Conservative Approach of Condylar Fracture in a Child by the Use of Rubber Elastics: 7-year Follow-up

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ABSTRACT

Condylar fractures in pediatric patients occur frequently, often with minimal pain and discomfort. Thus, these fractures in children are overlooked during emergency care. Condylar fractures can be treated conservatively or by open reduction. As a rule, very good healing results are achieved by conservative treatment. In these cases, jaw function restoration using physiotherapy at an early stage can prevent complications such as asymmetry, interference in the facial growth, and ankylosis. The purpose of this case report was to discuss the peculiarities of treatment of mandibular condyle fractures in pediatric patients and report a case in which the condyles were successfully treated conservatively in a 10-year-old patient. The case was followed up for seven years.

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Epidemiological studies have shown that mandibular fractures in pediatric patients are not frequent, anccounting for only approximately 1% to 5% of all the traumas of the maxillofacial region, including adults and children.[1-5] This difference may be explained by the bone tissue of pediatric patients being more flexible and because of the retruded position of the lower face relative to the forehead.[6,7] With increasing age and facial growth in a downward and forward direction, the midface and mandible become more prominent, and the occurrence of facial fractures increases.[2,4,7] Condylar fractures are the most common of all facial fractures in children,[8,9] reaching more than 50% of pediatric facial trauma in some studies.[10] The main etiologic agents are bicycle falls, falls from a tall height, and sporting activities.[9-11]

The mandibular fractures in pediatric patients, especially those of the condyles, need special attention because the mandibular condyle is one of the mandibular growth centers.[12] The potential for remodeling and bone healing is greater when compared to adults, requiring a shorter maxillomandibular immobilization (MMI) time in cases treated conservatively. In these cases, jaw function restoration using physiotherapy at an early stage can prevent complications such as asymmetry, interference in facial growth, and ankylosis.[13]

The purpose of this case report was to discuss the peculiarities of treatment of mandibular condyle fracture in pediatric patients, and report a case which the condyles were successfully treated conservatively.

CASE REPORT

A 10-year-old female came to the Department of Oral and Maxillofacial Surgery at the Aristarcho Pessoa Central Hospital from Military Fire Corps, Rio de Janeiro, Brazil, complaining of pain in the mandible following a bicycle fall. An extraoral clinical examination showed

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a laceration in the chin. Intraoral clinical examination showed mandibular retrusion with anterior open bite, limitation of mouth opening, and a crown fracture of the permanent maxillary right central incisor also caused by the fall (Figures 1-2). The imaging exams showed comminuted fractures of the condylar heads and simple fracture of the right parasymphysis (Figures 3-4). The tooth fracture was treated with a light-cured resin composite (Spectrum TPH/Prime and Bond NR, Petrópolis, Brazil), and the chin wound was sutured with 3-0 mononylon suture material. The parasymphysis fracture was surgically treated with resorbable plates (2.0-mm resorbable plates and screws, L/DL-lactine, Syntheofacial, Paoli, PA, USA); (Figure 5).

The condylar fractures were treated using physiotherapy. The Erich bars employed during surgery were used for therapy with elastic. MMI with rubber orthodontic elastics (one eighth, medium strength) was applied after the surgery for 7 days to guide the occlusion, and a soft diet was recommended (Figure 6).

Initially, the patient did not accept the continued use of elastics, but after a conversation, she showed more cooperation. In the second week, physiotherapy and therapy with rubber orthodontic elastics was established. The patient was instructed to not wear elastics for 2 hours in the morning and 2 hours in the afternoon. During the rest of the day the elastics were used continuously. In the third week, the patient was instructed to wear rubber elastics for only 2 hours in the morning, 2 hours in the afternoon, and at night while sleeping. From the fourth week until the end of the second month, the rubber elastics were used only at night and the physiotherapy was continued to prevent complications such as ankylosis and/or disturbances in mandibular growth.

