

Cap Splint For Segmental Dentoalveolar Fractures In 11-Years Old Girl: A Case Report

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Abstract

Mandibular fracture incidence was approximately 55.2% of pediatric facial fractures. The most common site of mandibular fractures was condyle, followed by symphysis and parasymphysis.

Teeth splinting is recommended as the correct position of the repositioned teeth will provide comfort and support function for the patient, eventually supporting the children's general health. Appropriate and immediate response is highly recommended to treat mandibular fractures. This case report aims the management of trauma with segmental dentoalveolar fracture in the anterior mandible accompanied by loss of maxillary anterior teeth by the use of cap splint.

An 11-years old girl with mandibular symphysis fracture compounded by several teeth missing and mobility followed by bleeding and crepitus in the mandibular anterior alveolar was referred to Universitas Airlangga Hospital twelve hours after the car accident. Systemic antibiotic and orthopantomogram were done at the first visit followed by wires and brackets splint insertion on the next day. A cap splint and acrylic denture were then inserted. Teeth mobility was corrected, at 42 days, then cap splint was removed.

Cap splint as mandibular fracture fixation technique was suggested for segmental dentoalveolar trauma management in children.

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Introduction

The prevalence of dental trauma in primary and permanent teeth in children is estimated to be around 36.8%. Mandibular fractures accounted for 55.2% of pediatric facial fractures, with the most common site of mandibular fractures was condyle (39.3%), followed by symphysis and parasymphysis (35.7%). The etiology varies, including falls, sports injuries, bicycle accidents, traffic accidents, and physical violence injuries. Dental trauma can

cause pain and potential infection, change facial esthetics, impede speech, and have a detrimental emotional impact, thus negatively impacting children's quality of life.¹⁻⁵

Various techniques are described to treat children's mandibular fractures, such as circumferential wiring, cap splint, open reduction, resorbable plates, orthodontic resin and modified orthodontic brackets. Among several options above, the proper treatment plan must be implemented to maintain teeth function and ensure nutritional intake.

Prompt and appropriate management should be managed carefully because children's bone is relatively flexible elastic bone, due to instability of deciduous or mixed dentition and varying levels of patient cooperation.⁶ This case reports the management of mandibular symphysis with several teeth missing and mobility as a compounding factor.

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Case Report

An 11-years old girl was referred to *Universitas Airlangga Hospital* twelve hours after a car accident. There were missing in #12, #11, #21, #22 and grade 3 mobility (Grace and Smales Index) of #33, #32, #31, #41, #42 teeth, followed by bleeding and crepitus in mandibular anterior alveolar (Figure 1). Systemic antibiotic and orthopantomogram were done immediately at the first visit after lesion debridement.

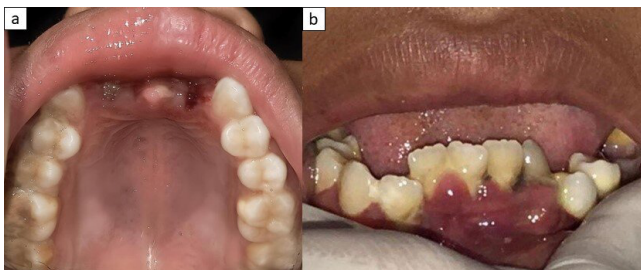


Figure 1. Intra oral view 12 hours after accident. 1a. Showing infra-positioned of the lower anterior teeth, accompanied by swelling, redness, debris and calculus. 1b. Indicating #12 #11 #21 #22 teeth missing.



Figure 2. Intra oral view showing wire and brackets splint on teeth #44 to #35 with continuous bonding ligature wire and periodontal pack. Scaling was done prior to fixation.

The next day, segmental dentoalveolar fractures were repositioned in the #42 #41 #31 #32 #33 region to normal occlusion using bimanual pressure with the vertical direction. Scaling was done before the fixation to remove food debris and bacteria. Fixation was done using 0.022 mini roth sloth bracket on teeth #44 #43 #42 #41 #31 #32 #33 #34 #35 with continuous bonding ligature wire under local anesthesia. A periodontal pack was placed to protect and secure the wound (Figure 2). A cap

splint was inserted on the thirteenth day of the visit, followed by an acrylic denture to replace the upper missing teeth (Figure 3). On the twentieth day, an orthopantomogram (OPG) was taken for bone healing evaluation, which showed healing on the alveolar bone on the anterior mandible (Figure 4). On the thirtieth day, the wires and brackets splint were removed. On the forty-second day, teeth mobility was corrected, and the splint cap was removed (Figure 5).



Figure 3. Fabrication of cap splint. Figure 3a: Cap splint design. Figure 3b: Maxilla anterior removable denture design. Figure 3c: Removable denture insertion and cap splint.

