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Case Report

From Fracture to Function: Implant Rehabilitation of an Endodontically Treated Anterior Tooth with Horizontal Root Fracture 4-Year Follow-Up: A Case Report

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Abstract

The involvement of the dentin, cementum, pulp and periodontal ligament characterises a root fracture. To encourage healing, the dentist may use different treatment techniques depending on the degree of the fracture line. The present case follows various methodological adjustments that enable a conservative approach to horizontal root fractures at multiple levels. This method offers a practical alternative to more costly and intrusive procedures, allowing the patients to retain their natural teeth for a longer duration. The patient came with a complaint of trauma 2 years back followed by discomfort and mobility in the upper front tooth region. Clinical evaluation showed grade I mobility and radiographic evaluation revealed a horizontal root fracture in the same region. Therefore, root canal treatment was carried out on the injured tooth to maintain the space for future aspects. After 4 years extraction was done followed by the placement of implant.

Keywords: Implant Rehabilitation; Root Canal Treatment; Tooth Fracture; Anterior Tooth

Introduction

One of the most common paediatric dental emergencies is traumatic tooth injury, which usually happens in children and adolescents [1,2]. In the oral cavity, the hard tissues sustain almost half of the damage, while the soft tissues sustain around 36% [3]. Usually accompanied by several injuries, the central incisors of the upper jaw are the most often affected teeth [4,5]. According to various research, the percentage of root fractures among all dental injuries in the permanent dentition varies between 1.2% and 7.0%, indicating that traumatic root fractures are uncommon.6 When a tooth experiences a fracture that impacts the pulp, cementum and dentin, it results in a fracture of the root [7].

Standard classifications of root fractures include oblique, vertical and horizontal. Depending on the location of the fracture, the tooth may need to be extracted or kept [6,7]. Tooth extraction and prosthesis replacement are frequent outcomes of vertical fractures [6]. A compression zone that splits the root into coronal and apical sections can occur when the root is exposed to frontal stresses from multiple directions, including labial, lingual, and/or palatal. A dental professional must assess pulp vitality and coronal fragment movement. A radiolucent line is visible on radiography, dividing the coronal and apical sections. To determine the angle of fracture, it may necessary to obtain multiple radiographs at various angulations. Apical third fractures typically show little movement and don't need to be treated. Extraction is frequently necessary for root fractures in the cervical third. Extraction is the only choice when the coronal sections exhibit extreme movement. The prognosis for fractures of the middle third root is satisfactory. The first line of therapy for displaced coronal fragments is realigning and stabilising the sections for the repair of surrounding periodontal tissues. The coronal fragment should be treated endodontically if the fracture line does not heal [8]. In the present case report, the treatment was aimed to preserve the injured tooth till the child attains the appropriate age for the implant placement.

Case Description

A 14-year-old boy came to the outpatient department of paediatric and preventive dentistry, with a chief complaint of discomfort and mobile tooth in the upper front region of his jaw since two years. Patient gave history of trauma to maxillary anterior teeth 2 years back due to the collision with his friend`s knee while playing Kabaddi. There was slight loosening of the tooth and bleeding from the same region, but there was no history of syncope, vomiting or bleeding from the ear and nose at the time of collision. On examination, Grade I mobility with no tenderness on percussion was present with respect to 21. Electric pulp testing was negative. Radiovisiography revealed horizontal fracture at the middle third of the root. No radiolucency was seen in the periapical area but there was widening of the periodontal ligament. Based on clinical and radiographic examinations, the patient was diagnosed with a horizontal root fracture wrt 21. Arch wire splint followed by root canal treatment was advised wrt 21. The coronal fragment was stabilised using arch wire splint from 12 to 22, further root canal treatment was done wrt 21. After 6 months patient reported to the department with dislodgement of splint. RVG was taken which revealed no periapical changes. Flexible splint was replaced to preserve the space for Implant till the patient attains 18 yrs of age. He was on follow-up for 3 years. 3 years later, CBCT was advised for implant placement which revealed no signs of resorption or changes in the periapical region. The patient was referred to the Department of Periodontics for an implant opinion. Extraction was planned, followed by immediate implant placement. Patient was recalled after 7 days for suture removal followed by the placement of a natural tooth pontic with fibre splint irt 21. 4 months later, RVG was taken to check for osseointegration. Natural tooth pontic was removed as there was a satisfactory osseointegration irt 21. Impression was made followed by the fabrication of crown. The patient was recalled after 6 months for follow-up. RVG revealed satisfactory healing with no patient discomfort (Fig. 1-5).

