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Management Of Ellis Class III Fracture In 12 Year Old Patient: A Case Report

1Dr Sneha Dori, 2Dr Bhavna Dave, 3Dr Anshula Deshpande, 4Dr Simron Baishya

1Post Graduate student , 2Head of the Department, Professor , 3Professor , 4Post Graduate student

1K M Shah Dental College and Hospital, Sumandeep Vidyapeeth,

2K M Shah Dental College and Hospital, Sumandeep Vidyapeeth,

3K M Shah Dental College and Hospital, Sumandeep Vidyapeeth,

4K M Shah Dental College and Hospital, Sumandeep Vidyapeeth

Abstract

The maxillary central incisors are the teeth most commonly impacted by traumatic dental injuries, which are common in children and teenagers. Crown fractures, particularly Ellis Class III involving the pulp, not only compromise function and esthetics but also have psychological and social implications. The management of such cases requires a balance between durability, conservation of tooth structure, and esthetic outcome. This case report presents the management of an Ellis Class III fracture in a 12-year-old male patient using endodontic treatment followed by fiber-reinforced post and core restoration and a provisional polymethyl methacrylate (PMMA) crown. Fiber posts were selected over standard metal posts because of their optimal stress distribution, reduced chairside time, improved aesthetics, and modulus of elasticity comparable to dentin. The treatment resulted in excellent esthetic and functional rehabilitation, demonstrating that fiber-reinforced posts provide a predictable, conservative, and patient-friendly option in the management of complicated anterior crown fractures in young patients.

Keywords: Ellis Class III fracture, traumatic dental injury, fiber post, post and core, esthetic dentistry, pediatric dentistry, anterior crown fracture.

Introduction

Traumatic dental injuries, also known as dental trauma, are frequent in the field of dentistry.[1] The maxillary incisors are the teeth most frequently affected, accounting for 96% of all crown fractures.[2] Traumatic injuries typically affect children and teenagers, with boys more likely than girls to be impacted.[3] The maxillary anterior teeth of children under the age of fourteen are commonly affected by Ellis class 3 dental trauma, which affects the tooth's enamel, dentin, and pulp.[4] Children and adolescents who suffer from tooth fractures may experience emotional distress as a result of the lost tooth structure. Restoring both function and appearance is the main goal of therapy in these situations.

Numerous treatment strategies can be used to treat anterior tooth fractures. In situations when the teeth are extensively fractured, endodontic treatment and intracanal post implantation are necessary before crown placement. In recent years, a range of fiber-reinforced posts have emerged as a substitute for cast and prefabricated metal supports in the restoration of endodontically treated teeth.[5] Compared to other solutions, an intracanal post composed of reinforced fiber offers benefits such as translucency, resin composite crown strengthening, and relative ease of manipulation.[6] The advancement of technology has made it possible for manufacturers to produce fiber posts that, in addition to being more aesthetically pleasing, require less chair side time, have a modulus of elasticity comparable to dentin (these are the first characteristics to be valued when compared to metal or cast posts), are radio opaque, and come in a wide range of shapes.

This article details a case of a Ellis class III fracture in maxillary left permanent central incisor and restored using fiber-reinforced posts and cores.

Case Report

A male patient of 12 years old reported to the Department of pediatric and preventive dentistry, KMSDCH with the complaint of fractured upper front teeth due to trauma while playing in ground yesterday. Examining the crown revealed a complex fracture of number 21, accompanied by discomfort and hyperplastic pulp. (Fig. 1,2) During the intraoral examination, the diagnosis of an Ellis class III fracture in 21 and an Ellis class II fracture in 11 was made. Intra-oral periapical radiography (IOPA) showed involvement of enamel, dentin, and pulp confirming the diagnosis of Ellis Class 3 fracture. (figure 3) Pulp sensibility test was performed using thermal and electric pulp testing device. Result of sensibility test revealed the vital status of pulp. (figure 4,5) The treatment plan, which includes root canal treatment followed by post and core and PMMA crown placement, was explained to the patient in detail.

Following local anesthetic, Access opening was done under rubber dam isolation, working length determined and Shaping was done using K file (Mani Tochigi, Japan). (Figure 6,7) Debridement was done using 2.5% sodium hypochlorite and saline. The root canal was obturated with AH plus sealer and laterally condensed with gutta-percha after being dried with paper points. In order to accommodate the fiber-reinforced post, the post gap was prepared and enlarged using the appropriate GG drills (Figure 8). The fit

of the fiber post was examined.The fiber post that was selected had a 1.5mm diameter. (Fig. 9,10) For post-cementation, dual cure cement (3M RelyX) was utilized. As directed by the manufacturer, the catalyst and base components of the substance were combined and applied. Before light curing, the post was seated and extra material was removed. Composite was used to build up the core. The tooth 21 was prepared for PMMA crown. (Figure 11) The Vita Shade Guide was used to choose the shade for the crown. Upper elastomeric Impression was taken for PMMA crown. (figure 12) CAD CAM designed PMMA crown cementation was done. (Figure 13)

