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Management of Complicated Crown Root Fracture: A Case Report

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ABSTRACT

Traumatic dental injuries, especially crown fractures affecting anterior teeth, are commonly seen among children and young adults in India, significantly diminishing their quality of life. Conventional restorative methods for complex crown fractures, such as root canal treatments followed by composite or ceramic restorations, tend to be expensive, time-consuming, and can compromise both tooth structure and appearance. An alternative approach, fragment reattachment—when the tooth fragment is available—provides a more conservative, cost-effective, and aesthetically pleasing solution. This technique helps maintain the natural shape and function of the tooth while also supporting the psychological well-being of the patient. The report emphasizes the importance of increasing clinician awareness regarding fragment reattachment as a practical and durable option for treating anterior crown fractures.

INTRODUCTION

A recent meta-analysis found that the prevalence of traumatic dental injuries [TDIs] is 1-76% in children and young people in the Indian population.[1]Crown fractures are the most frequent result of traumatic injuries, particularly affecting the anterior permanent teeth due to their position in the arch.[2] The treatment of traumatized teeth is essential to ensure the quality of life for teenagers and young adults in order to prevent long-term complications arising from the trauma.[3]

An anterior crown fracture can be classified as complicated or uncomplicated, depending on the pulp involvement. The options for treating complicated crown fractures encompass root canal therapy and several restorative techniques, including composite or ceramic restorations and crowns. These procedures might necessitate the use of an intraradicular post. While they are effective, these treatments can be costly, involve prolonged appointments, and may affect the tooth's healthy structure. Furthermore, the restorative materials used may not closely match the tooth's natural color and translucency.[5,6]

When a tooth fragment is available, reattachment is the best option as it preserves the natural appearance, function and alignment while being a quick, cost-effective solution that positively impacts the patient's psychological well-being.

With advancements in adhesive dentistry and improvements in restorative materials, preparation designs, adhesive protocols, clinicians are now able to perform fragment reattachment more reliably and accurately.[7]

Case Report: A 22-year-old young male patient came to the Department of Conservative Dentistry and Endodontics, SGT Dental Hospital with the chief complaint of fractured upper front

teeth due to a fall on the ground 2 days back. The patient had no relevant medical history.

Figure 1-[A]Pre-operative image showing fractured 11,21 [B] Clinical image after removal of fractured segment [C] Palatal view [D] Fractured segment

On examination, Ellis class Ⅲ fracture was observed with respect to 11 tooth which extended from the junction of cervical and middle third on labial aspect of crown and 2mm sub-gingivally from the palatal aspect. [Fig 1] The fractured fragment was loosely attached by the palatal periodontal tissues of the tooth. Ellis class Ⅱ fracture was observed with 21 tooth and was vital on electric pulp testing. There was no apparent trauma to soft tissue and no mobility of the fractured teeth. The pre-operative radiograph indicated 1 mm apical root resorption and complete root formation.

The patient expressed the desire to maintain teeth and restore them. So, it was planned to reattach the fractured fragment with respect to 11, following root canal treatment and fiber glass post placement to enhance the strength of the involved tooth and composite build up with respect to 21. The option to reattach the fragment was considered only after ensuring that it was in good condition and fit well on the fractured tooth.

Local anaesthesia was administered (2% lidocaine with adrenaline 1:80,000). The fractured segment was removed and stored in normal saline. [Fig-1 B] Single sitting root canal treatment was performed on the upper right central incisor. [Fig-2-a-c] Gingivectomy was performed with electrocautery in order to visualize the extent of the fracture. Access cavity was prepared and working length was established with a 10 no. K with the help of an apex locator which was confirmed radiographically. Biomechanical preparation was done and obturation was done.

The root canal filling material was partially removed in order to create space for post placement with peeso reamer while maintaining 5 mm in the apical third. A prefabricated glass fiber post was bonded in the canal using a self-adhesive resin cement (Calibra, Dentsply).

A hole was created in the fractured tooth fragment so as to engage the post, which was then etched using 37% phosphoric acid, rinsed, blot dried, and a bonding agent (Prime and Bond NT, Dentsply) was applied. The same resin cement (Calibra, Dentsply) was subsequently used to fill the hole in the tooth and the prepared grooves in the coronal fragment. The fragment was carefully positioned on the remaining tooth, light-cured, and held in place with firm finger pressure to ensure a close fit.

