Management of an Unusual Maxillary Dentoalveolar Fracture: A Case Report

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ABSTRACT

The purpose of this case report was to describe the management of a trauma-induced maxillary dentoalveolar fracture of the right maxilla in an 8-year-old boy. The child presented with swelling of the right maxillary region, difficulty in chewing and closing the mouth, and a sutured laceration on the cheek. Complete palatal displacement of the fractured fragment involving the deciduous canine and molars was observed clinically and confirmed by radiological examination. The fracture was reduced and stabilized using a custom-fabricated, open-cap acrylic splint with modified interdental wiring under general anesthesia. (J Dent Child 2006;73:112-115)

KEYWORDS: MAXILLARY DENTOALVEOLAR FRACTURE, OPEN-CAP ACRYLIC SPLINT, CHILD

Maxillofacial trauma is less common in younger children than in adolescents and adults.[1] Traumatic injuries to the dentofacial complex in children often cause avulsion of deciduous anterior teeth or dentoalveolar fracture. These injuries may be quite dramatic, with blood, teeth and soft tissue debris in the mouth, causing the child and parents to panic. Fractures of the anterior maxillary segment are more common, compared to the mandible. Concomitant soft tissue injury to the lips and gingiva may also be frequently encountered.[2]

Facial trauma in children can occur due to occurrences such as motor vehicle accidents, domestic accidents, and birth injuries, and the incidence of dentoalveolar fractures in children is variable.[3-7] Early reduction and fixation of fractured fragments is mandatory to allow rapid healing and return of normal function.[1] Also, pediatric facial fractures need to be managed at the earliest so as to facilitate the normal growth and development of the dentofacial complex. Hence, the goal is early re-establishment of preinjury skeletal anatomy to minimize morbidity in terms of form and function.

The management techniques should be modified to address the child's particular stage of anatomical, physiological, or psychological development.[3] Diagnosis of any dentoalveolar fracture requires a good clinical and radiological examination. Current methods of stabilizing dentoalveolar fractures involve the application of surgical arch bars or the newer acid etch techniques. Regardless of the stabilization technique selected, the splinting methods must meet specific criteria. These include easy fabrication, maintenance of only passive force on the teeth, lack of irritation to soft tissues, maintenance of normal occlusion, allowance of good oral hygiene, access for subsequent orthodontic treatment and easy removal.[1]

Craniofacial surgical techniques, as well as technical advances in instrumentation and rigid internal fixation systems have revolutionized treatment of midface injuries in children.[1] Such modalities, however, are not always applicable in all pediatric patients. Hence, techniques may have to be modified to suit individual needs. Acrylic splints are a well-known tool used to manage mandibular fractures in the young and elderly. The purpose of this case report was to describe an unusual case of dentoalveolar fracture of the posterior maxillary segment requiring treatment modification in the form of open-cap acrylic splint and interdental wiring to stabilize it.

CASE REPORT

An 8-year-old boy presented to the Department of Pedodontics and Preventive Dentistry, Bapuji Dental College and Hospital, Davangere, Karnataka, India, with a complaint of swelling on the face's right side and pain upon closing the mouth. The boy had sustained the injury due to an impact caused by a sudden explosion of scooter silencer and had experienced the pain and swelling for a week. Asymmetry of

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the face was noted due to edema of the face and upper lip. An intraoral examination revealed obvious palatal dislodgment of the fractured fragment involving the primary right canine and molars. The fractured segment was mobile and tender on palpation with an infected laceration in the right upper vestibule (Figures 1a, 1b).

A thorough clinical and radiological examination confirmed the fracture line traversing the right maxillary first premolar tooth bud. The presence of other concomitant fractures in the facial skeleton, however, was ruled out (Figure 2).

The child was admitted 2 days prior to the planned surgical procedure, and a thorough oral prophylaxis was performed. Under intravenous sedation, upper and lower dental arch impressions were made using alginate impression material and casts were obtained. The maxillary cast was sectioned along the fracture line, and the sections were oriented to the mandibular cast to re-establish the pretrauma occlusion and also refixed. Next, the articulated casts were mounted on a simple hinge articulator, and an open-cap acrylic splint was fabricated on the modified maxillary cast using the sprinkle-on technique. The excess acrylic was then trimmed, and the splint was polished. Four holes were made in the first deciduous molar's interdental areas on the palatal and buccal aspects of the splint on both the sides to facilitate passage of a 26-gauge stainless steel wire (Dentaurum, Germany; Figure 3a).

Figure 1a. Palatal displacement of the dentoalveolar segment with an infected buccal laceration.

