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Management of Maxillary Dento Alveolar Fracture with A Modified Splinting Method :A Case Report

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Abstract: *The purpose of this case report is to describe the management of a trauma-induced maxillary dentoalveolar fracture in a 7-year-old girl by a modified approach of splinting. The child presented with swelling of the right maxillary region, difficulty in chewing and closing the mouth. Complete palatal displacement of the fractured fragment involving the permanent central incisors was observed clinically and confirmed by radiolographic examination. The fracture was reduced and stabilized using a custom-fabricated, acrylic splint with modified direct wiring under local anesthesia*

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I. Introduction

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,luxation,intrusion or dentoalveolar fracture of the anterior teeth. 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 motor vehicle or domestic accidents. The incidence of dentoalveolar fractures in children is variable[3]. Early reduction and fixation of fractured fragments is mandatory to allow rapid healing and return to normal function[3.]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 skeletal anatomy to minimize morbidity in terms of form and function[1]. Current methods of stabilizing dentoalveolar fractures involve the application of surgical arch bars or the 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, good oral hygiene, access for subsequent orthodontic treatment and easy removal[1].The management techniques are modified according to the situation to address the child's particular stage of anatomical, physiological, or psychological development.A modified splinting technique suitable for a special situation is discussed here.

II. Case Report

A 7-year-old girl was brought to the Department of Pedodontics and Preventive Dentistry, Government Dental College ,Kozhikode with a history of trauma on face due to road traffic accident .She had a complaint of swelling on the face and pain upon closing the mouth. Oedema of the face and upper lip was noted. An intraoral examination revealed obvious palatal dislodgment of the fractured fragment involving the permanent right and left central incisors. The fractured segment was mobile and tender on palpation. The permanent left central incisor showed grade three mobility(figure 2). A thorough clinical and radiographic examination ruled out the presence of other concomitent fractures in the facial skeleton(figure 1).

Severe trauma, bleeding and mobility were present which prevented the dentoalveolar segment fracture being treated with traditional splinting methods.Under local anaesthesia, upper and lower dental arch impressions were made using alginate impression material and casts were obtained. An open-cap acrylic splint was fabricated on the maxillary cast using the sprinkle-on technique. The excess acrylic was then trimmed, and the splint was polished. A modified approach to splinting was planned. Four holes were made in the right and left permanent central incisor areas on the buccal aspects of the splint to facilitate passage of a 26-gauge stainless steel wire (figure 3).Similarly holes were made on the incisal edge of the right and left central incisors on their labial aspect. 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 and the teeth.The splint was cemented in position using Glass Ionomer Cement (GC Fuji Type1 luting cement) (figure 4).Fracture reduction and stabilization was satisfactory, as evidenced by the postoperative occlusion. The patient was discharged on the same day with instructions for a soft diet and maintenance of good oral hygiene. A 5-day course of antibiotic and analgesic was also prescribed. The child was recalled on a weekly basis to ascertain stability of the splint and the presence of other symptoms.

Splint removal was carried out at the end of 3rd week (figure 6).The consolidation of the fracture was confirmed clinically and radiographically. Satisfactory occlusion and healing was observed. Mobility of the left central incisor reduced considerably. The holes on the teeth were restored with compsite restorative material(Filtek Ultimate,3M ESPE)The child's parents were instructed to report immediately in case of any pain or discomfort in the region.The patient is still under regular recall.

III. Discussion

Road Traffic Accidents Remains To Be The Main Etiological Factor that account for over two-thirds of facial fractures, of which, 40% involve midface excluding the nose. Horizontal and vertical buttresses protect the maxilla and midface against impact wherein the horizontal buttresses are of two types –coronal and sagittal. The midface lacks sagittal buttresses, particularly in the central segments thus resulting in severe injury. 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.Treatment of fractures of the alveolar process involves reduction and immobilization of the involved segment and stabilization for at least 2 to 4 weeks.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.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 difficult. 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.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. 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 to use regular mouth rinses containing 0.2% chlorhexidine gluconate. Alternately, parents are trained and advised to irrigate the oral cavity with warm saline in a 10cc 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.

Figure 1;preoperative OrthoPantomogram)

Figure 2;(Palatal displacement of 11 and 21 with acrylic splint placed inside the mouth. upper labial gingiva with respet to 11 and 21 shows inflammation)

Figure 3;splint secured using interdental wires passing through splint and incisal edges of 11 and 21.

Figure 4;splint cemented using glass ionomer cement.

Figure 5;splint stabilized using digital pressure.

Figure 6;Splint removed after 3 weeks

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