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CASE REPORT

Management of malunited mandibular fracture in a pediatric patient by open reduction followed by compression splint

Kavita Wadde, Jayant Landge, Akhilesh Jakhete, Maroti Wadewale

Department of Oral and Maxillofacial Surgery, Government Dental College and Hospital, Mumbai, Maharashtra, India

Correspondence:
Dr. Kavita Wadde, Department of Oral and Maxillofacial Surgery, Government Dental College and Hospital, Mumbai.
Phone: +91-9004799405.
E-mail: dr.kavitawadde@gmail.com

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Abstract

Aim: The aim of this case report is to demonstrate the use of combination of open reduction followed by closed reduction in management of malunited fracture in pediatric patients. **Background**: The reported incidence of maxillofacial trauma is infrequent in children and adolescents. The gold standard in treating such injuries has been conservative management involving closed reduction of fractures. The line of treatment should aim at restoring the underlying skeletal tissue to their original position in a stable manner as non-invasively as possible. **Case Report**: The following report presents a case of 10 year old male patient who had reported with a 20 day old displaced parasymphysis fracture which had healed secondarily and was treated by open reduction followed by stabilization using an acrylic splint. **Conclusion:** After open reduction and mobilization of fractured segments, stable occlusion was achieved. Post-operatively, the healing was uneventful and no complications were reported. With this case, we can conclude that open reduction can be an alternative in pediatric patients when the traditional line of treatment has not delivered the desired results. **Clinical Significance**: With this case, we can conclude that open reduction can be an alternative line of treatment for fractures in pediatric patients when conservative management has not delivered the desired results.

Keywords: Fractures, mandible, open reduction, Pediatric trauma

Introduction

The incidence of pediatric injuries accounts for 4–6% of total injuries. This incidence goes further low as 0.6–1.2% in children below age of 5.[1] Various studies suggest that in pediatric injuries, mandible is fractured almost 50% of the time.[2,3] The most common site fractured in the mandible is the condyle.[4,5]

While in adults immobilization and fixation of the segments can be done with the greatest ease,[1] this situation is compromised in children and adolescents as a result of the growth that is occurring as well as the physiologic and psychologic differences as compared to adults.[2,6] The residual functional and esthetic impairment should be as minimum as possible.

In pediatric patients, closed reduction is favorable as open reduction may lead to disruption of periosteal envelope of the mandibular body which may lead to unpredicted growth.[1] Growth and development of maxillofacial structures should be considered to avoid malunion and subsequent deformities.[7]

Open reduction and osteosynthesis of the pediatric fractures with titanium plates and screws are reported to make a negative effect on skeletal growth and unerupted teeth.[8]

But in our case, since the patient reported after 20 days with old displaced right parasymphysis fracture which had healed secondarily. The only option left for us was to do an open reduction, stabilize the segment followed by compression splint without using titanium plates and screws.

Case Report

A 10-year-old male patient reported to the department of oral and maxillofacial surgery with a history of fall 20 days ago, while riding a bicycle in Bhivandi following which he was taken to a local hospital, where primary management was done. The patient had a history of bleeding from mouth. No loss of consciousness or vomiting was reported. There was no bleeding from nose or ear.

When the patient reported to the department, patient is conscious, cooperative, well oriented in time and place. His vitals were stable.

On extra oral examination, there was a hard swelling on right parasymphysis region. On palpation, there was a step deformity along inferior border at the right parasymphysis

region. The temporomandibular joint (TMJ) movements were normal.

There were no avulsion of teeth.

Examination revealed an open bite, deranged occlusion, and a mobile segment [Figure 1].

An orthopantamograph (OPG) was taken. The OPG revealed a radiolucent line beginning in between 42 and 43 extending up to the inferior border of mandible suggestive of displaced right parasymphysis fracture [Figure 2].

The diagnosis of displaced right parasymphysis fracture was made.

A treatment plan was formulated for closed reduction under general anesthesia using an acrylic splint, for which informed consent was obtained from his parents.

Alginate impressions were made and an acrylic splint was fabricated [Figure 3].

The patient was prepared for the surgery under general anesthesia, but the procedure was aborted as a result of arrhythmias.

Under all aseptic protocol, under local anesthesia closed reduction of the fractured segments was attempted. However, the occlusion achieved was not satisfactory, so the treatment plan was changed, and thus, open reduction was carried out.

A circumvestibular incision was taken in lower labial vestibule extending from 44 to 32. Dissection was carried out and fracture site was exposed. Following this debridement was done and the fractured segments were mobilized [Figure 4]. After guiding the segments into place, occlusion was checked intra orally. Once suitable occlusion was established that suturing was done in layers with 3–0 vicryl suture.

The acrylic splint was placed and braced with circum mandibular wiring [Figure 5]. Recovery was uneventful and the patient was discharged with a pressure dressing.

