



Alveolar Funding in Fractured Anterior Tooth – An Interdisciplinary Approach

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Abstract

Tooth replacement in esthetic zone demands both hard and soft tissue considerations. In cases where Implant is not desirable by the patient, the post extraction sequelae of alveolar collapse could be avoided by alveolar funding. In this process, the fractured / carious root piece is submerged / saucered at or 1 mm below the alveolar crest. This helps in funding or rather preserving of tooth supporting apparatus that maintains equilibrium of stomatognathic system and prevents alveolar collapse. The current case report is of a case of middle aged, systematically healthy male patient with fractured left central incisor at subgingival level. Following surgical saucerization, endodontic treatment and prosthetic replacement, desirable esthetic results were achieved. One year follow-up showed acceptable emergence profile with plaque free pontic. The findings of the present case are conclusive of predictable alveolar funding of pontic with root present.

Keywords: Root Submergence; Root Banking; Pontic-Site With Root; PRF; Interdisciplinary; Alveolar Funding

Abbreviations

PRF: Platelet Rich Fibrin

Introduction

Anterior region are more prone to injuries. Especially with increasing rate of injuries in anterior region [1] the concern among the dental practitioners arises in restoring this unnatural condition to natural looking replacements. Though dental Implant therapy is a boon in current advancement, not many patients are inviting this treatment for various reasons. Be it economic or lack of dental insurances in India. Providing a long term sustainable yet esthetic results in anterior region could be a challenge for many practitioners. Moreover, conditions like these require appropriate immediate attention. For, they take a toll on patient's psychological and social confidence [2].

The smile curve is defined by Maxillary anterior teeth. Loss of tooth in this region, due to trauma or extraction, results in unaesthetic flattening of the ridge [3]. Soon as the tooth is loss,

so is the periodontal ligament comprising of undifferentiated mesenchymal cells having formative function is lost too [4]. The periodontal blood vessels supplying to the thin cortical plates are severed which results in resorption of facial plates [5]. Providing fixed partial prosthesis in such region thus becomes difficult.

To maintain esthetics in such condition, a longer and narrower tooth or pontic in comparison to natural tooth dimensions will have to be selected. Change in facial profile of the patient and collapse in arch form may decrease the lip support. All this resulting into an unaesthetic and unnatural prosthesis. The technique of alveolar funding aims to preserve alveolar casing around the submerged root piece and prevents bone resorption at the pontic site.

Materials and Methods

A systematically healthy, 25 year old male patient entered the out-patient department with the chief complaint of pain and broken tooth in upper front region of the mouth. The history of trauma from motorbike accident was elicited 15 days prior to his

first visit. Clinical examination showed complete loss of crown structure of 21 with no obvious swelling, discoloration or bleeding (Figure 1). The result of vitality test for adjacent teeth was positive for 12 and 23 while it was negative for 11. The intra-oral periapical radiograph showed no pdl widening suggestive of no peri-apical changes (Figure 2). Based on the following findings, the diagnosis of Ellis Class VIII with respect to 21 was determined.



Figure 1: Pre-operative clinical picture showing fractured maxillary central incisor at subgingival level

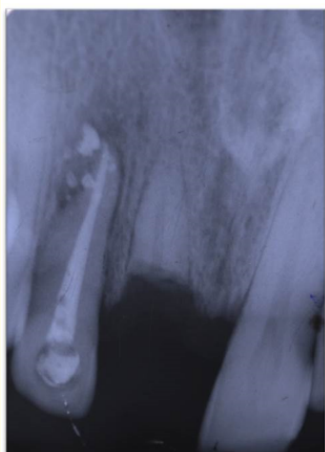


Figure 2: Pre-operative Intra-oral periapical radiograph showing fractured 21 without any periapical pathosis

The treatment plan was divided into three phase: surgical, endodontic and prosthetic phase. An interdisciplinary approach was taken for this case.

