ROTATED OR DISPLACED DEVELOPING TOOTH CRYPTS AT MANDIBULAR FRACTURE SITES AND THEIR MANAGEMENT

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ABSTRACT

Mandibular fractures are common in adults as well as in children. The patterns of mandibular body fractures are different in children when compared to adults. This is due to the presence of the developing permanent teeth and mixed dentition. These fractures run along crypts of permanent teeth and result in displacement of the bony segments and sometimes also developing crypts. Teeth buds are either rotated or displaced which make the management of the fractures mandatory with open reduction.

During two years, six pediatric patients were examined at Children and Dental Hospitals, Lahore with fresh displaced fractures at the body of mandible with displacement or rotation of permanent teeth buds at the fracture sites. Patients were confirmed with radiographs. Open reduction and fixation by selective modalities were recommended according to the need of the fracture.

All fractures as well as mesially or apically rotated teeth buds healed nicely without visible complications but the prognosis of the 180° rotated crypts was poor which resulted in defective eruption. The average follow-up period was six months, however the parents were told to bring the patients for follow up at six monthly intervals till the teeth were fully erupted.

Key wards: Mandibular fracture, open reduction, crypts and repositioning.

INTRODUCTION

A high tooth-to-bone ratio exists in a pediatric jaw. The mandible forms the lower one third of face and it helps in sucking, mastication, speech and facial esthetics. The mandibular fractures occur frequently through the developing tooth crypts and condyles in the children. The frequency of fractures ranges from 15% to 86.7% in pediatric mandible which is greater than mid-face (8% to 54%), the later being smaller and plastic comparative to mandible1 2. The studies conducted at Punjab Dental Hospital, Lahore show that mandibular fractures are 15.9% in infants up to 10 years of age3.

The most common causes of the pediatric mandibular fractures are the road traffic accidents (RTA) and falls. Thoren 1992 reported that in children 57% of fractures are due to RTA, and 18% are on account of falls. Older school-age children sustain mandibular injuries in sports activities while teenagers are often subjected to violent injury4. In Pakistan, the major cause is accidental fall from heights (trees, roof tops) followed by road traffic accidents5.

The pediatric mandibular fractures are sometimes accompanied by displacement or avulsion of deciduous and permanent teeth6, 7 and the developing tooth buds have been observed being dis-
placed, rotated or even avulsed at the fracture site".

Treatment of certain fractures differs from treatment of similar fractures in adults. The successful treatment of the pediatric mandibular fractures can accomplish several goals that include; restoration of occlusion, the function and the facial balance. The specific treatment of mandibular fractures depends on location of the fracture, trapturement of the developing buds at fracture line, degree of bony displacement, dentition status, and the expertise of the operators. The developing permanent teeth and their buds in the fracture line demand careful handling during reduction and methods of fixation in the management of the pediatric mandibular fractures.

The purpose of this study was to describe management options for the pediatric mandibular fractures associated with displaced or rotated permanent teeth buds at fracture site and to evaluate the follow-up fate of these buds.

**MATERIALS AND METHODS**

Six patients were presented at Punjab Dental and Children Hospitals Lahore during September 2003 to July 2005. All patients had displacement at mandibular fracture site. The age of patients ranged from 3 to 10 years with 5:1 male to female ratio. They were evaluated clinically by the teeth alignment and confirmed by orthopantomograph (OPG), mandibular lateral oblique and posterior-anterior (PA) radiographs. One patient had bilateral and another unilateral condyle fracture on radiographic confirmation. The management of these patients was planned with following modalities;

1. Rigid fixation
2. Acrylic occlusal splint
3. Metal arch bar (Eric) splint
4. Eyelets intermaxillary fixation

The rigid fixation by 2mm titanium mini-plates with 6mm length mono-cortical self-tabbing crosshead screws of 2mm diameter was used in patients without associated condylar fracture. The acrylic occlusal and Eric splint were formed after the model surgery in occlusion and were utilized in associated condylar fracture patients for three weeks. The intermaxillary fixation was preferred in relatively older without condylar fracture patients for three weeks also.

All developing permanent crypts were mechanically repositioned after open reduction at fracture sites and care was taken to avoid damage to the repositioning buds with average follow-up of six months.

**RESULTS**

The management of the fractures was planned with acrylic occlusal splints in patients who had associated condylar fractures. The reason for splint fixation was to avoid the future temporomandibular joint ankylosis in these patients. Clear acrylic occlusal splints were stabilized with 0.45 gauge circum-mandibular wires. The Eric arch bar with 0.35 gauge wires was adapted to only one patient, as the child was very young and acrylic splint facilities were not available at that particular time. Eyelets intermaxillary fixation was performed in a child because he had stable mixed dentition and the fracture line was in the danger of iatrogenic nerve damage.

