

FRAGMENT REATTACHMENT: ENDORESTORATIVE APPROACH

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ABSTRACT: Traumatic injuries of teeth are the main cause of emergency treatment in dental practice. The horizontal crown fracture, more frequently observed, usually occurs in maxillary anterior region and young male patients. The most common type of coronal fracture is in the middle third, followed by root and apical part. This case demonstrates sequential endodontic, restorative and prosthodontic modalities for the conservative management of complicated crown fracture of maxillary right and left lateral incisors in young patients. After root canal treatment, fractured fragment was reattached with the help of composite and a horizontal and vertical splints were given.

Key Words:

INTRODUCTION

Dental traumatic injuries are the main cause of emergency treatment in dental practice. It occurs in young patients with varying severity from enamel fractures to avulsion¹. The dental trauma followed by anterior tooth fractures, especially permanent incisors can cause a strong psychological impact on young patients. Dental trauma involving extensive loss of tooth structure can cause pain, discomfort and bad appearance. With recent advances in esthetic dentistry, restorative treatment has caused high expectations for the patients to be able to smile with confidence^{2,3}. Endorestorative treatment consists of endodontic treatment followed by a restoration. The determining process for restoration after endodontic treatment requires some factors to be considered i.e : the degree of tooth damage; the quality of dental supporting tissue; the presence of antagonist tooth or not; and the capacity of occlusal load⁴. The success of a restoration, moreover, is determined by retention, stability, and aesthetics of the teeth. Thus, the improving process of the appearance, especially in the term of aesthetics, is getting more importance in dentistry in this modern era⁵.

CASE REPORT - 1

A healthy 18 year old boy reported to the Department of Conservative Dentistry and Endodontics with a history of trauma the previous day while playing soccer. The patient was conscious and there was no evidence of head and neck trauma. Extraoral examination revealed no significant changes and intra oral examination revealed neither laceration nor alveolar bone fracture.

CLINICAL EXAMINATION

The maxillary right lateral incisor was fractured at the cervical third on the labial surface with fracture line extending upto the proximal surface with grade-I mobility (Figure 1). Clinical examination showed a Ellis class-III fracture. A radiograph indicated closed apex and did not show any other fracture or injury on the adjacent teeth.

A horizontal splint was placed near the cervical third to stabilize the labial surface (Figure 2) followed by cleaning of root canals ,filled with calcium hydroxide based sealer and gutta- percha using vertical condensation technique.The guttapercha was then partially removed (Figure 3(a) & 3(b) (3mm below CEJ) with a good apical seal and then the canal was etched with 37% phosphoric acid gel for 20 seconds , rinsed for 20 seconds and dried with gentle stream of air. An adhesive light curing system and a vertical fiber splint was placed sequentially and excess of fibers were cut off (Figure 4).

RADIOGRAPHIC EXAMINATION:

Clinical and radiographic follow up examination confirmed the effectiveness of combined restoration technique using fiber splint. Follow up examination showed no pathological signs. After 2 days crown preparation was done , and temporary crown was given. Final prosthesis was delivered after next 2 days (Figure5).



Figure-1:Maxillary Right Lateral incisor Fractured at Cervical third



Figure-2:Horizontal Splint to stabilize the fractured segment



Figure 3(a)

Figure 3(b)

Figure-3(a) & (b):Post space preparation 2-3 mm below the CEJ



Figure-4:Placement of vertical splint along with Flowable Composite



Figure-5: Crown placement

CASE REPORT - 2:

A 34 yr old male reported to the Department of Conservative Dentistry and Endodontics with a sports injury in upper left front tooth region on the same day.

CLINICAL EXAMINATION:

Examination revealed Ellis class-III fracture in the middle third on labial surface of maxillary left lateral incisor with no soft and hard tissue injury (Figure 6).

