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## RESEARCH ARTICLE

### BIOLOGICAL RESTORATION OF MAXILLARY CENTRAL INCISOR WITH COMPLICATED CROWN AND ROOT FRACTURE: A CASE REPORT

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#### ABSTRACT

Anterior teeth are quite vulnerable to traumatic injuries and are very common among all age groups resulting in plethora of problems from simple crown infarctions to avulsion of teeth. A crown root fracture of the anterior teeth mainly affects children and adolescents; one of the main reasons is due to increased outdoor sports and recreational activities. Salvaging the fractured teeth through reattachment should always be the priority of the treating clinicians if the fracture segment is available without compromising the periodontium. Reattachment of fractured tooth fragments can immediately restore form, function and esthetics, provides a positive psychological response, and is a relatively simple procedure due to advancements in adhesive and restorative dentistry. The prognosis of such cases depends on the degree of fracture, pulpal involvement, level of eruption, apex formation. Since the anterior crown fracture has direct psychological impact on the patient, so reattachment should be ideally done as it brings out the best esthetics in immediate vicinity after trauma and can give a perfect smile to the patients.

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#### INTRODUCTION

Current advancements in esthetics and adhesive dentistry allows clinicians to predictably restore form function and esthetics in complicated crown root fracture of anterior teeth. These procedures can be completed in a single appointment. If the original tooth fragment is retained following fracture, the natural tooth structures can be reattached using adhesive protocols to ensure reliable strength, durability, and aesthetics. Traumatic injuries to anterior teeth are frequently encountered. These injuries constitute the 3<sup>rd</sup> most common cause of dental morbidity and mortality. Such injuries represent the tragic experience for all age groups especially the younger ones. The people of geriatric age group taking plethora of medications often suffer from postural hypotension and loss of consciousness. These can result in minor injuries in form of subluxation to major injuries like avulsion of teeth. But the patient expectations irrespective of age group are concentrated especially on the immediate aesthetics. The changing attitudes of the patients in addition to new era of adhesive dentistry have probably rejuvenated the reattachment technique.

Reattachment is the most conservative method of managing the traumatized anterior teeth which involves the direct union between the fractured fragment and the remaining tooth structure. It is a semi permanent approach of restoration which was initially introduced by Tennery (Tennery, 1988). He used the acid etch technique to reattach the fractured fragment. Starkey and Simonsen have also shown similar case reports (Starkey, 1979 and Baratieri, 1990). Simonsen subjected the reattached incisor fragment to the orthodontic treatment without encountering the difficulties (Baratieri, 1990 and Simonsen, 1982). Conventional management techniques of such situations includes pin retained resin, basket crown, orthodontic bands, stainless steel crowns, porcelain bonded crown and composite resins (Simonsen, 1985) but these are associated with colour change, translucency defects, difficulty of contour and texture reproduction (Chu, 2000). This case report discusses the reattachment of a crown and root segment to a fractured incisor utilizing minimally invasive technique.

#### Case Report

A 21 years old male reported to department of Dentistry with the chief complaint of broken anterior tooth and a history of the bicycle fall one hour ago. He didn't give any history of loss of consciousness, vomiting and bleeding from ear or nose at

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Figure 1. Labial View of Fractured crown Figure 2. IOPA x ray showing crown root fracture

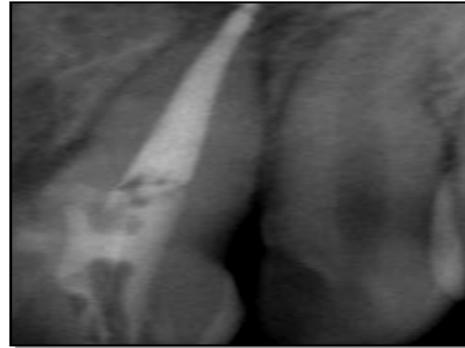


Figure 3. Restored Fractured segment (Biological restoration)

