Case Report

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COMPREHENSIVE CARE OF A CHILD WHO HAS SUFFERED DENTAL TRAUMA: A CASE REPORT

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ABSTRACT:

This case presents the management of a nine years old boy who sustained complicated and uncomplicated crown fractures of his permanent incisors. The treatment modality included root canal treatments and obturation using two techniques; thermoplastic gutta-percha and cold lateral condensation technique. One immature tooth had MTA apical plug inserted, and in another immature tooth, an apical barrier resulted in the long-time placement of calcium hydroxide. All crown fractures were restored with composite build up restorations included two teeth in which reattached crown fragments had debonded.

Keywords: Dental trauma, crown fracture, immature tooth, MTA

INTRODUCTION:

Crown fractures and luxation are the most commonly occurring traumatic dental injuries.

Accurate diagnosis, appropriate treatment planning, and follow-up are essential for a favorable outcome.[1] The aim of any subsequent dental management is to maintain the vitality of the pulp and facilitate healing of the supporting tissues.

This case presents the management of a nine years old boy who sustained complicated and uncomplicated crown fractures of his permanent incisors.

CASE DETAIL:

JF, a nine years old male child, medically fit and well, had fallen off his bicycle three days previous to his visit to our Pediatric Dentistry Department. He had hit his face on the handlebar, traumatizing his upper and lower permanent incisors (12, 11, 21, 31, 41). Two teeth (12, 31) had been extirpated, and crown fragments reattached and resin composite bandages had been placed on three teeth, 11, 21, and 41, by his general dental practitioner (GDP).

Clinical examination (Figure 1) showed no apparent displacement of any of the teeth. Teeth 11 and 21 with mobility grade 1. Sensitivity tests and trauma assessment are shown in Table 1.

Periapical (PA) radiographs (Figure 2) were taken to rule out tooth displacement or possible presence of root fracture, to assess the extent of crown fracture and maturity of roots.

The diagnoses were: (a) Uncomplicated enamel dentine crown fracture, 11, 21, 41 (b) Complicated crown fracture on 12 which had an immature apex (c) Complicated crown fracture on 31which

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had a mature apex (d) Subluxation of 11,21 (e) Concussion of 12, 22.

The treatment aims were to improve oral hygiene, maintain the vitality of uncomplicated fractured teeth, encourage continued root development, relieve symptoms and improve esthetics and function.

The initial treatment plan included:

A. *Initial management*: Preventive advice and relief of symptoms.

B. *Intermediate Management*:

   a. Root canal treatment of 12, 31.

   b. Composite build-ups on 11, 21, 41.

C. *Long-term management*: Recall and monitor traumatized dentition.

However, as treatment progressed, the intermediate master plan was modified to be:

A. Root canal treatment of 12, 21, 31, 41, with Mineral Trioxide Aggregate (MTA), plug placed in 21.

B. Composite build-ups on 12, 11, 21, 31, 41.

At the initial assessment visit, on the removal of the temporary resin composite bandage on tooth 21, it was observed that there was a potential pulp exposure. Considering the primary aim was to maintain vitality and promote further root development, a decision was made to undertake pulpotomy.

However, there was no bleeding from the pulp tissues which was found to be necrotic. The pulp was then extirpated, the canal was dressed with radiopaque non-setting calcium hydroxide paste (ns-CH) (Hypocal®, Ellman®, NY, USA), and a composite build up (Filtek™ Supreme XT composite resin, shade A2, 3M™ ESPE™, St. Paul, MN, USA) using clear strip crown (Frasaco®, Henry Schein®, Langen, Germany), was completed.

At nine days post trauma, the temporary composite bandage on tooth 11, was removed. The pulp had not been exposure. The tooth was therefore restored with a composite resin build-up.

The temporary resin composite bandage was removed from teeth 41, and it was seen that the pulp was close to being exposed and therefore pulpotomy was attempted. Pus was found in the canal. Canal debridement was carried out, and the canal dressed with ns-CH, followed by composite resin build-up.

At four weeks post trauma, a 4 mm MTA (ProRoot®, DENTSPLY, Surrey, UK) apical plug was placed in tooth 21 using microscopic vision (Figure 3).

One week later, root canal obturation was undertaken for tooth 21 using thermoplastic gutta-percha (GP) (Obtura®, Obtura Spartan Endodontics, Algonquin, IL, USA).

At seven weeks post trauma, clinical examination revealed that the reattached

crown fragments of teeth 12 and 31 had been lost one week previously. At this stage, a permanent composite build-ups placed on teeth 12 and 31.

