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Case Report

Dentistry Section

Restoration of Long Standing Traumatized Teeth: A Case Report

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ABSTRACT

Children are uniquely susceptible to craniofacial trauma. Injuries to the teeth occur often as a result of falls and sport activities. The pulp often gets infected after dental trauma resulting in to numerous complications. The authors present a case report of successful restoration of traumatized teeth with open apex which were weakened due to long standing infection and internal resorption. Initially antibiotic combination of 3- mix was used to disinfect the root canals. One tooth is treated with conventional endodontic treatment and the other tooth with open apex and perforation is managed by MTA apexification followed by canal reinforcement using glass ionomer cement and fiber reinforced composite post. Core build up is done using light cure composite resin followed by aesthetic crowns. The patient also presented with the peg shaped lateral incisors, which were built to an aesthetic appearance using light cure composite resins.

Keywords: 3-mix, Canal reinforcement, MTA, Apexification, Fibre composite post

CASE REPORT

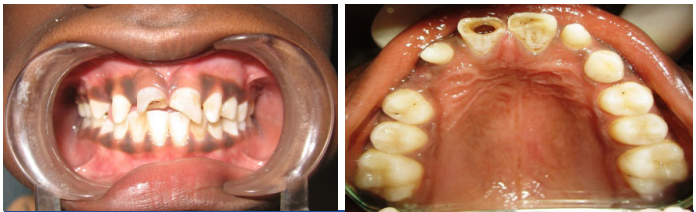
A 12-year-old male patient reported to the Department of Paediatric Dentistry, Saveetha Dental College and Hospital, Chennai, with the chief complaint of pain and mobility in the upper front tooth for past 6 months.

History revealed that patient had a trauma 2 years back and fractured his upper anterior teeth. The patient was not willing for any dental treatment immediately, because he was psychologically traumatized by the unaesthetic appearance of the teeth. But now the patient reported with chief complaint of increased pain and discomfort due to the traumatized teeth.

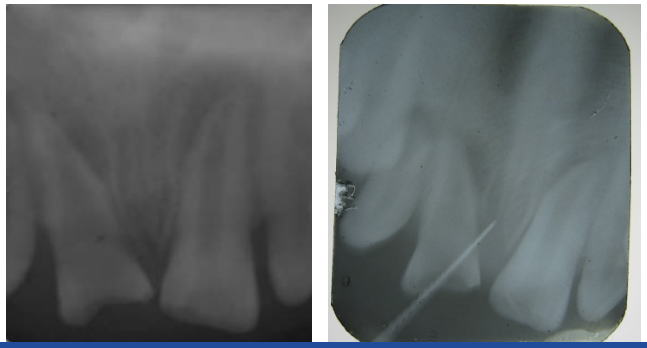
Intra oral examination revealed Ellis class III fracture of 11, 21 with grade I mobility and the peg shaped lateral incisors [Table/Fig-1a&b].

An intra oral periapical radiograph taken in relation to 11,21 revealed the presence of internal resorption, apical resorption and thin root canal walls with inadequate crown length and lateral luxation in 11 and a well defined periapical pathology in relation to 11, 21 [Table/Fig-2].

Prior to commencement of the procedure, treatment modality, cost benefit and risk were explained to the patient and appropriate consent was taken. Since the tooth was non-vital local anesthesia was not administered. The debris was first removed with the sharp spoon excavator and the access opening was done using no.330 round bur. Prior to instrumentation a paper point was placed in the root canal for 15 seconds then transferred to the transport media and sent to microbiological analysis. The canal was irrigated with the copious amount of saline to remove the necrotic pulpal remnants. An intra oral radiograph taken with the endodontic file confirmed the lateral perforation at the mesial wall of the root canal [Table/Fig-3].



[Table/Fig-1]: Preoperative photographs: (a) Frontal retracted view, (b) Occlusal view: Showing Elli's Class III fracture of teeth 11 and 21



[Table/Fig-2]: Preoperative radiograph: Showing lateral luxation in 11 and periapical pathology in relation to 11, 21 **[Table/Fig-3]:** Perforation in the mesial wall of 11