Figure 4. Immediate Post operative IOPA x ray

the accident site. His medical history was inconclusive. Extra oral examination showed no significant changes. There were no other abnormalities clinically detected on the intraoral examination, mild gingival laceration and bleeding and crown fracture extending to cervical end was evident with respect to tooth #21 and it was grade II mobile (Figure 1). The tooth #21 was sensitive to percussion and palpation. The mobility of adjacent and contra lateral teeth were within normal limits. Periodontal, endodontic and occlusal evaluations of tooth #21 were done. There was inflamed gingiva on the labial surface of tooth #21 with palatal gingiva being normal. There were no pockets around it. Bleeding was controlled with a sponge soaked in adrenaline solution and pressure pack was given for 5 minutes to analyze the situation. An IOPA was done to rule out the root or alveolar fractures if any. Radiographic examination showed intact lamina dura and no associated periapical changes with oblique complicated crown fracture was evident on tooth #21 (Figure 2) extending to the cervical margin. Pulp vitality test was performed on the adjacent teeth which responded positively. The fractured fragment was carefully taken out using endodontic locking tweezers and was kept in the saline. On examination of the fractured fragment, margins were clearly discernable with the fracture line extending subgingivally to the level of CEJ on the labial surface and oblique and supragingival on the lingual surface. The adequate adaptation of the fractured fragment and remaining tooth structure was found. After analyzing the situation, various treatment options were told to the patient. Patient gave consent to the following treatment plan.

The single sitting root canal treatment of tooth #21 was planned and tooth was obturated by sectional filling, post space was created with a drill corresponding to the size of the fiber post [coltene]. An internal groove was prepared in the fractured part with a no.35 inverted cone bur corresponding to the head size of post.

Isolation was achieved with cotton rolls and high evacuation saliva ejectors. Self etching adhesive agent [xenon 4, Dentsply, Mallifer] was applied to the prepared root canal space and was light cured. Dual cure resin cement [Flurocure, Dentsply] was used for bonding the post to the root dentine. Now head of post and groove in fragment was prepared accordingly and same cement was applied simultaneously to both the parts. Then the fragment was placed into the head of the post according to the margins and light curing was done. Fracture line on the lingual surface was sealed with flowable microfilled composite (Figure 3) Occlusion of the patient was relieved and post op instructions were given after taking IOPA radiograph (Figure 4). Patient was put on antibiotics and anti-inflammatory drugs for 5 days. Patient was recalled after 1month, 6 month then after a year for follow up.

## DISCUSSION

Restorative dentistry advancements in 2<sup>st</sup> century has permitted the clinicians to reattach the patient's own tooth fragment (Reis, 2004), rather than using cast post and core. This is the logical treatment when crown fractures results in minimal or no violation of the biologic width, retrieved crown fragment is intact and adapts well to the remaining tooth structure (Macedo, 2009). In cases of breach of biologic width, flap surgery, ostectomy and endodontic treatment is opted (Nogueira Filho Gda, 2002). Reattachment is simple technique which provides immediate aesthetics, improves prognosis of traumatized anterior teeth in pediatric and adolescent patients and is conservative in nature. It is opted for faciolingually extending horizontal and oblique fracture lines at cervical level with no discernable vertical root fracture or injury to adjacent teeth. Since there was the large pulp exposure in the above case so the root canal treatment was opted rather than direct pulp capping with MTA. The deep bite and class II malocclusion cases should be treated either by correcting the occlusion or crowns to minimize the occlusal stresses on the reattached

segments. The placement of internal groove seems advisable when remnant and fragment fit well into each other while partial loss of hard tissue must be compensated with a slight overcontouring (Weigand, 2005). Post and core is needed for the retention, distribution of stresses and reinforcement. Controversies are still on over the use of custom made or the prefabricated posts. Lingual surfaces are veneered with the microfilled composite to improve the retention of the reattached fragment (Arapostathis, 2005). The reattached teeth are of 55-60% of the original strength. These teeth have unknown longevity and continuous monitoring is required so it is mandatory to have a definite treatment plan after reattaching the fractured segment.

### Conclusion

For astute clinicians every clinical situation has many viable options but conventional treatment should always be given priority. The clinician who first sees such patients can decide better. The treatment plan lies upon the attitude and the expectations of the patient regarding weightage on the immediate aesthetics or the ultimate strength and longevity of the restoration. Every treatment is bounded by limitations but this technique if well performed, can dramatically increase the success rate and caters with patient's satisfaction of receiving immediate aesthetics with natural tooth which would otherwise be difficult to obtain with conventional methods of management. The patient's immediate aesthetic requirements were fulfilled through biologic restoration and tooth #21 remained asymptomatic during follow up periods.

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