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Dimensional changes in periodontium with immediate replacement of tooth by socket shield technique

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Abstract

Background: Trauma during extraction and loss of periodontal ligament were the lead cause of alteration; therefore, many techniques were introduced to prevent the resorption of alveolar bone. The present study was conducted to assess dimensional changes in periodontium with immediate replacement of tooth by socket shield technique.

Materials & Methods: 40 fractured central incisors were enrolled and PDL-mediated root preservation technique was planned with simultaneous implant placement.

Results: Out of 40 patients, males were 22 and females were 18. Pre- operatively bucco- lingual alveolar bone width was 8.2 mm and post- operatively 9.3 mm. There was 2.1 mm bone loss pre- operatively and 2.5 mm post- operatively. The difference was significant ($P < 0.05$).

Conclusion: PDL-mediated root preservation technique with simultaneous implant placement is effective.

Keywords: Alveolar ridge, socket shield technique, trauma

Introduction

Trauma during extraction and loss of periodontal ligament were the lead cause of alteration; therefore, many techniques were introduced to prevent the resorption of alveolar bone [1]. Atraumatic extraction, socket preservation, grafting, and immediate implant placement prevent alveolar resorption by preventing the collapse of cortical plates and maintaining the dimension. These techniques show the significant result in maintaining the post-extraction alveolar bone, but no studies show the complete preservation of alveolar socket [2]. Sufficient alveolar bone volume and favorable architecture of the alveolar ridge are essential to obtain ideal functional and esthetic prosthetic reconstruction following implant therapy. Within 12 months of tooth extraction, the width of the alveolar ridge reduces by 50% during the observation period [3]. The loss corresponds to 5 to 7 mm as reported in earlier studies. The reduction of alveolar bone volume following tooth extraction may interfere with the placement of implants. Even with the introduction of traumatic techniques for socket preservation and advances in biomaterials used in conjugation with these techniques, ridge resorption can only be partially countered [4]. The loss of the PDL and bundle bone plays a major role in influencing the resorption process resulting in subsequent peri-implant soft tissue recession and esthetic deterioration. This led to the development of a root submergence technique; however, it was utilized for maintaining ridge morphology for complete dentures and for pontic site development [5]. A technique called socket shield was adopted for preservation of periodontium on the buccal side of extracted socket by partial retention of the root. Retaining the buccal aspect of the root during implant placement did not appear to interfere with Osseo integration [6]. The present study was conducted to assess dimensional changes in periodontium with immediate replacement of tooth by socket shield technique.

Materials and Methods

The present study comprised of 40 fractured central incisors of both genders. All patients were enrolled with their written consent. name, age, gender etc. was recorded.

All cases had extension of caries sub-gingivally. All patients underwent extraction of fractured central incisors with partial retention of the buccal part of root. In all cases, immediate replacement with an implant was done. PDL-mediated root preservation technique was planned with simultaneous implant placement. Radiographs were taken to assess bone level. Prosthetic part was given after 4 months. Results were tabulated and assessed statistically. P value less than 0.05 was considered.

Results

Table 1: Distribution of patients

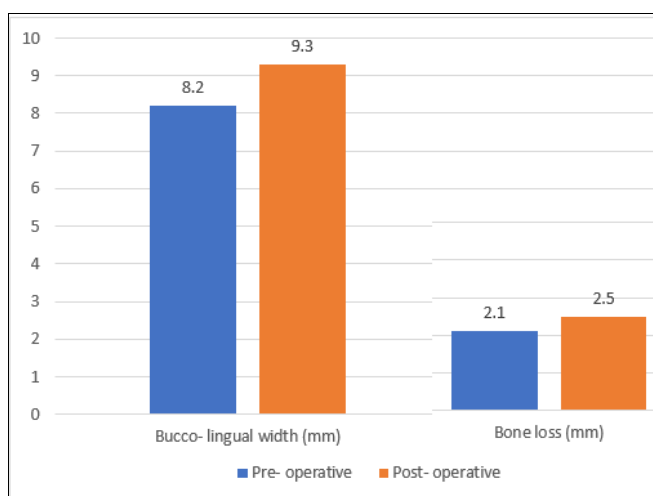
Total- 40		
Gender	Males	Females
Number	22	18

Table 1 shows that out of 40 patients, males were 22 and females were 18.