At three months post trauma, tooth 12 had an associated labial sinus. The canal was opened and the working length (WL) estimated at 20 mm. A GP point was placed in the sinus, and PA radiograph was taken (Figure 4). A short working length and a periapical radiolucency associated with 53, 13 were noted. The WL was corrected to 23.5 mm, based on the radiographic calibration. The canal dressed with ns-CH.

At fifteen weeks post-trauma, the abscess associated with 53, 12 regions had resolved. Tooth 11 showed a positive response to sensitivity testing. At this stage, a working length PA radiograph was taken for teeth 31 and 41 followed by root canal instrumentation using:

1. Tooth 31: 21 mm/size 60 file.
2. Tooth 41: 22 mm/size 50 file.

At five and a half months post trauma, teeth 31 and 41 were obturated with GP using a cold lateral condensation technique.

Two weeks later, there was radiograph evidence of an apical barrier at 22.5 mm on 12. A working length PA radiograph estimated that the WL was short of the apex at the clinical stop. There was a possible bony barrier, so root canal obturation was undertaken using a thermoplastic technique (Obtura®) to the apical barrier level.

At one-year post-trauma review, teeth 11, 22, 32, 42 showed a positive response to sensitivity tests.

At one year and four months post-trauma, teeth 11, 22, 32, 42 still showed a positive response to sensibility tests. At this time, PA and occlusal radiographs were taken (Figures 5 and 6), and tooth 11 showed a slight periapical radiolucency but evidence of continuing root development.

At one year and seven months post-trauma (Figure 7), all teeth were sign- and symptom-free, and a three-month review was arranged.

The long-term treatment plan and future considerations include:

1. Review and monitor the traumatized dentition, including sensitivity monitoring of tooth 11.
2. Review the integrity and esthetics of the composite resin restorations.

DISCUSSION:

This case demonstrates complicated and uncomplicated crown fractures with immature and mature roots which had a number of challenges. Throughout the management of this case, the treatment plan was reviewed and modified based on the clinical and radiographic findings.

Teeth with crown fractures are almost twice as likely to sustain root fractures.[2] Maxillary occlusal radiographs should be taken at the time of assessment as this view is more likely to demonstrate the oblique root fractures if present, although

PA radiograph can show root fractures when they are horizontal.[1] Two views at different angles are recommended in guidelines. In this case, this was not done because of the nature of the injuries; i.e. no displacement and likely no fracture, especially since multiple radiographs were possible during treatment given the number of teeth affected.

Attempts were made to preserve the vitality of teeth 21 and 41, by performing pulpotomies. However, both teeth showed non-vital pulp tissue when accessed. This was surprising given the nature and timing of the injuries. For tooth 11, clinical and radiographic evidence of vitality was demonstrated with continued root development and positive responses to sensibility testing 15 weeks post-trauma.

Traditionally, endodontic treatment of an immature permanent incisor tooth has involved inducing apical closure (Apexification) through the formation of a mineralized hard tissue barrier before obturation, most commonly with ns-CH. Although, the mean time taken for barrier detection varies in the literature ranging from 5 to 20 months,[3] studies showed that CH could weaken the dentine resulting in root fracture if used over 30 days.[4]

Calcium hydroxide tends, therefore, to be used only for short periods now as canal disinfectant with MTA increasingly used to create the apical barrier. In this case, MTA was placed successfully in 21.

MTA should be put in a tooth after ensuring there is no infection in the region and that the canal is adequately disinfected.[5] There was evidence of infection in the region of 53 and 12. Following stabilization with ns-CH for a longer period, the infection resolved in 12 and an apical barrier was noted. Thus an MTA plug was not required.

Crown fragments, when retrieved, can be reattached with a positive result. Factors such as the storage medium, preparation technique, and adhesive materials may play a role in the survival, color and bond strength of the reattached fragment.[6] In this case, two fragments were stored dry for 6 hours before reattachment which may have been a contributory factor in the debonding of the crowns.

CONCLUSION:

This case presented the challenging with dentoalveolar trauma management. It is important to plan and modify the treatment plan based on the clinical and radiographic findings. Long term follow up is critical for prognosis, possible sequelae and complications.