Pre-prosthetic phase

Diagnostic alginate impression of upper and lower arch was fabricated to cast for determination of bone height and

width, prosthetic treatment planning, crown preparation and temporization purpose. Crown preparation in relation to 11 and 22 was done and a temporary fixed partial denture containing an ovate pontic was fabricated (Figure 3). An Ovate pontic design was selected to maintain the natural contour of gingiva in post surgical healing phase.

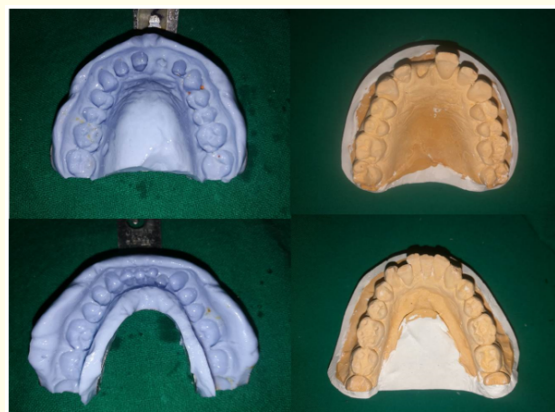


Figure 3: Diagnostic impression and cast

Surgical and endodontic phase

In the same visit, surgical intervention was planned. Following appropriate consent from patient, local anaesthesia was administered. Incisions were placed using no. 15 blade (Figure 4) and mucoperiosteal flap was raised (Figure 5). Copious saline irrigation ensured clear visibility and hydration of the reflected flap throughout the procedure. Saucerization of 21 up to 1 mm below the alveolar bone was done to encourage hard and soft tissue growth (Figure 6 and 7).



Figure 4: Incision placed using 15 no blade

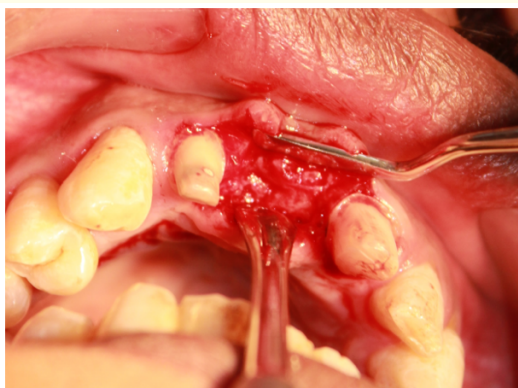


Figure 5: Reflection of Mucoperiosteal flap.

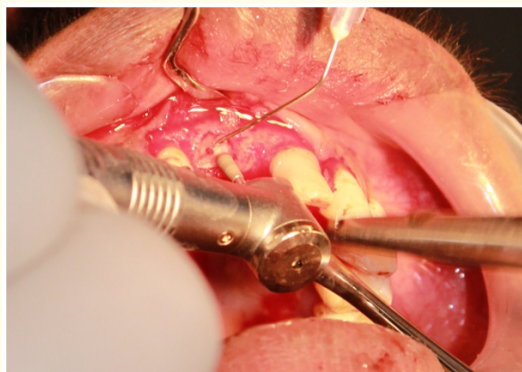


Figure 6: Copious irrigation with saline during the procedure.



Figure 7: Tooth root saucered 1 mm below the alveolar crest.

The exposed canal orifice was negotiated with #20 K file and working length was determined (Figure 8). Bio-mechanical preparation up to #70 K file was achieved. An orthograde root filling with MTA as obturant material ensured both apical and coronal seal (Figure 9).



Figure 8: Working length determination.

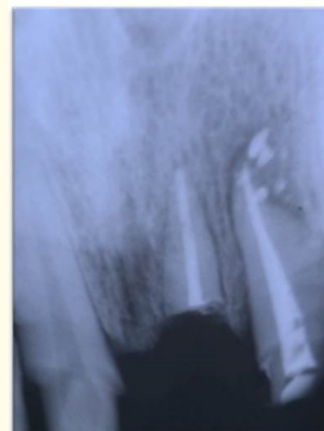


Figure 9: Obturation with MTA

Root was covered with PRF membrane for better recontouring of the gingival tissue (Figure 10). Flap was repositioned with 4 - 0 silk sutures (Figure11).