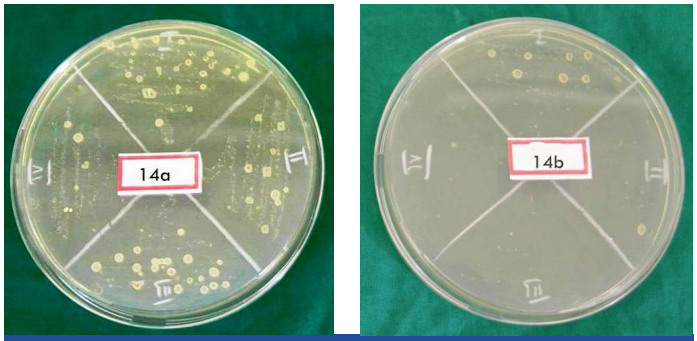
The working length was determined. Due to the presence of a long-standing infection the placement of intra canal medicament was considered and the medicament of choice was 3-mix. The 3-mix consists of ciprofloxacin, metronidazole, minocycline in the ratio of 1:3:3. The enteric coating of the ciprofloxacin tablet was removed; all the three tablets are taken in the above said ratio and crushed to powder form. This powder was then mixed with distilled water and the mix was coated in the root canals of 11 and 21 using the pluggers, and then access was temporarily sealed.

The patient was recalled one week later and another swab was taken for microbiological analysis. After confirmation of reduction in bacterial count [Table/Fig-4a&b], apex and cervical perforation in 11 were sealed using mineral trioxide aggregate (MTA). In 21 endodontic treatment was performed parallely [Table/Fig-5].

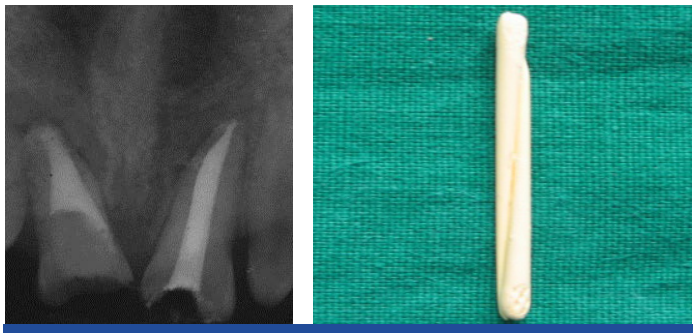
Since the internal resorption has weakened the root canal in 11, it has to be reinforced using a suitable material to prevent the risk of root fracture, in this case GIC was selected for reinforcement. Rolled cone was made using two 6% GP. GIC was coated into the canal, followed by the introduction of the rolled cone into the canal to allow the space for the placement of the post [Table/Fig-6].

The rolled cone should be kept rotating slowly inside the canal to prevent the sticking of the cement to the cone.

The inadequate crown structure in 11 was restored with the fiber reinforced composite post. The Fibre reinforced composite post was first tried in the canal and the radiograph was taken to check the fit (Note: Radio opacity of the fiber post is less, hence it is



[Table/Fig-4]: Microbiological culture: (a) Before (b) and after disinfecting the root canal space using 3-Mix antibiotic paste



[Table/Fig-5]: Perforation repair and apexification using MTA in 11 and endodontic treatment (Obturation) in 21**[Table/Fig-6]:** GP stick (Roll cone) used for preparation for post space

[Table/Fig-7]: Tooth preparation to receive the full crown restoration
[Table/Fig-8]: Temporary crown placement **[Table/Fig-9]:** Postoperative Photograph: Permanent crown placement on 11 and 21, 21 and 22 (Peg shaped lateral incisors) built to an aesthetic appearance

recommended to take digital image than conventional IOPA). 37% orthophosphoric acid was used to etch the canal as well as the post for 40 seconds and washed and air dried. Fifth generation bonding agent was applied inside the canal and on the post, cured for 20 seconds. The flowable composite was injected into the canal and applied on the post, placed inside the canal and cured for 20 seconds. The composite core build up was done in 11, 21. Crown preparation was done in 11, 21 [Table/Fig-7] and the temporary crowns were luted [Table/Fig-8]. The patient was recalled after 2 days and the permanent crowns were cemented with Type I GIC (Fuji I) and peg lateral incisors were built to an aesthetic appearance using light cure composite [Table/Fig-9].

DISCUSSION

Children are uniquely susceptible to craniofacial trauma because of their greater cranial –mass-to-body ratio. Because of the differences between adults and children in anatomic, physiologic, and psychological development, not only do the consequences of trauma differ, but the management technique should be modified to address the child's particular stage of anatomic, physiologic, psychological development [1].

Dental trauma is a common injury in children, approximately every one of three children will also suffer trauma to the permanent teeth before leaving school age [2]. Injuries to the teeth occur more often as a result of falls, brawls in the schoolyard and during sport activities such as bicycle riding and contact sports. Often boys experience more dental trauma than girls and maxillary central incisors are the most commonly affected teeth [3].