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TABLE:

Tooth	12	11	21	22	42	41	31	32
Tender to percussion	+	+	+	+	-	-	-	-
Percussion sound	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Mobility	-	Grade 1	Grade 1	-	-	-	-	-
Sinus	-	-	-	-	-	-	-	-
Discoloration	Grey	-	-	-	-	-	-	-
Ethyl chloride – Cold test	RCT	-	-	+	-	-	RCT	+
Electric pulp test	RCT	-	-	-	-	-	RCT	-

Table 1: Sensitivity Tests And Trauma Assessment

FIGURES:

Figure 1: Intraoral view at time of first assessment

Figure 2: PA baseline radiographs

Figure 3: PA radiograph post placement of MTA, Tooth 21

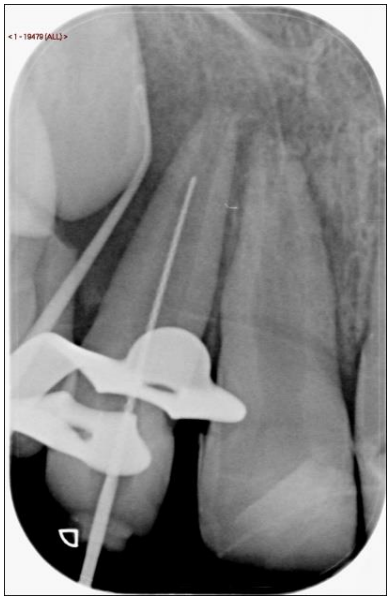

Figure 4: PA radiograph, Working length, and GP in the sinus

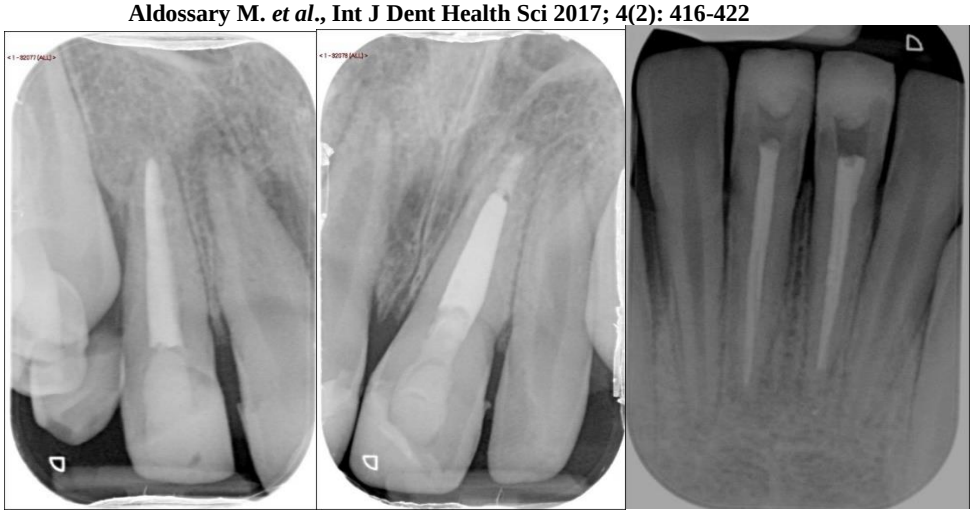

Figure 5: PA radiographs at one year, four months review

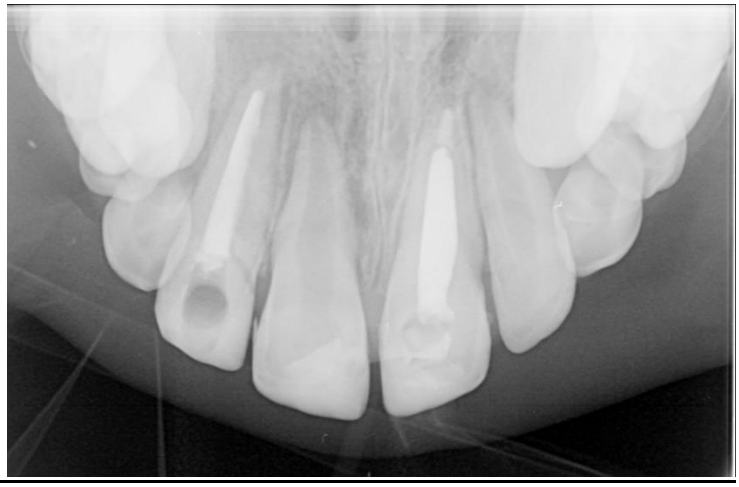

Figure 6: Occlusal view radiograph at one year, four months review

Figure 7: Intraoral view at one year, seven months review