Physiotherapy was performed by active and passive movements of the mouth including opening, protrusion, and lateral movements to the right and left side twice a week, for two hours each session. The elastics were removed and placed by the patient's mother with the aid of a hemostat (Halsted hemostat type). The patient did not require orthodontic treatment. After 7 years of follow-up, clinical examination showed facial symmetry (Figure 7), recovery of the mouth opening (Figure 8), a stable and satisfactory occlusion (Figure 9), remodeling of the fractured condyles (Figure 10), and parasymphysis (Figure 11).

DISCUSSION

Boys are more prone than girls to mandibular condular fractures,[14-16] and accidents involving bicycles, falls, and sports activities[9,11] are the main etiological agents. The patient in our case report had an accident riding a bicycle, which is consistern with the literature[9,11].

The signs and symptoms related to condylar fractures are limitation of mouth opening, pain and edema in the condyle region, anterior open bite (bilateral fractures),

Figure 1. Full-face photograph showing a chin laceration as a result of a fall from a bicycle.

Figure 2. Intraoral photograph showing an anterior open bite secondary to bilateral condylar fractures. Note the loss of posterior vertical dimension with posterior premature contact bilaterally.

Figure 3. Computed tomography scan showing bilateral fractures of the condylar heads.

mandibular retrusion (bilateral fractures), deviation of the chin to the fractured side (unilateral fractures), and crossbite on the affected side (unilateral fractures).[10]

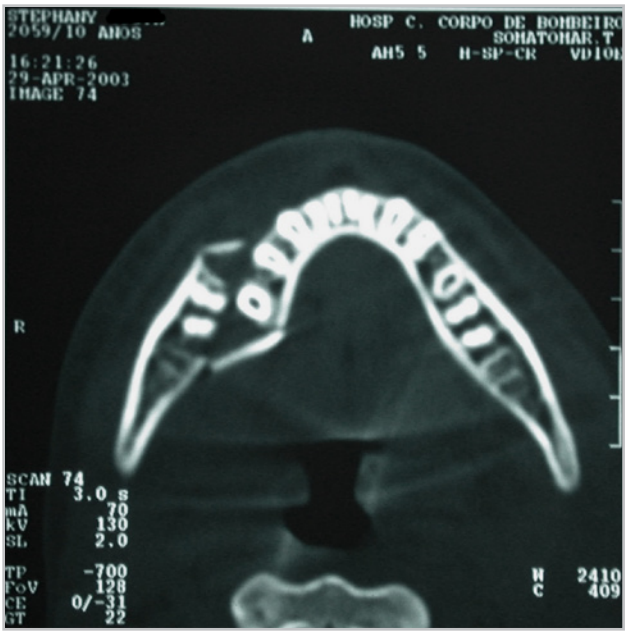

Figure 4. Computed tomography scan showing fracture of the right parasymphysis.

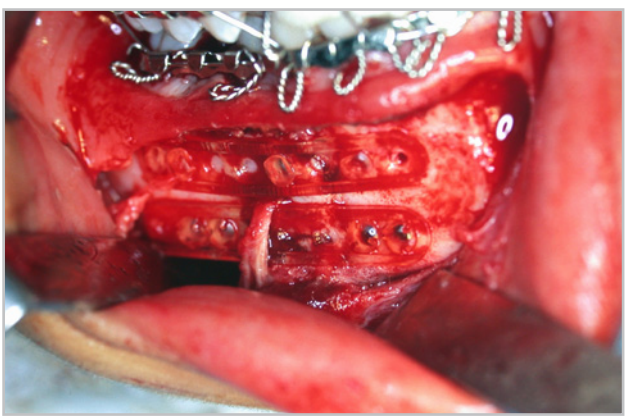

Figure 5. Intraoperative photograph showing the reduction of right parasymphyseal fracture with two 2.0 resorbable plates.

Figure 6. Intraoral photograph showing the use of rubber orthodontic elastics to guide the patient's occlusion.