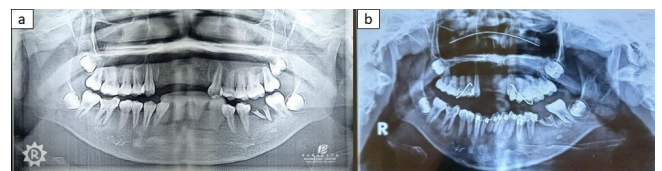


Figure 4. Pre and post treatment Orthopantomogram (OPG). Figure 4a: Preoperative orthopantomogram (OPG) pretreatment. Showing dentoalveolar segmental fracture in anterior mandible and teeth missing #12 #11 #21 #22. 4b: Twentieth day orthopantomogram (OPG) indicating bone remodelling at #41 #42 #31 #32 #33 area.



Figure 5. Intraoral photograph showing tooth condition after splint cap was removed.

Discussion

Several considerations such as growth and stage development, degree of compliance,

as well as the choice of surgical approach should be considered by dentist when manage children with maxillofacial injury.^{7,8} The faster healing period in children aided by the well vascularized tissue and blood supply of the face seems an advantage. Thus, knowing patient's age, patient cooperation, as well as their tooth development stage is mandatory. The latter seems influential on the proper ways of treatment.⁹

Given the high complexity of the case presented, the patient was treated with several appliances to treat all the complaints. Cap splints for mandibular fractures, followed by splinting to retain existing teeth, and removable dentures to replace missing teeth. Several techniques were previously reported in managing pediatric fractures including circumferential wiring, and open reduction technique that is highly invasive but unsuitable for cases with this complexity.⁹ The open reduction technique for unstable mandibular fractures using miniplates and screws is considered to have a negative effect on the growth of bone and unerupted teeth. Furthermore, it involves two-stage surgery because of the need to remove the plate after complete healing. An alternative splinting method was reported for mandibular fracture management using the circumferential wiring technique. This method requires two steps of anesthetics. The first is for insertion of the wire and the second is for anesthesia or sedation when removing the circumferential wiring splint which causes time and cost inefficiency. Oral hygiene maintenance is also important to prevent the splints becoming foul and if circummandibular wires are deadlocked to the fracture site, the splints may be inadequately secured.^{10,11} The drawbacks of resorbable plates application are not completely complication-free. Some of the associated complications include: breaking of the devices due to excessive forces, loosening and migration of the devices, damage to tooth buds, neurovascular injury, post-operative infection and foreign-body tissue reaction to the plates. Moreover the cost of resorbable plates should be taken in consideration.¹²

Cap splint was recommended due to its simple technique. Cap splint is suitable because the manufacturing procedure is relatively fast, easy, inexpensive, effective and easy to maintain oral hygiene. Those considerations were taken for this patient's case. The patient's home distance, poor oral hygiene conditions, as well as

low patience cooperativity led us to choose a cap splint for segmental dentoalveolar fractures. When using a cap splint, the patient had no significant complaints. As masticating and talking can cause discomfort at start it takes a few days for the patient to adapt. After the insertion of the cap splint, the patient was instructed to maintain oral hygiene, have a softened food diet, avoid any heavy physical activity, and prescribed mouthwash usage.⁷

Most pediatric fractures are greenstick type. A conservative approach is preferred compared to more obtrusive ones. Growth of the mandible and development of dentition are the main concerns while treating mandibular fractures in children, so non-permanent splinting is needed, such as cap splints.⁹ Insertion of Cap splint immediately after trauma due to lowering fractures in children as early as possible resulting in shorter treatment duration seems mandatory. Excellent bone remodelling occurs even if bone surfaces are in poor apposition and fibrous union or non-union rarely occurs in children. However, immobilization time should be minimized to reduce condyle growth and cause ankylosis.¹³

The use of acrylic splints should be considered in pediatric mandibular fractures with minimal to moderate displacement. Acrylic splints may be labiolingual, cap, intermaxillary, lingual or open cap splints. Labiolingual as well as cap types for the deciduous and mixed dentition. The intermaxillary type is indicated for the loss of multiple teeth. The lingual type for the predicted intraversion of bone fragments. The open cap splint enables early jaw movement which is important in cases of concomitant sub-condylar fracture and, thus, prevents the development of temporomandibular joint ankylosis.⁸ Cap splint is a simple, practical, easy to build and more attested method. Advantages of cap splint include time efficiency, cost-effective, without any risk of injuring the teeth buds, good stability during the healing period and minimal trauma to surrounding tissues, ease of maintenance of oral hygiene, and comfort for young patients.^{8,9,14} Although for this case cap splint has lots of advantages, it is also important to be aware of patient's mandibular growth problem as asymmetry and retrognathism with open bite may result from mandibular fractures, respectively. Need periodical check-up evaluation in order to obtain an optimal patient outcome.

Conclusions

Cap splint to mandibular fracture fixation technique is promising management for segmental dentoalveolar trauma in children because cap splint has time efficiency, cost-effective, without any risk of injuring the teeth buds, good stability during the healing period and minimal trauma to surrounding tissues, ease of maintenance of oral hygiene, and comfort for young patients.

Declaration of Interest

The authors report no conflict of interest.

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