Table 2: Assessment of parameters

Parameters	Pre-operative	Post-operative	P value
Bucco- lingual width (mm)	8.2	9.3	0.05
Bone loss (mm)	2.1	2.5	0.81

Table 2, graph 1 shows that pre- operatively bucco- lingual alveolar bone width was 8.2 mm and post- operatively 9.3 mm. There was 2.1 mm bone loss pre- operatively and 2.5 mm post- operatively. The difference was significant ($P<0.05$).



Graph 1: Assessment of parameters

Discussion

Replacing missing teeth to restore function and aesthetics is one of the main goals of dentistry. For the past years, osseointegrated dental implants have been accepted as one of the major treatment concepts for restoring completely and partially edentulous patients [7]. In order to overcome the negative consequences of tooth extraction, different techniques such as immediate implant placement and ridge preservation procedure, graft materials and/or barrier membrane have been proposed to maintain the ridge dimension to a certain amount [8]. However, these methods could not completely preserve the coronal part of facial bone walls. The marked alterations after tooth extraction appear to be attributable to the loss of periodontal ligament and the

consecutive trauma in particular at the buccal bone plate. Thus, it can be assumed that root retention may have an influence on the occurring resorption process [9]. The present study was conducted to assess dimensional changes in periodontium with immediate replacement of tooth by socket shield technique. In present study, out of 40 patients, males were 22 and females were 18. Buser *et al* [10] attempted to introduce a new concept—implants surrounded by PDL. A very important observation was made; the portion of the implant that was in contact with the retained portion of the root was covered by a layer of cementum populated by collagen fibers. Hürzeler *et al* [11] were the first to demonstrate the socket-shield technique in a study on one beagle dog. Hemi section of mandibular premolar was performed and a buccal fragment of distal root was retained 1-mm coronal to the buccal bone plate. The immediate implant placement was done lingually to the retained root piece with or without contact with root fragment. We found that pre- operatively bucco- lingual alveolar bone width was 8.2 mm and post- operatively 9.3 mm. There was 2.1 mm bone loss pre- operatively and 2.5 mm post- operatively. Barakat *et al* [12], evaluated the socket shield technique clinically and radiographically as a new modality for immediate implantation in comparison to the conventional technique. Twenty patients were included in this study (n=20). They were divided in two groups; group I: Ten maxillary single rooted teeth were extracted followed by immediate implant placement using the socket shield technique. Group II: Ten maxillary single rooted teeth were extracted followed by immediate implant placement using the conventional technique. All implants were evaluated clinically and radiographically to evaluate bone loss on intervals of 1, 4 and 7 months. The mean horizontal and vertical bone loss value in socket shield technique group was $0.09\pm 0.03\text{mm}$ & $0.43\pm 0.23\text{mm}$ contrary to the conventional implantation after 7 months follow up, which was $0.33\pm 0.14\text{mm}$ & $1.56\pm 0.77\text{mm}$ which was statistically significant. Durani *et al* [13] in their study found that extraction socket healing and osseous remodeling took 120 to 180 days. Healing results in 50% reduction in the buccolingual bone in 12 months. Buccal bone loss of the extraction socket exceeds more than two-thirds with reduction in apico-coronal height by approximately 0.8 mm within 3 months of healing. In the study performed by Baumer *et al* [14] one of the cases had apical resorption of the shield, which might be due to microbiological leftovers in the root apex, which is indicative of the technique sensitivity of this approach.

Conclusion

Authors found that PDL-mediated root preservation technique with simultaneous implant placement is effective.

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