



Conservative Treatment in Condylar Fracture in Pediatric Patients: Case Study

Leandro Augusto Vicente¹, Leonardo Augusto Vicente¹, Leandro Moreira Tempest^{1,2}, Idiberto José Zotarelli Filho^{2*} and Igor Mariotto Beneti^{1,2}

¹University Center North Paulista (Unorp), São José do Rio Preto SP, Brazil

²Post Graduate and Continuing Education (Unipos), São José do Rio Preto SP, Brazil

***Corresponding Author:** Idiberto José Zotarelli Filho, Professor, Unipos - Post graduate and Continuing Education, São José do Rio Preto SP, Brazil.

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Abstract

The literature presents a limited number of studies that describe the specific characteristics of facial traumas in children, especially those involving condyle fractures of the mandible. This is due to the fact of the difficult diagnosis, the low incidence that occur, besides the little experience of the Bucco-Maxillofacial Surgeon and Traumatologist in front of these cases. The risk of damaging the growth center of the mandibular condyle, still under development, is high, which would lead to a delay in growth and facial asymmetry. The objective of this study was to present a clinical case report of a pediatric patient, who suffered a trauma due to a bicycle fall fractured the condyle unilaterally. The proposed treatment was the conservative only with liquid diet and physiotherapy for the oral opening. The importance of following the guidelines established by the team for a favorable prognosis, with the absence of disorders, as occurred with the establishment of ankylosis due to the abandonment of the proposed physiotherapy exercises, was discussed. The resumption of treatment, following the guidelines provided a favorable evolution of the mandibular condyle fracture. The patient is undergoing an outpatient follow-up showing maintenance of dental occlusion, mandibular movements without alterations and with correct facial symmetry.

Keywords: Fracture; Conservative Treatment; Pediatric Patient; Ankylosis

Introduction

The occurrence of maxillofacial trauma in pediatrics is relatively low [1,13,22,23]. Mandibular fractures occur in a greater number of all facial traumas, due to their anterior projection, anatomically, in the lower third of the face, making it vulnerable. In turn, the condyle is the most affected region. Studies evidenced the fact attributed to the relative protected social environment of the child and the low resistance of the maxillofacial skeleton up to the age of five years [1,3,6,13,21-23]. After five years, the social environment of the child is altered with the beginning of school activities and the practice of sports, thus increasing the number of occurrence of condyle fractures [5,23].

The experience of the Bucco-Maxillofacial Surgeon and Traumatologist is often limited to a better treatment behavior due to the low incidence, difficulty, controversy between authors/professionals and the sequelae that may arise when poorly conducted, therefore, fractures of should receive special attention [1,22,27]. Regarding the age group, the group of children aged 8 to 10 years is the one with the highest incidence, followed by the group of 5 to 7 years [26]. Children younger than 4 years old have soft bone with thin cortical and thick medullary, in addition to thick layer of

soft tissue, which cushion the impact in a trauma, constituting a low index of fractures [3,23]. When the fracture is established in this age group, the majority of cases are of the "green branch" type, which is incomplete [1]. Therefore, the etiology is related to age group [3].

Another important factor is gender. The masculine predominates in relation to the female, in the average proportion of 2: 1 [8,23,26]. The approach of maxillofacial traumas in children has evolved. The treatment of trauma in adults was modified to attend the pediatric patient, considering the physiology and anatomy of the child [1].

According to the study of [1,7,8,12], mandibular fractures reach 55.0 % of all facial fractures. On the other hand, the condyle fractures collaborate with 16.1 % of the cases due to the neck that is the thinner part between the branch and the head of the mandible, making it more vulnerable [1]. The study of [3] shows that the index related to condyle fractures reaches 35.0% of total mandible fractures.

Traumas to the condylar growth center that occur before skeletal maturation can cause delayed ipsilateral growth, characterizing future dentofacial developmental disorders, malocclusions and fa-

cial asymmetry [1,7,12]. The fracture usually results from a trauma suffered in the region of symphysis or mandibular parasymphysis [3,20,26]. In children, fracture of the condyle can lead to complete separation from the center of bone growth, resulting in ankylosis that can occur within the first months up to two years, as well as deformities [23].