RADIOGRAPHIC EXAMINATION:

Radiographic examination showed no periapical pathology. Initially, broken fragment was placed back to its position with occlusal adjustment by firm pressure and a horizontal splint using composite resin by acid etch technique (Figure 7). Then root canal treatment was carried out using calcium hydroxide based sealer and guttapercha using vertical condensation technique. After 2 days guttapercha was removed 2-3 mm below the CEJ and the canal was etched with 37% phosphoric acid for 20 seconds, rinsed and dried with gentle air pressure (Figure 8). Adhesive along with a vertical fiber splint and composite was placed inside the canal and excess fibers were cut off (Figure 9). After another 2 days, crown preparation was done and temporary crown was given. Final prosthesis was delivered next day (Figure 10).



Figure-6: Horizontal Fracture in middle third of the crown



Figure-7: Horizontal splint to stabilize the fractured segment



Figure 8: Post space preparation



Figure-9: Clinical and Radiographical placement of vertical splint with Flowable Composite



Figure-10:Crown placement

DISCUSSION

Various conditions of trauma can cause crown fractures although many literatures suggest several predominant causes, such as trauma while playing and running or during sports activities, traffic accidents, and hit on face. Anterior teeth are more susceptible to trauma, approximately 80% of maxillary incisors followed by maxillary lateral incisors and central mandibular incisors¹. The principle of dental care for those who have experienced endodontic treatment is actually to restore root and crown by using retentive and stable post crown, so it will not be easily separated and can be used as long as possible in the oral cavity as same as the original ones. Tooth that has got endodontic treatment, moreover, is relatively more brittle and prone to fracture than the vital one because of tooth internal moisture that is reduced during endodontic treatment and can weaken the remaining tooth structure⁶.

There are numerous factors that influence such a high male preponderance in traumatic injuries to both hard and soft oral tissues. These factors could be social, cultural and geographical. It is well-known that males usually participate in more aggressive and risk taking activities like contact sports and night time activities, etc. Many studies have also suggested that men tend to be more aggressive in nature, leading to

fights and assaults. Some authors have reported that this may be attributable to the fact that males have higher levels of dopamine and epinephrine⁷.

Endodontic treatment was conducted on teeth 12 and 22 in single visit because the form of the root canals was normal, mild periapical abnormality and no clinical symptoms. This single visit endodontic treatment aimed to prevent the spread of diseases of the pulp to the periapical tissues or if it has occurred, it will aim to restore the periapical tissues. It also gives the advantage to reduce the risk of infection that may occur between visit periods, and to save time. The preparation of root canals 12 and 22 was then conducted by using crown down pressureless technique with ProTaper instruments conducted with coronal-apical approach. This technique is advantageous since most of the microorganisms located in 1/3 coronal and 1/3 center had been cleaned before getting into the apical regions, and the irrigation is more perfect in 1/3 apical⁸. Post space was prepared 1 to 2 mm short of CEJ. 12 and 22 were stabilized with a horizontal and vertical fibre splints using flowable composite and the splint was removed after 2 days. After tooth preparation a temporary crown was given. Then, the final crown was delivered after next 2 days.

Various techniques for reattachment include the use of an enamel/circumferential bevel before hand , placement of a chamfer at the fracture line after bonding, use of a V-shaped enamel notch, placement of an internal groove or a superficial overcontour over the fracture line, or simple attachment with no additional preparation. The use of a variety of materials as bonding agents is advocated. Hydrophilic adhesive agents with light cured/dual cured resin cement , bonding agents with flowable resins, hybrid or microfilled resin composites, dentine adhesives with or without unfilled resins dual or self-cured luting cements, light-cured luting cement, and self-etch adhesives with microhybrid composites have been used with varying results. Developments in adhesive dentistry have improved the outcome by facilitating ultraconservative preparation techniques, and allowing "biologic restoration", thus improving the esthetic outcome by retaining natural translucency and surface texture and reducing cost and chair time while increasing patient acceptance⁹.

CONCLUSION

It can be concluded that horizontal crown fractures due to trauma can be treated conservatively with the help of endorestorative treatment in order to restore the form, function and esthetics of the teeth in accordance with their original ones.

The combined use of a fibre splint, composite and an original crown fragment is a simple and efficient procedure for the treatment of traumatized anterior teeth that appears to offer excellent aesthetic and functional results.

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