Figures

Fig. 1. Pre-operative view of the maxillary arch

Fig. 2. Pre-operative frontal view demonstrating the intrusion of the maxillary right central incisor

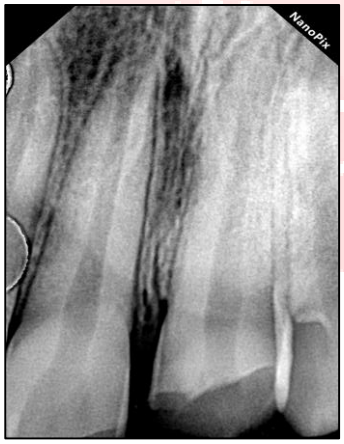

Fig. 3: Pre operative IOPA of 11 21

Fig. 4: thermal test using endofrost on 11

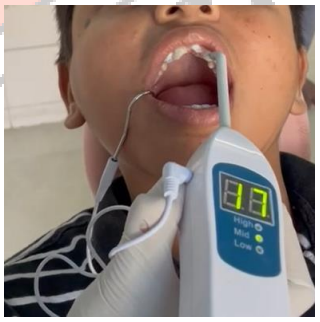

Fig. 5: Electric pulp testing performed on 12 11 21 22

Fig. 6: Access opening in 21

Fig. 7: Working length determination in 21

Fig. 8: Obturation completed in 21

Fig. 9: 2/3rd of GP removed using GG drill in 21

Fig. 10: Fiber post selection in 21

Fig. 11: Crown preparation on 21

Fig. 12: Upper elastomeric impression taken for PMMA crown

Fig. 13: after cementation of PMMA crown on 21

Discussion

When anterior teeth are involved, the restoration of endodontically treated teeth is a challenging clinical procedure that requires careful balancing of the needs of both functional integrity and aesthetics. Restorative techniques and post systems have advanced significantly over the last few decades, providing physicians with a wider range of materials and designs. Cast metal posts were once thought to be the best

option for treating severely weakened teeth. However, clinical taste has changed toward more conservative and aesthetically acceptable solutions such prefabricated posts, fiber-reinforced systems, resin-based composite cores, and ceramic alternatives with the introduction and widespread use of adhesive dentistry.[6]

Fiber posts' favorable biomechanical characteristics and optical compatibility have made them more and more popular in anterior esthetic zones. Fiber posts are prefabricated, time-efficient, and blend in well with tooth-colored restorations, unlike metal posts, which frequently need laboratory fabrication and may impair aesthetics.[7,10] Their resin-based composition reduces the risk of catastrophic root fractures by enabling more uniform stress distribution along the root and providing an elastic modulus comparable to dentin.[8] According to Oliveira et al.[1], the most crucial factor influencing fracture resistance is the amount of tooth structure that remains, and fiber posts strengthen this structure by forming an efficient binding with the root dentin. Freedman et al.[2] further emphasized that the post's primary function is to anchor the post-and-core complex, and that the restoration's longevityand retention greatly increase when it is bonded to the dentin.

Although mechanically sound, the dark colour of earlier generations of carbon fiber posts limited their aesthetic appeal in anterior regions. This disadvantage is addressed by more recent substitutes, such as silicon fiber posts, glass fiber, and quartz fiber, which provide better aesthetics, translucency, and, frequently, radiopacity.[9,10] Additionally, the ability of certain light-transmitting fiber posts to enhance polymerization of resin-based luting cements in the apical region contributes to their clinical success.[11]

In the present case, reattachment of the fractured crown fragment was not possible as the fragment was missing. More invasive treatment options such as crown lengthening or orthodontic extrusion, though viable, would have increased patient discomfort, extended treatment time, and required a longer healing period. Therefore, the use of fiber post and composite resin core build-up was deemed the most conservative and esthetically favorable approach.

Overall, advances in adhesive restorative materials, coupled with fiber-reinforced post systems, have provided clinicians with predictable, minimally invasive, and esthetically superior options for managing anterior tooth fractures. These materials not only restore function and comfort but also enhance patient satisfaction by meeting esthetic demands.

Conclusion

The successful management of an Ellis Class III fracture in a 12-year-old patient highlights the importance of adopting a conservative yet durable restorative approach in pediatric dentistry. The use of fiber-reinforced posts, combined with composite core build-up and a provisional PMMA crown, provided excellent functional stability, biomechanical compatibility, and esthetics. Compared to traditional metal posts, fiber posts demonstrated superior adaptability to dentin, minimized stress concentration, and improved patient comfort and satisfaction. This case reinforces that modern adhesive techniques and fiber-

reinforced post systems are predictable, patient-friendly, and effective solutions for the rehabilitation of traumatized anterior teeth in young patients.

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