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OPEN CAP SPLINT WITH CIRCUMMANDIBULAR WIRING IN MANAGEMENT OF PEDIATRIC MANDIBULAR PARASYMPHYSIS FRACTURE:A DEFINITIVE CONSERVATIVE TREATMENT MODALITY

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Abstract:

The most frequent facio-skeletal traumatic injuries seen in children are fractures of the mandibular parasymphysis and symphysis. The complexity of the developing mandible's anatomies, as well as its patients' psychological and physiological qualities, make it difficult for paediatric dentists to manage these injuries. Mandibular parasymphysis/symphysis fractures in children can be treated using a variety of techniques, each of which has drawbacks and problems. In the current case report, an open cap splint-treated paediatric mandibular parasymphyseal fracture is described as having been successfully managed conservatively.

Introduction:

In comparison to fractures in the adult population, paediatric fractures are uncommon; they are thought to occur in 5% of all maxillofacial traumas. [1] The most frequent (56%) facial skeletal injuries found in a hospitalised paediatric trauma patient are mandibular fractures. Boys experience it twice as often as girls [2,3]. The risks of facial bone fractures in children are most frequently connected with a kid's hyperactivity, falls, assaults in traffic, and child maltreatment.

[4] The majority of body and symphysis fractures in infants are undisplaced due to the elasticity of the mandible, implanted tooth buds that hold the fragments together "like glue," and a short, thick condylar neck that tends to resist fracture. Closed reduction and immobilisation are used if the patient is moved. [6]

The majority of fractures have been treated conservatively using circummandibular wires, dental splints, rubber elastics, and occlusal cap splints. With the use of a cap splint, a mandibular fracture can be closely reduced and stabilised while allowing for hygiene care without damaging tooth buds. [7] The development of tooth buds and associated anomalies must be observed over an extended period of time.

In this study, a paediatric patient's mandibular fracture was treated using a cap splint. In addition to highlighting the role of acrylic splints with the use of circummandibular wiring technique in the management of displaced parasymphysis fracture in a 6-year-old child, the article's goal is to provide insight on mandibular injuries in paediatric patients and assist clinicians in the management of mandibular or parasymphysis fracture in children.

Case report:

A 6-year-old girl reported to the Department of Dentistry with a history of fall from 1st floor of her house 12 days ago. After the fall the child did not loose consciousness, had no history ofvomiting or convulsion or bleeding from nose. There was a history of bleeding from gums, and from the cut on the chin. The child was taken to the local hospital by her parents for primary treatment, after which the child along with her parents reported to our department with the

complain of pain and swelling in lower left front teeth region and also reported difficulty in opening and closing mouth.

Extraoral examination revealed the presence of a swelling in the left anterior region of mandible causing asymmetry of face, difficulty in opening and closing the mouth and a laceration on the chin, which was sutured by the local physician before reporting to us.

Intraoral examination revealed a fracture line between the left mandibular primary canine and primary first molar associated with medially displaced left mandibular dentoalveolar segment with step deformity and altered occlusion leading to a posterior open bite and reduced mouth opening [Figure 1].

Preoperative orthopantomogram (OPG) confirmed left mandibular parasymphysis fracture between primary canine and primary 1st molar and also revealed right condylar extracapsular fracture [Figure 2].

Prior to surgery, impressions were taken under local anaesthesia and casts were prepared. A mock surgery was performed contemplating good intercuspation, during the mock surgery decision of extraction of right mandibular primary canine was planned, since it was buccally tilted (out of the arch) and caused a hindrance in proper adaptation of wire and fabrication of splint. After removing the right mandibular primary canine from the cast and approximating the fractured segment, a 19-gauge wire was adapted to the entire circumference of the mandibular arch at the neck of the teeth both on the buccal as well as on the lingual side, and lateral compression open cap acrylic splints (leaving occlusal surface open) was prepared involving lingual and buccal flanges. [Figure-3]

Under strict aseptic condition, betadine painting and draping was done. Local infiltration was done along the right lower border of mandible using 2% Lignocaine with Adrenalin (1:2,00,000). followed by administration of general anaesthesia, the right mandibular primary canine was extracted first, by using a forcep. Sutures from the chin region were removed. 18G Spinal needle was punched through the lingual vestibule, exiting extraorally along the lower border of mandible and trough the buccal vestibule simultaneously. A 24G single wire was passed through the lingual as well as the buccal vestibule through the needle, between 31 and 32.The same procedure was followed in the posterior jaw region, distal to 36. Incision was given between the point of insertion of wire, dissection was done using mosquito forcep and wire was pulled inward and rested on supraperiosteal layer of lower border of mandible. Extraoral sutures were placed using 3-0 silk, splint was adjusted and grooves were made and wire were engaged in the groves and tightened. Copious irrigation was done using betadine and saline. This was followed by dressing done using betadine ointment and the pressure pack was given extraorally.