Figure 1: Radiographic details.

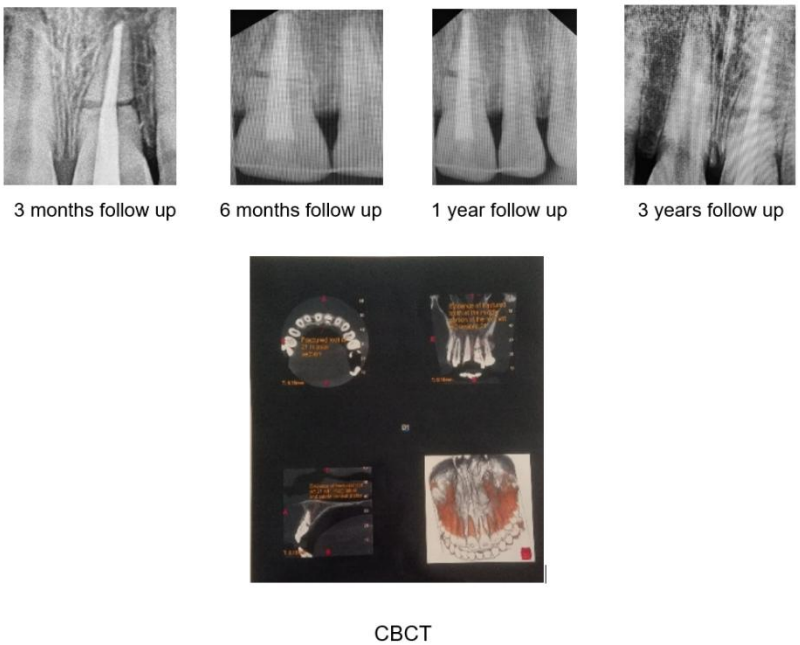

Figure 2: Follow up radiograph.

Figure 3: Immediate placement of implant following natural tooth pontic placed with fiber splint wrt 21.

Figure 4: Crown fabrication done**.**

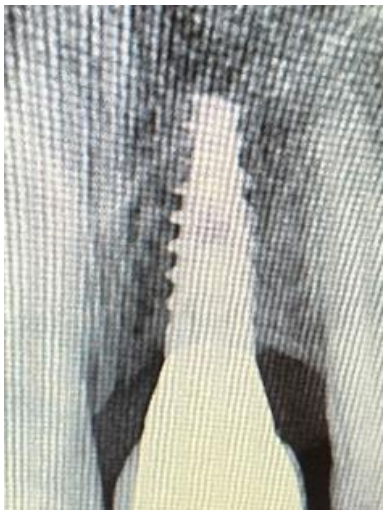

Figure 5: Follow up radiograph, after 6 months.

Discussion

Fights or collisions with foreign objects are frequently the primary cause of tooth fracture and the maxillary central incisor area is most commonly affected. A successful outcome depends on a precise diagnosis, careful treatment planning and frequent follow-ups at various intervals. Young patients who suffer dental injuries may become quite distressed and choose to protect their natural tooth structure over all other considerations. Making a precise diagnosis is the first important step in treating cases with horizontal root fractures. Radiographic assessment is required to accurately diagnose root fractures [9]. The position of the fracture line and the amount of displacement present in the coronal fragment are both crucial factors in the classification of horizontal root fractures [9].

One crucial consideration for immobilising fractures is the type of splint. According to Andreasen, et al., the selection of splints does not appear to have a major impact on the healing process. They suggested short-term, passive and flexible splints for luxated, avulsed and root-fractured teeth to promote physiological motions [10]. Pulpal diseases, such as irreversible pulpitis or an infected root canal system, can occur in the apical segment of certain teeth. Treatment options in these situations include either

doing RCT of the coronal and apical segment together or performing RCT of the coronal fragment and then surgically removing the apical fragment (apicectomy) [11]. In the present case, there was a widening of the periodontal ligament hence we performed root canal treatment in coronal as well as apical segment to prevent any further infection. we focussed on the preservation of the tooth, because treated natural tooth holds the space more effectively than a prosthetic one, as stated by Belanger [12].

