preserving the keratinized tissues.

Same results were reported in 2009 by Stephen [32] who used small CT grafts, 5 mm in length, 3mm in width, and 1 to 2mm in thickness, the CT grafts were secured by horizontal mattress sutures. Patients were referred for restorative treatment 3 to 4 months after implant surgery and were recalled for examination and instruction in home care following connection of the implant crowns.

The second stage surgery was performed 6 months after the initial procedure. A tissue punch was used to expose implant site, and the implant gingival former was inserted for 1-2 weeks to develop a permucosal seal around the implant, and the superstructure was then inserted and porcelain fused to metal fixed prosthesis was constructed.

Implants placed in the oral cavity represent artificial surfaces colonized by bacteria from the saliva. This microbial biofilm represent an important etiologic factor in the pathogenesis of the peri-implant disease [33]. Therefore, it appears meaningful to monitor oral hygiene habits by quantifying plaque accumulation. Mombelli and Coworkers modified the original plaque index (PI) introduced by Silness and Löe to assess biofilm formation around the implant [14]. The severity of the gingival inflammation was assessed in this study using the modified Gingival Index (mGI) [14].

The results of the present study revealed a reduction of the mean mPI and mean mGI scores between the 1st , and 3rd months after loading but this reduction was statistically insignificant. These results were attributed to the oral hygiene instructions which lead the patients to be aware of their oral hygiene and good contouring of the crown with the gingiva for self-cleansing maintenance leading to reduction of inflammation by rapid and favorable healing process. In 2006 Barone [34] reported reduction in the mean mPI and mean mGI over the study period. In addition, De Angelo et al. [35] detected reduction in the mPI and mGI at 12 weeks after loading compared to baseline.

The peri-implant probing depth is considered as an important and reliable diagnostic parameter in the continuous monitoring of both periodontal and peri-implant tissues, in 1993, Ericsson and Lindhe [36] stated that at sites with healthy peri-implant mucosa, the location of the apical level of the barrier epithelium is about 2-3 mm, they suggested that the probing depth at such sites should be ≤ 3mm to detect healthy peri-implant mucosa. On the other hand, a peri-implant probing depth greater than 5 mm have greater incidence of anaerobic bacteria [37].

The results of this study revealed statistical significant decrease in the values of the mean peri-implant probing depth throughout the follow up period after loading. This goes with previous study where 116 patients were consecutively admitted for treatment with a total of 116 solid screw ITI-implants supporting single crowns. Ninety-six patients underwent the proposed immediate implant placement with connective tissue graft (test group), while 20 received only single immediate implants (control group). The observation time extended from 1 up to 9 years. Comparative statistical analysis of soft and hard tissue peri-implant parameters regarding peri-implant probing depth bone density, and marginal bone level demonstrated better results in the test group than in the control during every single 3-year analysis and especially in the last observation interval [38]. Also Covani [31] showed a peri-implant probing depth <2 mm when using connective tissue graft over immediate placed implants. His results showed a mean decrease of peri-implant probing...
probing depth between the baseline measurement and the peri-implant probing at the end of the follow up period. Standardized periapical radiographs using long-cone paralleling technique with XCP film holder device was used. Serial standardized radiographs were used to measure peri-implant bone level and density changes by using special image J software with the use of bone length and density as reference for the calculation [39].

In the present study using connective tissue graft to cover immediate placed implants showed a statistical significant increase in bone density in the study group, while the increase in bone height was statistical insignificant with minimal amount of marginal bone loss (MBL) during the follow up period. These results were in accordance with the outcome reported by Bianchi and Sanfilippo [38]. Similar findings were reported by Covani [31], where no changes in the MBL values at baseline and 6 months after immediate implants placement with connective tissue graft. He attributed his results of bone formation around implants to that, connective tissue graft would prevent soft tissue growth at the bone implant interface. In 2008, Fagan and coworkers [40] reported that 37 grafted sites with connective tissue graft healed uneventfully with no complications. Thirty-six implants osseointegrated and were stable and successful at the 6- and 12-month post-restoration evaluations. One immediate implant failed to integrate. The overall success rate was 97.3%. On the other hand Stephan [32] reported that there were no differences in the mean radiographic DIB (The distance from the shoulder of the implant to the most crestal radiographic contact of the bone with the implant surface) levels that were recorded on the mesial and distal surfaces of the implants when using connective tissue with immediate placed implants indicating stable crestal bone conditions during the follow up period. In 2010 Stimmelmayer and coworkers [41] assessed using of a combination epithelized-subepithelial connective tissue graft for closure and soft tissue augmentation of an extraction site following ridge preservation or implant placement; he reported preservation of the hard tissue volume and prevention of peri-implant bone loss following tooth extraction. Also Wiesner [42] evaluate whether connective tissue grafts performed at implant placement could be effective in augmenting peri-implant soft and hard tissues. After 3 months of submerged healing, abutments were placed and within 1 month definitive crowns were permanently cemented. Outcome measures were implant success, complications, peri-implant marginal bone level changes, patient satisfaction and preference. One year after loading, no patients dropped out, no implants failed and no complications occurred. Both groups lost statistically significant amounts of peri-implant bone 1 year after loading (0.2 mm in the grafted group and 0.6 mm in the non-grafted group).

In 2013 Jyothi and his coworkers [43], reported that using connective tissue graft seems to prevent the complications induced by the use of synthetic barrier membrane, and at the same time, improves the local metabolic environment of the superficial tissues, thus preserving the keratinized tissues thus improving the quality of peri-implant soft and hard tissues.

5. Conclusion

The placement of implants in fresh extraction sites associated with immediate connective tissue grafting was shown to be a valid treatment procedure that produces predictable results for the non-salvageable teeth. This single step technique performed in this study was shown to improve the quality of the peri-implant soft tissues and hard tissues at the end of 9 month follow up. However, long term studies are necessary before using this technique routinely in implant treatments.

References