Immediate Post-operative OPG was taken to check if the wires were properly secured to the bone [Figure 4]. Postoperative antibiotic treatment was started for 1 week. Post operative instructions as soft diet, avoidance of physical activities, and antibacterial mouth rinse were prescribed. Postoperative monitoring was performed on a weekly basis and was favourable in both healing

and function. No signs of complications were observed during healing period. the interdental wiring and acrylic splint were removed after 3 weeks.

Discussion:

Both the paediatric and adult populations experience different rates of different types of fractures. Mandible fractures are the most prevalent of the skeletal injuries in children, but nasal bone fractures are the most common facial fractures in the adult population. This is due to the distinct growth patterns of the cranium and face (8:1 at birth changes to 2.5:1 at growth completion), as well as the mandible and midface moving forward and downward with age [2]. According to research by Kale et al. in 2011 [2] and Shehzadi et al. in 2018 [9], the most prevalent age range for mandibular fracture in children was 1.5 to 11 years, with a mean of 6 years. The majority of these fractures occurred in the first ten years of life. Condyles, subcondylar, and angle regions of the paediatric mandible are the most commonly fractured locations (80%), whereas symphysis/parasymphyseal area fractures of the body of the mandible (15% to 20%) are uncommon in the paediatric population [8].

A variety of things need to be taken into account when treating paediatric patients. These factors include the patient's age, level of compliance, the location and stage of the fracture in the body (anatomical, physiologic, and psychological), the complexity of the injury, the presence of concurrent injuries, the amount of time since the injury, and the surgical approach being considered (closed vs open). [10]

The most common form of treatment for jaw fractures is surgery. Depending on how minimally or severely displaced the fractures are, a variety of techniques have been used to treat paediatric fractures, including tape muzzles, circumferential wiring, acrylic splints, percutaneous skeletal fixation, open reduction, resorbable plates, orthodontic resin, modified orthodontic brackets, rubber elastics combined with orthodontic brackets, and nickel titanium staples. [11] However, surgical intervention is not typically considered for the management of paediatric jaw fractures in children due to the insufficient ossification of the jaw bones and proximity to the underlying permanent tooth buds. When the fracture line is minimised utilising an open surgical technique, it has been shown that mandibular fractures that happen during deciduous or mixed dentition are connected with later failed eruption of permanent teeth. [12] Therefore, simple splinting techniques are crucial for treating childhood trauma. Children have a higher osteogenic potential and heal more quickly than adults. Therefore, it is necessary to complete anatomic reduction in children earlier and reduce the length of immobility. [13]

For the care of minimally to moderately displaced parasymphyseal fractures, circumferential wire with acrylic splints is the only effective therapeutic option. They receive support from the bone in addition to the nearby teeth. They are affordable and simple to make. They are frequently used to stabilise mandibular fractures since circum-mandibular wire can be used to do so. [14]

An efficient closed reduction technique for a minimally displaced parasymphysis fracture is an open cap splint. It has a number of benefits, including being easy to use and dependable, giving fragmented segments appropriate support, and avoiding intermaxillary fixation. An open cap splint's design minimises the requirement for occlusal coverage, eliminating the need for frequent radiographic evaluation because the occlusion is apparent. This improves masticatory efficiency, which in turn improves patient compliance. [5] An open cap splint is a conservative and effective therapeutic option for the therapy of children mandibular fractures due to its simplicity in administration and removal, reduced time commitment, cost effectiveness, good stability during the healing period, and minimum stress to surrounding tissues.

Conclusion:

The majority of juvenile mandibular fractures in the parasymphysis region are slightly displaced and treatable with conservative measures. When treating paediatric mandibular parasymphysis/symphysis fractures, open cap splints are more effective than open reduction or intermaxillary fixation methods in terms of occlusion guided fracture reduction, maximum

stability during the healing period, ease of application and removal, shorter operating times, minimal trauma to nearby anatomic structures, wide age range safety, simplicity of oral hygiene maintenance, and comfort for the patient.