There are five possible outcomes from root fractures: (i) hard tissue formation leading to healing; (ii) connective tissue formation leading to healing; (iii) bone and connective tissue interposition leading to healing; (iv) no healing but granulation tissue formation; (v) coronal fragment infection after late pulpal necrosis [11]. In the present case, healing occurred due to the interposition of bone and connective tissue. This type of healing is mostly seen in young children having root fractures. As the normal alveolar down-growth process takes place, the coronal segment essentially emerges properly, but the apical segment stays in the same position as when it was injured. Both the segments and the pulp must be free of microorganisms for this to happen. Often, a PDL gap can be seen radiographically across the fracture line and around the two segments. Canal calcification is a frequent occurrence in such cases. The blood vessels of pulp in the coronal segment most likely anastomose with the blood vessels of tissue that proliferate into the gaps between the root pieces, creating a new blood supply. In both segments, pulp canal calcification often develops over time [13]. Since there was still grade 1 mobility, extraction was carried out and the implant was placed as the patient needed a permanent solution.

Conclusion

After trauma, a horizontal root fracture shouldn't be indicated for extraction. This case mainly focuses on the conservative and endodontic management of horizontal root fractures associated with necrotic tooth segments. proper case selection combined with competent execution can result in effective treatment, long-term success and tooth retention. Various approaches may be used for the best care of the fracture, depending on its location, pulp vitality and displacement of the fractured section. For patients with horizontal root fractures, non-surgical treatment provides a painless, aesthetic and affordable alternative. The patient may then choose a permanent solution, such as an implant or fixed prosthesis.

Conflict of Interest

There are no conflicts of interest that may have influenced the research, authorship or publication of the article.

Financial Disclosure

None.

Ethical Statement

This project was exempt from IRB review as it did not qualify as human subject research under federal regulations.

References

1. Santos LV, da Hora KC, Alves AC. Successful minimally invasive intervention in a primary central incisor after root fracture: A case report. Dent Traumatol. 2021;37:807-12.
2. Bardini G, Musu D, Mezzena S, Dettori C, Cotti E. Combined management of apical root fracture and avulsion of two maxillary permanent central incisors: A case report. Dent J. 2021;9:39.
3. Gassner R, Bösch R, Tuli T, Emshoff R. Prevalence of dental trauma in 6000 patients with facial injuries: Implications for prevention. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 1999;87:27-33.
4. Andersson L, Andreasen JO, Day P, Heithersay G, Trope M, DiAngelis AJ, et al. Guidelines for the management of traumatic dental injuries: 2. Avulsion of permanent teeth. Pediatr Dent. 2017;39:412-9.
5. Fouad AF, Abbott PV, Tsilingaridis G, Cohenca N, Lauridsen E, Bourguignon C, et al. International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: 2. Avulsion of permanent teeth. Dent Traumatol. 2020;36:331-42.
6. Abbott PV. Diagnosis and management of transverse root fractures. Dent Traumatol. 2019;35:333-47.
7. Andreasen FM, Andreasen JO, Tsilingaridis G. Root fractures. In: Andreasen JO, Andreasen FM, Andersson L, editors. Textbook and color atlas of traumatic injuries to the teeth. 5th Ed. Oxford: Wiley Blackwell. 2018:377-412.
8. Sheikhnezami M, Shahmohammadi R, Jafarzadeh H, Azarpazhooh A. Long-term outcome of horizontal root fractures in permanent teeth: A retrospective cohort study. J Endod. 2024;50(5):579-89.

9. Dhindsa A, Garg S, Poddar P, Singla S, Saraf BG, Shetty JA. Management of root fractures in young immature permanent teeth: Three case reports. Int J Clin Pediatr Dent. 2024;17(3):352.
10. Kucukyilmaz E, Botsali MS, Keser G. Treatments of horizontal root fractures: Four case reports. J Pediatr Dent. 2013;1(1):19-23.
11. Mane NA, Shetty P, Borkar AC, Mujumdar SV, Mujawar A. Healing after horizontal root fracture of maxillary central incisor: A case report with 24-month follow-up. Cureus. 2023;15(8):e43373.
12. Belanger GK. Pulp therapy for the primary dentition. In: Pinkham JR, editor. Pediatric Dentistry. Philadelphia: Saunders. 1988.
13. Sisodia N, Manjunath M. Conservative management of horizontal root fracture: A case series. J Clin Diagn Res. 2015;9(8):ZD04-6.