The common sequela of the non-vital tooth is internal resorption, which makes the endodontic treatment a complicated one. Calcium hydroxide was the gold standard material routinely used as the intra canal medicament. But its major drawback is increased risk of root fractures in long term use [4]. It is been demonstrated that use of 3-mix drug in teeth with periradicular involvement gives excellent clinical results [5]. The bactericidal efficacy of the 3-mix is sufficient to eradicate bacteria from the dentin of the root canals [6]. Healing of periradicular lesions is excellent when 3-mix is used as an intra canal medicament [4].

In the present report, special attention was paid to perform micro-biological analysis as the residual bacterial count can be detrimental for the progonosis of the procedure. More over the materials used for apexification and root reinforcement (namely MTA and GIC) does not possess significant antimicrobial activity which makes it further more important to ensure canal disinfection prior placement.

Grossman pioneered the use of antibiotics in endodontic therapies in the year 1951 which was known as poly antibiotic paste [7]. The paste was the combination of penicillin, bacteracin, streptomycin and carpylate sodium (PBSC). Presently tri antibiotic paste containing ciprofloxacin, metronidazole and minicyclin is being widely used as intracanal medicament the procedure which is frequently referred as lesion sterilization and tissue repair (LSTR).

Metronidazole is anitroimidazole compound that exhibits broad spectrum of activity against anaerobic bacteria as well as protozoa. It is selectively lethal to anaerobes. Tetracyclines like doxycycline and minocycline are primarily bacteriostatic. They exhibit broad spectrum of activity against both gram positive and gram negative bacteria. Ciprofloxacin is a synthetic fluoroquinolone which has a strong bactericidal action. Most of the anaerobic microorganisms exhibit resistance to ciprofloxacin. Hence, it is usually used in combination with metronidazole to increase the spectrum of activity against mixed infections [7].

Sunandan M et al., reported similar kind of case where they used type IX GIC to reinforce the root which was followed by cementation of custom metal post [8]. Steining JH et al., and Guiliani V et al., highlighted use of MTA in rapid treatment modalities of wide canal and recommended MTA as a valid treatment option for apexification procedure because of the speed at which the treatment can be completed [9,10]. Duprez et al., reported a case of restoring an infected immature tooth which was treated with surgical treatment and root was reinforced using GIC [11], They also listed the advantages of GIC in the root reinforcement procedure like, chemical adhesion, biocompatibility, low solubility and ease of handling, condensing characteristics, radio opacity and low cost.

Composition and preparation of 3-Mix-MP

According to Hoshino et al., [6]

Antibiotic (3Mix) – ratio 1:1:1

- Ciprofloxacin 200mg, Metronidazole 500mg, Minocycline 100mg

- Carrier (MP) – ratio 1:1 - Macrogol ointment, Propylene glycol

3 Mix is incorporated into MP using the following - 1:5 (MP: 3-Mix) - 1:7 (standard mix)

According to Takushige T et al., [5] the drugs are powdered and mixed in a ratio of 1:3:3 (3-mix) and added either with macrogolpropylene glycol (3-mix-MP) or a canal sealer (3-mix-sealer).

In the present case MTA plug was used to create an artificial barrier. MTA appeared to show good sealing ability, good marginal adaptation and excellent biocompatibility. For a clinical point of view MTA has a reasonable setting time (about 4 hours), it can be used in presence of moisture in the root canals. This property is important in teeth with necrotic pulp and inflamed periapical lesions because one of the problems found in these cases is the presence of exudate at the apex of the root [10,12]. GIC strengthens the thinned out root canal walls in teeth with internal resorption and/or

immature teeth. This reduces the root fractures considerably. It also reduces diameter of the canal making endodontic closure easier and ensuring an anchor point for a post-core and crown [11].

Fiber reinforced composite post contains a high volume percentage of continuous reinforcing fibers embedded in a polymer matrix which keeps the fibers together. By using FRC in repair of fractured teeth, the compressive fatigue limit of the restored incisal edge can be substantially increased and there will be improvement in the load bearing capacity (2 to 3 times) compared to conventional restorations [13].

During the follow up period of one year and 6 months both restored teeth remained aesthetically acceptable and functionally sound.

CONCLUSION

Restoring & caring the dental structures reinforces the smile of an individual. Here we are in the new era of materials of superior quality that gives hope to even the hopeless teeth to survive in the oral cavity without any further complications, a longer follow ups are recommended to evaluate the potential of such materials to a greater extent.

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