Figure 1b. Preoperative occlusal discrepancy.

Figure 2. Orthopantomograph illustrates the fracture involving right maxillary posterior segment.

Under general anesthesia, a plastic closure of the extraoral wound was carried out following re-exploration and surgical debridement. The fragment was reduced using digital pressure, and the prefabricated, custom-made splint was seated in position. The splint was secured in place using interdental wires (26-gauge stainless steel wire) running horizontally through the holes made in the splint in the buccopalatal direction (Figures 3a, 3b). Fracture reduction and stabilization was satisfactory, as evidenced by the postoperative occlusion (Figure 4). Recovery from general anesthesia was uneventful, and the patient was discharged on the third postoperative day with instructions for a soft diet and maintenance of good oral hygiene. A 5-day course of antibiotic and analgesic syrup was also prescribed. The child was recalled on a weekly basis to ascertain stability of the splint.

Splint removal was carried out at the end of 3 weeks. The consolidation of the fracture was confirmed clinically and radiographically (Figure 5). Satisfactory occlusion and healing was observed. The child's parents were instructed to report immediately in case of any complaint of pain or discomfort in the region.

At the end of the eighth postoperative week, normal eruption of the maxillary right lateral incisor was also observed (Figure 6).

DISCUSSION

Factors to be considered in the definitive treatment of the dentoalveolar injury include: (1) age and cooperation of the patient; (2) duration between trauma and treatment; (3) location or extent of the injury; (4) injury to primary or permanent dentition; (5) stages of root development; (6) presence of fracture of supporting bone; and (7) periodontal health of remaining teeth.[8]

Treatment of fractures of the alveolar process involves reduction and immobilization of the involved segment and stabilization for at least 2 to 4 weeks. Arch bars may be used for stabilization in adults, but in the pediatric population it is not feasible due to the size of the teeth and mixed dentition. The contour heights of the crowns of deciduous teeth are below the gingival level, and circumdental wiring may result in extrusion of deciduous teeth. The use of freshly erupted permanent teeth is also contraindicated due to the

incomplete root formation. Resorption of roots, attrition of deciduous teeth, and incomplete root formation of permanent teeth in the mixed dentition phase make these teeth less helpful in securing arch bars in place.[8]

Among the commonly used treatment options, acrylic cap splints are ideal. They not only avail support from the adjacent teeth, but also from bone. They are easy to fabricate and are economical. Routinely, these are used in stabilizing mandibular fractures, as they can be stabilized by the use of circum-mandibular wires. Similarly, gunning splints are used in the edentulous mandibles of the elderly where peralveolar wires may be used to stabilize the splint in the maxilla. Extrapolation of the same technique, however, is not possible in the pediatric patient, owing to the developing permanent dentition. A modified method of wiring to secure the maxillary splint in place was used in this particular case, thus facilitating adequate stabilization of the fractured segment. A delay in treatment may render the fracture less amenable for adequate reduction. In addition, early re-establishment of the pre-injury skeletal anatomy is essential to facilitate normal growth of the craniofacial complex.[1] This would minimize or avoid the ill effects of delayed or no treatment such as malunion, deranged occlusion, and an impending dentofacial deformity.

Maxillomandibular fixation is seldom carried out in pediatric patients, since children do not tolerate it and, consequently, maintaining the splint in position until satisfactory consolidation of the fracture is important. The interdental wiring technique employed is innovative and holds the splint in place in a secure manner. Moreover, the wires also do not interfere with occlusion or chewing. Following splint placement and during the entire period of the splint in situ, a strict protocol for diet and maintenance of oral hygiene is followed. Liquid or semisolid diet should be advised initially, and hard foods should be completely avoided. Maintenance of oral hygiene poses a problem, particularly with children and more so with the splint in place. The child is advised

Figure 3a. Fabricated open-cap acrylic splint and wiring pattern on a cast.

Figure 3b. Splint in place using interdental wiring.

Figure 4. Immediate postoperative placement of a splint.

Figure 5. Orthopantomograph illustrates consolidation of a fracture at 3 weeks.

Figure 6. Occlusion with a normally erupting lateral incisor at 8 weeks.

to use regular mouthrinses containing 0.2% chlorhexidine. Alternately, parents are trained and advised to irrigate the oral cavity with warm saline in a 10-cc disposable syringe following any food intake.

Following removal of the splint, a careful examination of the teeth and the fractured fragment is carried out to confirm satisfactory healing of the fracture. It is also imperative to monitor such cases over a prolonged period so that future eruption of the permanent dentition can be closely observed.

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