Temporary prosthesis fabricated prior to the surgery procedure was passively adjusted and cemented with temporary cement (3M ESPE temporary luting cement). Care was taken to smoothen all the rough edges on the prosthesis prior to cementation, for uneventful soft.



Figure 10: Placement of PRF Membrane.



Figure 11: Suture placement

10 days post operatively, the sutures were removed. The area was well irrigated with physiologic saline solution. Uneventful and satisfactory soft tissue healing was observed (Figure 12). Re-temporization was done (Figure 13) and the patient was recalled after 10 days for final prosthetic procedure.



Figure 12: Post suture removal healing is found to be satisfactory



Figure 13: Re-temporization post suture removal until final prosthesis.

Prosthetic procedure

Final impression (Figure 14) and delivery of final prosthesis was done in subsequent appointments (Figure 15). One year follow up was found to be satisfactory (Figure 16). The final prosthesis was a porcelain fused to metal fixed partial denture containing a ovate pontic in relation to 11.

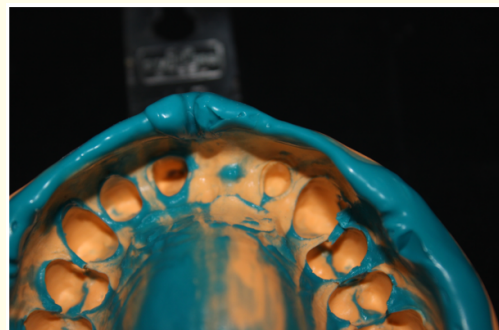


Figure 14: Final impression.



Figure 15: Final Prosthesis.



Figure 16: One year follow-up.

Results and Discussion

The very first documentation about the procedure dates back in 1961 by Bjorn. In his first experimental animal study where he concluded that the exclusion of epithelium results in obtaining mesenchymal re-attachment to Alveolar bone and other structures [6]. However, soon by 1965, Bjorn and associates continued with their study and the very first report of root submergence in humans was documented [7].

The alveolar ridge post extraction goes through series of changes [8]. And the process of resorption continues throughout life [9]. However, in this present study the alveolar funding was performed to escape the chronicles of resorption process.

In this present case report, the submerged tooth structure was endodontically treated. The literature has it, that the submerging of non-vital teeth may result in apical inflammation or cyst formation [10]. The choice of material selected was MTA instead of gutta percha. MTA is known for its biocompatibility and sealing ability [11] is preferable to avoid any future foreign body reaction in the bone [12].

Platelet rich fibrin is known to have healthy supply of growth factor that decreases healing time, improves tissue texture and resiliency [13]. The desirable tissue resiliency could have been obtained by the use of PRF Membrane over the experimental site in this trial. PRF is also known for its osteogenic property [14] which ensures long term stability result.

The temporization immediately post surgery, ensured quick interim prosthesis and ovate profile for the pontic. This is also advantageous in providing immediate passive temporization at surgical site aiding in the healing process the healing process.

Over a period of time, the soft tissue from facial aspect could considerably reduce and a free gingival or connective tissue grafting could be required [15]. However, the subject was lost after one year of follow-up. This procedure has both advantages and disadvantages. But, it could be looked upon as a choice of option where implant therapy is not desirable and fixed prosthesis can be planned. Furthermore, use of PRF in such cases could be advantageous. This amalgamation of old technique along with autologous growth factor could be an unique approach for treating anterior trauma cases.

Conclusion

Based on the findings of this current case report, it can be concluded that Alveolar Funding the combination of root submergence and PRF shows advantageous clinical results. However, long term follow-up along with larger sample size is recommended.

Acknowledgements

None.

Conflict of Interest

None.

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