Management of Complicated Crown Fracture with an Aberrantly Placed Tooth Fragment – A Case Report and Review of the Literature

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ABSTRACT

Background: Trauma to the anterior teeth in children is often of great concern to patients, parents and clinicians. The attendant sequelae and psychosocial impact cannot be overemphasized if the trauma is not managed properly according to international best practices for traumatic dental injuries.
Case Report: This is a case of a 15-year-old boy who presented to the paediatric clinic with a fracture of the upper left central permanent incisor and swelling of the lower lip. On examination, the tooth was not tender to percussion, with pulpal exposure and swelling of the lower lip. A soft tissue radiograph of the lower lip showed a left-sided radiopaque mass that was suggestive of the tooth mass. Management of complicated crown fractures involves root canal treatment (RCT) and post-retained crown or composite build-up or tooth fragment reattachment if found. In this case, an RCT of the upper left central incisor was done, and surgical exposure of the tooth fragment in the lower lip was performed, followed by subsequent reattachment of the still viable tooth fragment.
Conclusion: Thorough clinical examination and radiographic assessment are the mainstays of successful diagnosis and management of dental trauma. In addition, for cases with missing tooth fragments, radiographs of the adjacent soft tissue are of high diagnostic value to rule out soft tissue impaction and tooth fragments, if found, can be successfully reattached.

Keywords: Crown fracture, Trauma, Re-attachment, Root canal treatment, Fragment

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INTRODUCTION

Traumatic dental injuries represent a public health issue involving children and adolescents, affecting the teeth and their supporting structures.[1] The common aetiology of traumatic dental injuries include falls, road traffic accidents, domestic violence, conflicts, and contact sports. Most dental injuries in children are reported during the first two decades of life, more frequently in boys than girls, notably between the ages of 2 to 3 years and 8 to 12 years, which are periods of high mobile activities in children.[2]

Children and young adults account for 5% of all traumatic dental injuries.[3] The teeth most frequently impacted by dental trauma are the maxillary incisors because of their anterior position in the maxilla, with 80% central incisor and 16% lateral incisor involvement.[4] The incisors are frequently associated with soft tissue injury during trauma, especially when fractured.[5]

Traumatic dental injuries usually result in crown fractures. Crown Fracture can be defined as a fracture involving the enamel and dentine. However, a crown fracture can become complicated when the fracture involves exposure to dental pulp tissue.[6] Fractures of the maxillary central incisor require prompt treatment not just because they damage the teeth but also because they psychologically affect the patient.[7]

The fundamental objective of managing and treating teeth that have been traumatically damaged is to restore aesthetics and functionality. When the fractured fragment is available, reattachment is a fantastic biological repair method. Restoring the fractured tooth with resin-based composite or full-coverage crown is an unsatisfactory alternative to the conservative and cosmetic option that tooth fragment reattachment offers.[7]

CASE REPORT

A 15-year-old boy presented to the paediatric dental clinic on account of a fractured tooth 21, a week following a fall while riding his bicycle. He sustained a traumatic injury to his tooth as well as a laceration to his lower lip. Immediate emergency care was provided at a nearby clinic where the haemorrhage was controlled from the lower lip and prescription of medications (Ibruprofen, Vitamin C, and tetanus toxoid). He was, however, unable to account for the fractured segment of his tooth. The patient also complained of recurrent spontaneous sharp pain and sensitivity from the fractured tooth 21.

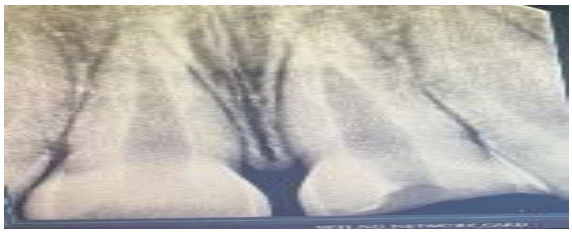
On extra oral examination, the lips were complete and competent, with asymmetry of the lower lip. There was a swelling on the left side of the lower lip associated with a scar (Picture 1a). On palpation, swelling on the lower lip was hard, deep-seated, measuring about 1cm in diameter.

Intraoral examination revealed a horizontal fracture in the enamel and dentine of tooth 21 with exposure to pulp tissue (Picture 1b). The tooth was not mobile. The alveolar bone was intact with no sign of fracture

Picture 1a: show swelling on the left side of the lower lip

Picture 1b: show fractured tooth 21

Intraoral periapical radiographic investigation showed loss of coronal tooth structure, pulp exposure with complete root development, no periapical radiolucency and no alveolar bone fracture (Picture 2a). Soft tissue radiographic assessment of the lower lip showed a radiopaque mass. (Picture 2b)



Picture 2a: Periapical radiograph of tooth 21 at presentation

Pictures 2b Soft tissue radiograph of the lower lip showing a radiopaque mass.