In traumas in the region of mentation, common in children, condylar fractures are no longer evident if CTBMF does not pay due attention to clinical examination (intra- and extra-oral) and to imaging (panoramic radiographs with Towne projection, of oblique lateral incidence of the mandible and computerized tomographies with reconstruction in 3D) [1,3,11,16].

Condylar lesions represent a large number of fractures, compressive lesions and displacements. They are divided anatomically into intracapsular (horizontal, vertical and compressive) or extracapsular, which may be simple or comminuted, without or with displacement (lateral, medial or external region of the glenoid cavity), open or closed, high (only the head of the condyle) or low (in relation to the neck/neck and subcondylar region), fractures isolated or associated with other facial fractures [1,3,7,11,12,20,27]. Because of the child's bone resilience, "green-branch" condylar fractures are commonly encountered [7,23].

The most frequent causes are falling of the own height, falling of bicycle, fall of elevated heights, practice of sports, trampling, violence. Some papers report condylar fractures even at delivery [3,7,8,15,20,23,24]. A good physical examination is essential, as well as to obtain the history of the patient, either through the same or the parents/witnesses, to verify the mechanism of action of the trauma, the direction that the same occurred and to measure the force that was applied [23]. The precise diagnosis shows that the limitation of the movements of the mandible that the patient presents is caused by mechanical interference or by the presence of edema and pain coming from the inflammatory process in the first hours after the fracture [3].

The signs and symptoms that characterize the condylar fracture are: pain, altered dental occlusion, premature contact of the teeth, shortening of the affected side branch, facial asymmetry (observed with the deviation of the chin towards the side of the fracture, at rest or during opening of the mouth), open bite with flattening of the body on the affected side, limitation of jaw movements and mandibular retrognathism (in the case of bilateral condylar fractures) [1,3,7,13,19,20,25]. Edema and bruising on the joint region, external auditory canal bleeding and tenderness on the preauricular region are common [11].

The choice of treatment for condylar fractures is controversial because of the uncertain prognosis [3,8]. Several factors influence the choice of treatment, conservative or surgical, ranging from the patient's age, the fracture region, the degree of displacement, if there are other associated fractures, the possibility of an occlusion when there is presence of teeth, stage of bone and dental development, muscle function [1,4,6,11,25,26].

The objective of this study was to present a case report of a pediatric patient, who received conservative treatment; she was the victim of a cycling accident, with a unilateral fracture of the mandibular condyle.

Case Report and Follow up

Patient of the female gender, leucoderma, 8 years old, admitted to the Emergency Service of the Hospital Santa Casa de Misericórdia of São José do Rio Preto - State of São Paulo, on October 27, 2016, victim of traumatism due to cycling accident, received emergency care by the on-call staff. A single point suture was performed, totaling 4 stitches, in the ment region. The initial diagnosis suggested a jaw fracture.

Imaging examinations such as x-rays and computed tomography with 3D face reconstruction were requested. The patient was shown to be oriented and cooperative, reporting how the fall of her bicycle occurred, which resulted in a short-blunt wound in the lower part of the chin.

The patient was referred to the Ambulatory Service of Buco-Maxillo-Facial Surgery and Traumatology, scheduled to be performed on October 31, 2016. Subsequently, an out-of-hospital physical examination was performed, where small excoriation was observed with edema and edema in the region of unilateral temporo-mandibular articulation of the right side and deviation of the chin (facial asymmetry) in the mandibular movements, as well as the short-blunt wound, palpation in the right pre-auricular region, limitation in the mandibular movements, the same side. No bone crepitation was found in the region. Intra-oral anterior open bite was observed due to the primary contact between the posterior elements and shortening of the mandibular branch on the right side. In view of the clinical picture, it was suggested a unilateral fracture of the mandibular condyle. New complementary imaging tests were requested, such as: right mandibular oblique lateral radiographs, Towne, and panoramic radiography. The evaluation allowed to suggest a high sub condylar fracture of the right side of the mandible.