Composite veneering followed by finishing and polishing of the tooth was done. Then composite build-up was done wrt 21, followed by finishing and polishing. The patient was recalled for follow-up at 3 months and 6 months. The patient was pleased with the results and the tooth was functioning normally.

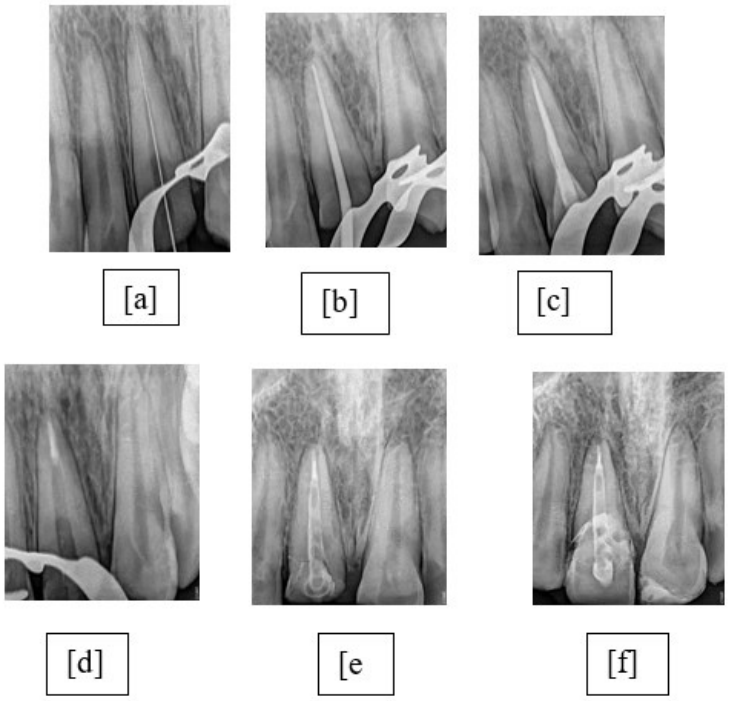

Figure 2- X-ray showing-[a] Working length [b] Master cone [c] Obturation [d] Apical Gutta percha [e] Post placement [f] Fragment reattached

Figure 3-[A] post operative image after fragment reattachment [B] After direct veneering [C] Palatal view

DISCUSSION

The primary option for treating coronal fractures is immediate fragment reattachment when the fragment is accessible at the accident site. This conservative method guarantees that the incisal wear, translucency, and original anatomy all occur at the same rate as the original tooth.[7] This not only reproduces the natural anatomy of the tooth but also provides psychological benefits to the patients and is a fast, cost-effective solution.[8,9] When compared with reattachment, composite restoration presents difficulties in matching color and shows higher wear than the enamel structure. These may fail due to bond failure, marginal failure, discoloration, composite fracture, and shade instability.[5,10]

Rehydration of the fractured fragment is an important factor for the success of fragment reattachment. Hydration of the segment prevents the desiccation of the collagen fibrils and network. A fragment that has been dehydrated will show poor transparency, reduced bond strength, and fracture resistance.[11]According to a study conducted by Farik et al on evaluation of the fracture resistance of dehydrated and rehydrated teeth over different periods observed that when a fragment remains dehydrated for more than one hour, the fracture resistance decreases significantly.[12]

The reattachment procedure is quite simple when the fracture line is supragingival. In cases of subgingival fracture line, various treatment modalities like orthodontic extrusion, surgical extrusion, electrocautery or gingivectomy with or without osteotomy can be done inorder to make the fracture line supragingival. Electrocautery was done in the palatal aspect of 11 to make sure that the fracture line was visible.

Fiber posts serve as a splint to reinforce the fractured segment, improve retention, distribute stress uniformly throughout the root, offer better aesthetics, and require less chairside time.[13,14]Enamel beveling, internal dentin groove and external chamfer can be done to increase retention of the reattached fragment. In this case, an internal groove was prepared in the tooth fragment surface which added up to the fracture resistance.[15]

CONCLUSION

Although crown fractures are more common, there is less knowledge about managing tooth fractures among clinicians compared to avulsions. Tooth fragment re-attachment simple, aesthetic, cost effective and conservative approach which has long-term results compared to using a direct composite material. Dentists are still determining the best preparation process and materials for the fragment reattachment technique.

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