* A diagnosis of complicated crown fracture of tooth 21 with an aberrantly placed tooth segment in the lower lip was made.

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The treatment plan was as follows:

- Review of emergency treatment
- Root canal treatment of tooth 21
- Surgical exposure and removal of the radiopaque mass within the lower lip
- Restoration of the fractured tooth

Emergency treatment was reviewed by asking the patient and mother what was done for the child immediately after trauma. Before the patient presented to our clinic, emergency care was given to the patient in a private clinic where haemostasis was secured on the lower lip by applying pressure using a Gauze pack, paracetamol 1000mg and antibiotics were prescribed. However, the patient and the mother couldn't recall the name of the antibiotics.

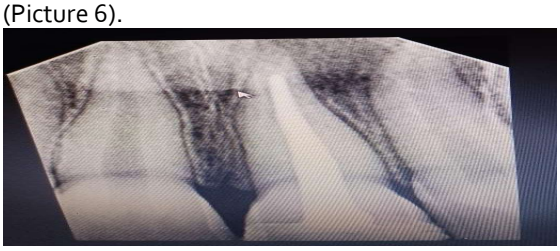
Under local anaesthesia, an access cavity was made on the tooth and the infected pulp tissue was removed from the root canal. The root canal was irrigated with normal saline, and a working-length radiograph was taken. Subsequently, the root canal was cleaned, shaped, dried with paper point and obturated with Gutter percha.

A horizontal incision was made on the lower lip over the swelling, under local anaesthesia, using a size 15 blade. This resulted in the oozing of purulent discharge immediately following the incision. Dissecting forceps were used to separate the muscle while concurrently applying digital pressure on the labial surface of the lower lip to expose the radiopaque mass. The radiopaque mass was found to be the fractured tooth segment (Picture 4). The tooth fragment was placed in normal saline.

The surgically exposed site was thoroughly examined and irrigated with normal saline. A size 3-0 vicryl suture was used to close the surgical site. The tooth fragment was reattached to tooth 21 using a 7th-generation adhesive system (NOVA COMPO restorative composite). Occlusion was checked in biting, protrusive and lateral excursions, and patient satisfaction was confirmed for aesthetics, comfort and function.

Post-operative medications (Caps Amoxicillin 500mg 8 hourly for 5 days, Tabs Metronidazole 400mg 8 hourly for 5 days and Tabs Paracetamol 1g 8 hourly for 3 days) and instructions were given. The patient was reviewed as follows: 1 week, 1 month, 3 months, 6 months and 1 year.

On the second recall appointment, composite veneer was applied to mask the fracture line on tooth 21 (Picture 6).



Picture 3: Post-obturation Radiograph

Picture 4: Exposure of the tooth fragment

Picture 5: Reattached tooth fragment. Note the fracture line.

Pictures 6: One-month post-reattachment with the fractured line mask composite

Pictures 7: 6 months post attachment

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Table 1: Previously published studies on the management of tooth fragment impacted in soft tissues following Trauma in paediatric patients

S/N	Author/ Year	Age in years/ Gender	Fractured Tooth/ Teeth	Aetiology of the Trauma	Duration of the tooth fragment within the soft Tissue	Tissue Involved	Type of treatment
1	Taran et al 1994[8]	7/F	11	Fall	18days	Lower lip	Surgical Removal
2	Da silva et al 2005[9]	10/M	11	Fall from a bicycle	3 months	Lower lip	Surgical removal
3	Rao and Hegde 2006[10]	14/F	21	Trauma from the handle of a pump	8 months	Lower lip	Surgical Removal
4	Naudi and Fung, 2007[11]	11/M	11	Road Traffic Accident	1 hour	Lower lip	Surgical Removal/ Reattachment
5	Schwengber 2010[5]	8/M	21	Sports	2 Months	Lower lip	Surgical removal/ Reattachment.
6	Sangwan et al. 2011[12]	8/F	11, 21	Fall from a bed	1 year	Lower Lip	Surgical removal/ Reattachment
7	Cubuku et al. 2011[13]	4/M	51	Fall	24 months	Upper lip	Surgical removal
8	Antonio et al. 2011[14]	17/M	11	Fall from Bicycle	1 year	Lower lip	Surgical removal
9	Lauritano et al 2012[15]	10/M	11, 21	Sports	3Days	Lower lip	Surgical removal/ Reattachment
10	Lips et al. 2012[16]	10/M	11	Sports	2 days	Lower lip	Surgical removal
11	Agarwal et al. 2013[17]	12/F	11	Fall	-	Upper lip	Surgical Removal
12	Barua et al. 2013[18]	12/F	11, 21	Fall from staircase	4 months	Lower lip	Surgical Removal
15	Nagaveni NB and Umashankara KV 2014[19]	10/M	11	Fall	10 Months	Lower lip	Surgical removal
14	Avinash et al. 2014[20]	10/F	11	Fall	10months	Lower lip	Surgical removal.

