

Management of Multiple Traumatic Injuries in a Single Patient - A Case Report

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Abstract

This case report presents a case of avulsion, intrusion and fracture injuries of multiple anterior teeth in a 12 year old girl. The teeth were endodontically treated and orthodontically repositioned and successfully replaced with prosthesis. The case was monitored for 4 years. Considering the severity of the injury, prognosis and clinical approaches of treatment, we planned a multi-disciplinary approach which is important to achieve successful results. In this case, root canal treatment was done for pulpally severe teeth and a 2×4 appliance was used for orthodontic correction. The follow-up of such cases is very important as the repair process after intrusion is complex. After 4 years, no clinical or radiographic pathology was detected.

Keywords: Avulsion; Intrusion; Multidisciplinary approach; Four year follow-up

Introduction

Traumatic dental injuries (TDIs) occur with great frequency in preschool, school-age children, and young adults comprising 5% of all injuries for which people seek treatment [1]. They present a challenge to clinicians worldwide and proper diagnosis, treatment planning and follow up are critical to assure a favorable outcome [2]. The common etiologies includes oral factors (e.g. overjet), sport activities, traffic accidents which include pedestrian-, bicycle- and car-related injuries and some forms of violence [1,3].

Trauma to anterior teeth plays a critical role in aesthetics, phonetics, and functional activities of the patient [4]. It may also result in emotional distress for both parents and affected children. In addition to pain and possible infection, the consequences of incisal trauma include alteration in physical appearance, speech defects and psychological impact, thus affecting the child's quality of life [5]. Avulsion and luxation are complex injuries that affect multiple tissues, accounting up to 16% of all traumatic injuries in the permanent dentition and 7.2% of injuries in the primary dentition [6]. The management strategy and factors affecting the treatment outcome for avulsion, intrusion and luxation injuries are poles apart as the vector of forces are in different directions. This is such a case report where we have a combination of avulsion, luxation and fracture injuries which have been treated in a unique way of multidisciplinary management.

Case Report

A 12 year old girl reported to the Department of Pediatric and Preventive Dentistry with the chief complaint of irregularly placed upper front teeth for the past three months. Patient also gave a history of road traffic accident three months back which has been managed for that time by a nearby general physician. Clinical examination revealed multiple traumatic injuries including avulsion, luxation and fractures, which were seen in maxillary anterior region. Examining intra-orally we could also elicit extrusive luxation in 12, intrusive luxation and Ellis

class III fracture in 11, avulsion in 21 and lateral luxation in 22 (Figure 1). Pain on percussion was also present in 12. On radiographic examination, we could not appreciate any other related fractures or remnants of tooth structures inside the socket. The root of 12 showed marked dilaceration towards distal side and also PDL space widening was noticed (Figure 2).



Figure 1: Case at the presentation.

Considering all the complex injuries and prognosis, a multi-disciplinary approach was planned. The phases of treatment are as follows:

- Endodontic phase (root canal treatment of 11, 12)
- Orthodontic phase (repositioning of misaligned teeth)
- Prosthodontic phase (esthetic rehabilitation)

During the initial visit endodontic treatment of 11, 12 were completed (Figure 3) followed by orthodontic treatment with a two-by-four appliance where 0-12 NiTi (Nickel-Titanium) wire was used. Due to severe intrusion of 11, the difficulty to adapt the arch wire was overcome with the use a ligature pull for a week, which facilitated its placement later (Figure 4). Once all the teeth were properly aligned the NiTi wire was replaced with 0-14 stainless steel round wire for 2 months. During the period of orthodontic phase, a riding pontic (Figure 5) was fabricated to maintain the space for 21 (Figure 6) and

also for esthetic concerns. Tooth preparation of 12, 11 and 22 were done to receive an acrylic dental bridge (Figure 7). Patient was found to be asymptomatic from the first month till four year follow-up (Figure 8). Even after 4 years of radiographic review, no bony or tooth related changes were appreciated (Figure 9).

an anterior tooth, it is important that an immediate replacement with proper alignment is provided in order to avoid esthetic, masticatory and phonetic difficulties and to maintain the edentulous space to avoid arch length discrepancy [8].



Figure 2: Root of 12 showed marked dilaceration towards distal side.



Figure 3: Endodontic treatment of 11, 12 were completed.



Figure 4: Orthodontic treatment with a two-by-four appliance (0-12 NiTi wire was used).



Figure 5: Orthodontic phase.



Figure 6: Space for 21 for esthetic concerns.

Discussion

The prevalence of dental injuries in the permanent dentition has been shown to occur in approximately 10-35% of the general population worldwide [7]. Following the traumatic loss or fracture of



Figure 7: Tooth preparation of 12, 11 and 22.



Figure 8: Patient during follow-up.



Figure 9: Radiographic review after 4 years.

Pulp necrosis is the most common complication following luxation injuries to the teeth. Pulp of teeth with completed root development (closed apical foramina) that have been traumatically separated from its blood supply are not expected to survive. The development of pulp necrosis after traumatic injuries to the permanent teeth has been shown to range from 0 to 100% [7]. Endodontic intervention is required when the injured tooth demonstrates the signs and symptoms of pulp necrosis and its sequelae.

The traditional relationship between dental trauma and orthodontic treatment depends on the most appropriate time of initiating routine orthodontic treatment after an accident. It is customary that this be delayed until the teeth are symptomless for at least a few months after the emergency treatment. This 'cooling off' period is recommended to reduce the possibility of collateral damage, particularly root resorption, that might occur when orthodontic loading of normally acceptable force levels is applied to the affected teeth [9].

Gradual repositioning of displaced teeth is a less traumatic alternative that safeguards tooth vitality, prevents ankylosis and encourages periodontal healing in a healthy growing child. Orthodontic splints using brackets and wires have been shown to be non-rigid and able to maintain physiological mobility which allows for gradual reestablishment, and even possible improvement, of the arch form after traumatic injury to the teeth [10]. Orthodontically repositioned teeth facilitate future rehabilitation of both avulsed and displaced teeth.

A 2x4 sectional fixed appliance offers an effective and efficient tooth positioning as it allows three dimensional control of the involved teeth during correction of misaligned anterior teeth which can be treated very quickly using such a versatile technique [11]. This technique was thus used for better alignment of teeth which were malpositioned due to a traumatic injury.

The continuous eruption of affected and adjacent teeth, large pulp chambers and changing gingival contours, characteristic of an adolescent dentition, contraindicate the use of a fixed partial denture. Until fixed restoration is feasible, an adolescent dentition requires a transitional restorative approach [12]. Croll and Castaldi reported that in certain situations, the preformed stainless steel crowns can be a respectable interim restoration for a permanent tooth until a more desirable full cast crown is possible [13]. Stainless steel crown was contraindicated in this case as it involves the esthetic zone. This problem can be managed in several ways, including (1) a provisional removable partial denture replacing the missing tooth (teeth); (2) a provisional fixed acrylic bridge utilizing the adjacent teeth as full crown abutments; or (3) a bonded bridge using either a denture tooth, or a chairside fabricated composite resin tooth as the tooth replacement [14]. So a fixed acrylic bridge was fabricated which is functional, readily acceptable, maintains mesiodistal dimensions of lost tooth, prevents supra eruption of opposing teeth and does not restrict normal growth and development, as is required of an ideal space maintainer [15].

In future, the acrylic bridge is to be replaced with a fixed partial denture or an implant, but at present the patient has a satisfactory esthetic appearance.

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