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Fig-1(a)

Fig1(b)

Fig-1(c) **Fig-1(d)**

Figure-1 Extraoral and Intraoral photographs

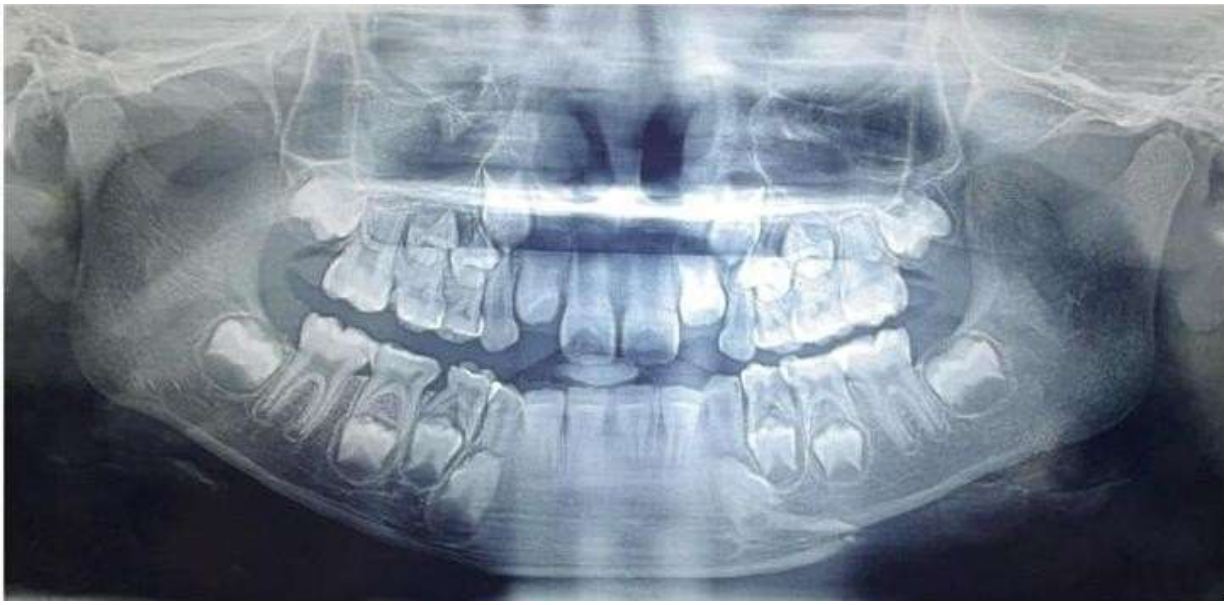

Figure-2 pre-Operative radiograph showing left mandibular bodyfracture with right condylar fracture.

Fig-3(a) Fig-3(b)

Fig-3(c) Fig-3(d)

Figure-3 Fabrication of open cap splint.

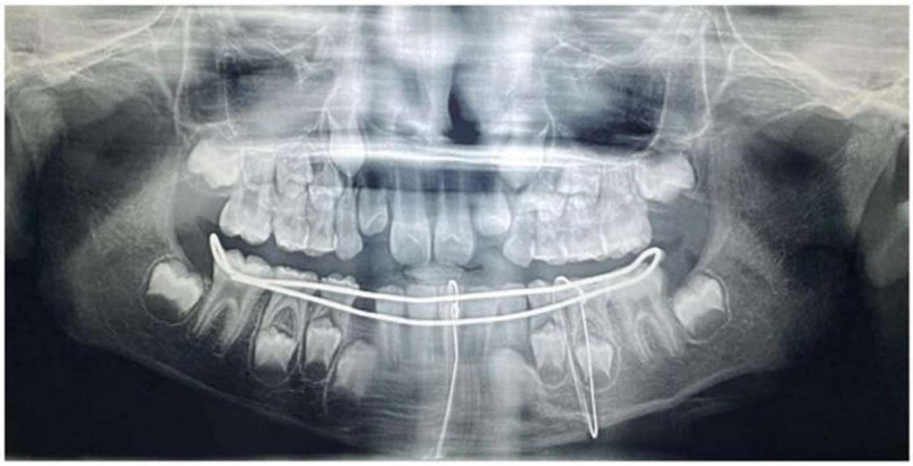

Figure-4 Post-operative radiograph.