The rigid fixation was performed in two mandibular fracture patients without condylar fracture, with titanium 2.0mm mini-plates intra-orally with 6mm long self-tabbing mono-cortical crosshead screws of 2.0mm diameter. The plate was fixed at buccal lower border, hoping to save the future developing permanent tooth buds. Statistics of patients are shown in table 1.

One mesially rotated bud was repositioned after the fracture had healed as at the time of reduction, the rotated bud was not approached and the mini-plate was fixed extra-orally through open traumatized contused wound. In two patients, the tooth buds had avulsed into the surrounding soft tissues and at the time of surgery the buds with follicles were located and were carefully repositioned. Three tooth buds were rotated downwards (180°) with the crown direction towards the basal bone and open reduction was performed to reposition these buds, caring not to damage the buds. In another case, the tooth was apically displaced and was easily managed during the open reduction of the fracture.

Open reduction was mandatory in all patients as the tooth buds had to be repositioned prior to fixation.
of the fractures. The minimal and careful surgical intervention was performed to avoid the iatrogenic trauma to the developing tooth structures. Postoperative X-rays confirmed the accurate placement of the tooth bud and relative success of the procedure. All patients were hospitalized for two days postoperatively. None of the patients developed postoperative infection or serious complications during average 6 months follow up with maximum of 11 months. All patients had excellent fracture site healing. The overall healing and success ofthe surgery was good whereas, 180 degrees rotated tooth buds had relatively defedentition7,8,10.(Figures 1 to 12)

The dental management of traumatic injuries in children demands a care-regards methodical approach. The common injuries at growing age group are in the mandible and usually lead to fracture of this jaw. Sometimes the developing tooth buds are seen rotated or displaced at the fracture line that may necessitate their repositioning for the reduction of fracture segments. The dental records may be retained until the permanent teeth erupt to assess the extent of the damage to developing dentition7,8,10.

The healing at fracture site after tooth buds repositioning had been evaluated and as -egards the extent of surgical intervention, the operating surgeon has to weigh the benefits against the risks. Careful follow-up is recommended following any jaw trauma, because the ultimate goal in treatment is to prevent damage to the permanent successor11. Dilacerations of the crowns constitute 3% of traumatic injuries to developing permanent teeth. It usually involves the maxillary incisors and less frequently their mandibular counterparts12.

The patients where the tooth was inverted at 180 degree, showed the defective root formation, comparative to contralateral non-traumatic tooth. A high correlation was found between the degree of intrusion of the primary tooth and the frequency and severity of developmental disturbance of the permanent tooth during the jaw injuries13. Damage to the developing teeth subsequent to primary tooth injury is often unavoidable and has permanent effects on the dentition such as necrosis of the pulp etc.14

External resorption may have been present, but was rare. Treatment or antibiotics were rarely needed at follow-up visits. Overall, these teeth responded positively, and there was a low morbidity associated with subluxation injuries15. It could be concluded that these varying responses could not be correlated with explicit clinical diagnoses. However, in certain combinations, histological parameters could be correlated to clinical findings while treating the fractures of the mandible associated with tooth buds.

In a multivariate analysis the pulp necrosis in teeth after trauma has been observed and following decisive factors were found; age of the patient at the time of injury, degree of displacement of the tooth as well as the degree of loosening and presence of crown fracture.
The factors found to influence development of pulp canal obliteration were; displacement of the tooth at time of injury as well as detectable physiologic root resorption at time of trauma. The presence of crown fracture seemed to decrease the risk of obliteration. The need for scientifically based treatment strategies for managing and reducing complications after trauma in the primary or permanent dentition is stressed\textsuperscript{16}.

Although six month follow up for the repositioned crypts was satisfactory, yet till full eruption of these teeth they ought to be monitored to reach the definitive conclusion.

**CONCLUSION**

These cases reflect occasional and different findings of displaced tooth buds during pediatric facial bony trauma. These tooth buds most of the time are overlooked during diagnosis and management and create problems later on. It is advocated that these fractures may be treated with open reduction and tooth buds should be repositioned carefully to reduce the fracture segments. Follow up showed excellent fracture site healing but the buds that had been rotated at 180 degree were found with defective bud development comparative to contralateral side. This may have been caused either due to follicular damage at the time of injury or during repositioning at the time of surgery. All cases must be evaluated till complete eruption of the buds to draw conclusion.

**REFERENCES**