Follow-up was done on 7, 14, and 21 days postoperatively.

Figure 1: Pre-operative view

Figure 2: Pre-operative orthopantamograph

Figure 3: Fabrication of acrylic splint

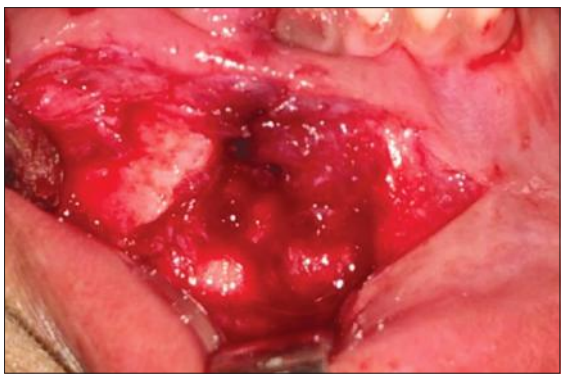

Figure 4: Intraoperative: Reduction of fracture segments

Figure 5: Post-splint operative: Stabilization with acrylic

On 14th day post-operation, another OPG was taken, which revealed normal healing taking place and formation of bone in the fracture site [Figure 6].

After 25 days, the acrylic splint was removed under local anesthesia.

Discussion

The most common fracture requiring hospitalization for children involves the mandible, particularly the condyle. The common etiologies are falls or sports injuries.[1] Majority investigations have shown that males are more prone for fractures or maxillofacial trauma as compared to females.[5]

According to a study done by Mukhopadhyay S., the incidence for condylar fractures amounted to 39%.[3] Similar studies done by Almahdi and Higzi (29.8%),[9] Joshi *et al.* (40.9%),[10] Namdev *et al.* (40.3%),[11] Owusu *et al.* (27.9),[12] and Shi *et al.* (55.7%),[13] Haug and Foss concluded that mandibular angle fractures are rare in children and adolescents.[14]

Pediatric fractures tend to be non-displaced or greenstick fractures and conservative management is adequate.[2]

Management of fractures in deciduous and mixed dentition has continued to be a topic of debate. Considerations should be made with regard to growth and development of child. Conservative approach (closed reduction and fixation) is considered to be the first line of treatment as the fracture heals rapidly and children grow normally.[2]

An acrylic splint maybe used in immobilizing a jaw. Ridson cables or mini arch bars may also be used. Mixed dentition stage should be evaluated for stability and strength. At the age of around 8 years, children can tolerate arch bar placement due to establishment of permanent dentition.[4]

Various authors have concluded that a long period of immobilization (more than 2 weeks) may lead to TMJ ankylosis and damage the developing teeth.[2]

Closed reduction using intermaxillary fixation was used as a principle line of treatment till the mid 70s.[1]

Today, open reduction and internal fixation is a standard protocol for fracture treatment. Induction of micro/mini/biodegradable plates has provided a stable 3D reconstruction and thereby promoting the primary bone healing leading to lesser time on the treatment table. In pediatrics, the effect of the implant on the periosteum and soft tissue as well as the potential damage they can cause to primary teeth or developing permanent teeth is hardly understood.[1]

Figure 6: Post-operative orthopantamograph

Posnick *et al.* claimed that a decreased dependence in intermaxillary fixation improved post-operative respiratory care, nutritional intake, and oral hygiene measures.[15]

Problems associated with open reduction and internal fixation in pediatric trauma include presence of developing tooth germ, growth interference due to miniplate placement, allergic reaction, leading to inflammation, stress shielding etc.[1]

Complications associated with fractures are post-operative infection, malunion of segments, nonunion, malocclusion, facial asymmetry, mandibular growth disturbance, disruption of permanent teeth, and TMJ dysfunction among others.[4]

This case report presents a case of a 20-days old displaced right parasymphysis fracture which was mobilized and reduced followed by stabilization using an acrylic splint. A splint is more reliable than other intermaxillary techniques with regard to cost effectiveness, ease of application and removal, reduced operating time, maximum stability during healing period, minimal trauma for adjacent anatomical structures, and comfort for young patients. Using this approach, we combine the positive attributes of open and closed reduction techniques which can be used to provide a quicker rehabilitation with a stable occlusion.

Conclusion

In our case report, we observed that there is no consensus in the manner of treating a mandibular fracture. Here, the patient had a 20-days old displaced right parasymphysis fracture which had healed secondarily through granulation tissue. To mobilize the fractured segments and to achieve a stable occlusion, open reduction was done followed by stabilization using an acrylic splint for a period of 25 days. No complications occurred postoperatively and healing was uneventful.

Clinical Significance

With this case, we can conclude that open reduction can be an alternative line of treatment for fractures in pediatric patients when conservative management has not delivered the desired results.

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