A contusion or laceration on the chin, however, draws attention to possible indirect condylar fractures.[10,17] In our case, the patient had a mandibular retrusion with open bite and a laceration in the chin region that drew attention during the first visit.

Condylar fractures are divided into 2 groups: (1) intracapsular; and (2) extracapsular (subcondylar). The first are those that occur on the condyle head, which are always treated conservatively with MMI for 1 week, followed by guiding elastics to bring the mandible into normal occlusion and physiotherapy.[12,16,18-22] Haug and Assael[23] indicated that surgical treatment for this type of fracture is absolutely contraindicated. The subcondylar fractures, however, can be treated conservatively or by surgical reduction (open reduction). The dental literature indicates that surgical reduction is necessary under the following conditions: fractures with condyle displacement; apparent functional impairment; middle third fracture; contraindications for MMI; persistent malocclusion in spite of conservative treatment; and loss of posterior facial height.[24]

Sometimes the facial fractures in children are overlooked during emergency services. This fact is related to the difficulty in obtaining the history of trauma, even when the patient is accompanied by the parents. In these cases, the imaging exams become essential in aiding the diagnosis of fractures. Some investigations have shown that conventional radiographs are of little value in cases of condylar fractures due to the overlapping of images, especially in cases of intracapsular fractures and also in the sagittal fractures.[2] In these cases, a CT scan is mandatory for correct diagnosis and subsequent treatment.[12,25] Lee et al.[9] showed that a condylar fracture in a child may be masked for months until it causes an apparent deformity. In this reported case, the patient had a bilateral intracapsular fracture of the mandibular condyles, which could not be easily visualized on conventional radiographs. In this case, the CT scan was essential for the correct diagnosis.

Condyle fractures that occur in children before they're fully grown and that are untreated or are not properly managed can cause growth disturbances and asymmetry at multiple facial levels involving the orbits, zygomatic area, maxilla, and mandible.[24] Temporomandibular joint (TMJ) disorders, such as ankylosis, have a greater chance of development in children; this fact is credited to the speed of bone healing and the high condylar vascularization in the first years of life, thus allowing a high potential for remodeling in this type of patient.[10,26] Kaban[10] draws attention to the fact that a fracture in children may heal in 4 days. Ferreti et al.,[27] evaluated 26 patients with ankylosis after trauma,of which 27 were fractures with displacement (~73% of the TMJ). The same authors state that displaced condylar fractures are more likely to become ankylosed.[27]

The main goals of treatment of condylar fractures in children are: stability of TMJ; restoration of occlusion; symmetry; speech; swallowing; and recovery of mandibular movements.[13,28,29] In many cases, the earlier the treatment is instituted, the lower the impact on facial growth. According to the literature, the treatment of first choice for condylar fractures in pediatric patients is a conservative treatment associated with physiotherapy.[12,16,18,19,20,21] Thus, growth disorders are rare.[30] Regardless of the patient's age, the remodeling of the fractured condyle always occurs due to displacement of fragments associated with the fracture, which is greater in younger patients.[31] Hence, the stimulating function of the sto-matognathic system by means of physiotherapy is important for condyles to remodel during the healing process, thus preventing growth disturbances and asymmetries. It is also important that, during the remodeling process, there is no formation of an ankylosis.

In children and adolescents, a new TMJ is established by remodeling and by extrusion of the anterior teeth and/or intrusion of posterior teeth. The masticatory adaptations that occur after conservative treatment most often produce a uniquely favorable outcome.[32] Strobl et al.[19] point out that the regeneration and condylar remodeling, with subsequent functional adaptation of the TMJ, will occur even in cases where there is displacement of the condyle. In adult patients, the fractures have a lower potential for remodeling, and condylar fractures with dislocation have less predictability in relation to adaptation and bone remodeling. Thus, the need for surgical reduction of the fracture to replace the condyle within the articular fossa is greater after the end of the growth phase.[33]