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DISCUSSION

About 25% of all school-age children and teenagers (ages 7 to 19) have experienced a type of Traumatic dental injury (TDI) that affected their permanent teeth.[21] The majority of traumatic injuries to the permanent teeth are crown fractures with pulpal exposure, which account for 18% to 20% of all dental injuries.[22] Adeyemo et al.[23] reported that traumatic dental injuries and their effect on the quality of life have a prevalence of 20.2% with male transcendence and a peak age of 8-12 years.

Traumatic injury to the anterior teeth could be devastating for the child as well as the parents not only because of the un-aesthetic appearance of the fractured tooth or teeth but also because of the economic and psychological effect the trauma could have on the child and the parents as well as the impact on the oral health-related quality of life.[24]

Reattachment of a fractured tooth segment is a time-conserving treatment procedure that restores function and has a favourable psychological effect on the child and parents.[7] Chosak and Eidelmanch[25] introduced the idea of reattachment in 1964 when they reattached an anterior crown fragment using a cast post and traditional cement. Reattaching a fragment to a fractured tooth can result in good and

long-lasting aesthetics because the tooth's original anatomical form, colour, and surface texture are preserved. Successful reattachment of a tooth fragment is now more likely due to the tremendous advancement of adhesive systems and resin composites [26]. However, this method should be viewed as the first line of treatment and can only be utilized when the intact tooth fragment is available.[27] Naudi et al. [11] reported a case of an 11-year-old boy who was involved in a road traffic accident, which resulted in an uncomplicated tooth fracture #11. The fractured fragment was lodged within the lower lip. The fractured fragment was surgically removed and attached using an acid-etched technique and scotch bond.[11]

Rao and Hegde[10] reported a similar case of a 9-year-old girl who was struck accidentally by the handle of a pump, resulting in the fracture of tooth 21 and the tooth fragment was embedded within the lower lip. The patient reported eight months post-trauma. The fractured tooth was endodontically treated and restored using a jacket crown, while the fractured fragment was removed surgically from the lip and was not reattached.[10]

Sangwan et al. reported a similar case of an 8-year-old girl whose upper central incisors were fractured, and the fractured fragment was embedded in the lower lip for one year. The fractured fragment was surgically removed and reattached to the tooth. No root canal therapy was done on the tooth because the fracture was uncomplicated.[12]

Care must be taken when a tooth fracture is associated with a soft tissue injury since tooth fragments lodged in the soft tissue may go undetected during a clinical examination.[9] The fractured segment must be kept hydrated if found for the reattachment to be successful. This is essential to maintaining sufficient bond strengthening, avoiding dehydration and tooth discolouration.[28] In the case reported above, the fractured segment was placed in normal saline immediately after it was removed from the lower lip. One major disadvantage of reattachment is the de-bonding of the fractured segment secondary to subsequent trauma.[29]

Treatment options for traumatized teeth with complicated crown fracture in a young patient include direct pulp capping, partial pulpotomy, cervical pulpotomy, RCT or extraction depending on the length of time between the trauma and treatment, the extent of root development, and the size of the pulp exposure.[30] The goal of interventions is to preserve the vitality of the pulp tissue. Pulp capping is advised for pulp exposure of less than 1mm and within a few hours of exposure.[1]

Cveck et al.[31] observed success rates in cases with complicated crown fractures treated by a partial pulpotomy (96%) with a follow-up of between 14 and 60 months and 30 hours between trauma and treatment. In the case reported above, pulp exposure was greater than 1mm and was exposed for seven days before presentation. Thus, root canal treatment was done on the fractured tooth.

CONCLUSION

The case report highlights the significance of thorough clinical and radiographic examination of soft tissue, especially when the patient cannot account for the tooth fragment following trauma. It also emphasizes that tooth fragments, if found, can be reattached because it is more aesthetically pleasing and biologically acceptable. Reattachment is possible due to the advent of adhesive systems and composite resin.

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None Declared

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