The literature has emphasized over the years that the conservative treatment of such fractures in children, with or without displacement, is simple to implement, with little morbidity to the patient. Also, satisfactory results are observed in relation to function and in the remodeling of the TMJ in the long-term.[12,18-21,34] When the patient's occlusion is stable, it can be treated, even without MMI, using only physiotherapy and monitoring of occlusion. There are very few justifications for the surgical treatment when the occlusion and facial height are maintained.[23,35] The duration of the MMI should be approximately 1 week, and early functional rehabilitation is essential for proper treatment. Killey[36] indicated that an MMI for more than 10 days in children increases the risk of ankylosis. It is important to note that usually the surgical reduction of condylar fractures is a delicate procedure, because there are several anatomical structures in the region, and usually the manipulation of fractured segments is difficult, especially when the condyle is displaced medially.[38]

Complications such as impairment of the facial nerve, avascular necrosis of the proximal segment, bleeding, and the presence of a postoperative scar are described in the literature as disadvantages of surgical treatment.[39] Satisfactory results do not always require anatomical reduction of the fracture. Even when there is interference in the growth of the fractured side, esthetics and function are maintained satisfactorily in most cases.[40] According to Haug and Assael,[23] there are few differences in the outcomes of patients treated conservatively compared to those treated surgically. Iizuka et al.,[41] emphasize that, despite the success with conservative treatment, some cases may show an anatomy outside the normal range in imaging, but without functional impairment.

Figure 7. Full-face photograph 7 years after the trauma: There is no facial asymmetry.

Figure 8. Recovery and maintenance of the mouth opening 7 years after the trauma.

Figure 9. Intraoral photograph 7 years after the trauma: Improvement of the occlusal relationships is evident.

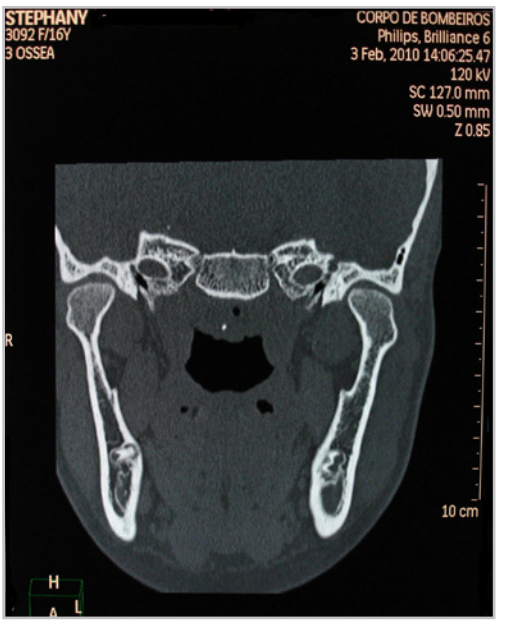

Figure 10. Computed tomography scan 7 years after the trauma showing the restoration of condylar shape bilaterally.

Figure 11. Computed tomography scan 7 years after the trauma showing bone healing of a right parasymphyseal fracture.

Takenoshita et al.,[33] also added that the return of jaw function after surgical treatment is faster, but does not seem to be better vs cases treated conservatively. Given the potential for bone remodeling of pediatric patients and the risks arising from surgery, the latter is only recommended before puberty in exceptional cases, such as with large displacement or loss of contact between the fragments or when associated with maxillary fractures, where the mandible will serve as a parameter for 3-dimensional reconstruction of the face.[30]

In our case report, the fracture of the parasymphysis was treated surgically with the goal of restoring the mandibular arch continuity so that physiotherapy could be instituted with the fractured condyles. We decided to use resorbable plates because the literature[22,42,43] recommends this type of material, which doesn't interfere with facial growth.

The excellent results demonstrated in the literature have encouraged us to recommend and carry out increasingly conservative treatment in condylar fractures, especially in children. In this case, conservative treatment proved to be an option that provided esthetic and functional satisfactory results.

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