Because the patient had mixed dentition, he limited the use of some maxillo-mandibular locking means. The treatment imposed for this case was the conservative only with liquid diet and physiotherapy with ice cream sticks that were made available to stimulate the initial buccal opening, which was 12 mm (about 7 toothpicks), followed by anti-inflammatory home prescription and analgesic.

She and the mother (companion) were instructed on the importance of the liquid diet, providing the nullification of the masticatory effort with the stop of the muscular movements and the lack of occlusion, for the bone consolidation. They were also advised on physiotherapy with ice cream sticks to stimulate the reduced mouth opening, which should be performed four times a day. It took ten stimuli at a time, lasting thirty seconds each, forcing the maximum opening of the mouth.

Weekly or biweekly returns were scheduled at the Ambulatory Service of Buco-Maxillo-Facial Surgery and Traumatology for follow-up of the patient. On the first return, the patient was well and without complaints. The short-blunt wound looked good. 9 ice cream sticks were placed, resulting in a 16 mm opening.

On the second return, points from the ment region were removed. Patient was always cooperative. In total, 10 ice cream sticks were placed resulting in 17 mm of mouth opening. He presented regression of the edema in the right pre-auricular region.

In the third and fourth return, the patient did not evolve her mouth opening, keeping 10 ice cream sticks (about 17 mm). The mother confessed that she was not following the guidelines for the practice of physical therapy with toothpicks. Its importance was again reinforced for the reestablishment of maximum oral opening. A new panoramic x-ray and computed tomography with 3D face reconstruction were ordered for control. The team suspected ankylosis in the right condylar region.

In the fifth return, already with the result of the imaging tests, traces of fibrous or bone consolidation were verified, concluding the suspicion of the previous week. Again, the importance of buccal opening physiotherapy with ice cream sticks was evidenced. It was decided to intensify the activity increasing to eight times a day, being 10 stimuli for each time. Subsequently, in the sixth return, three months after the trauma, the patient showed good and without complaints. It presented mouth opening of 26 mm, with fifteen sticks of ice cream. Pasty diet was released.

After fifteen days, in the seventh return, for outpatient control, a new computed tomography was requested. The patient had no complaints and had a 28 mm mouth opening, using 16 ice cream sticks.

In the eighth return, with good evolution, the patient followed without complaints or pain. No traces of ankylosis were found on computed tomography with 3D reconstruction. Performing physiotherapy correctly, with 20 toothpicks, his mouth opening was 35 mm. Solid diet was released

Six months after the trauma, on the ninth return, it appeared without complaints in the region of the temporo-mandibular joint on both sides, as well as correct dental occlusion. Its mouth opening was 38 mm, with a total of 22 ice cream sticks. The movements of protrusion, retrusion, laterality, as well as the opening and closing movements of the mandible, as well as facial symmetry, were evaluated.

The patient is followed up at the Ambulatory Service of Buco-Maxillo-Facial Surgery and Traumatology with satisfactory evolution, with preserved mandibular movements, without complaints

or pain, without dental malocclusion or facial asymmetry. The same must be discharged from the outpatient service after one year of the event.

The patient was advised of the importance of the intensification of physiotherapy for the improvement of the buccal opening and the non-consolidation of the condyle with the cavity. The mother, in turn, again undertook to stimulate her in the home environment, thus allowing the fracture not to be approached again, now in a surgical way.

Following the guidelines, the evolution of the patient has become favorable. It presents acceptable mouth opening and maintains the practice of physical therapy exercises. The patient received guidance for the onset of pasty food intake.

New imaging tests of control showed the absence of any type of consolidation in the region of the temporo-mandibular joint. With the solid diet released, it is followed up in an outpatient clinic at the Department of Oral and Maxillofacial Surgery and Traumatology of Santa Casa de Misericórdia, São José do Rio Preto - SP.

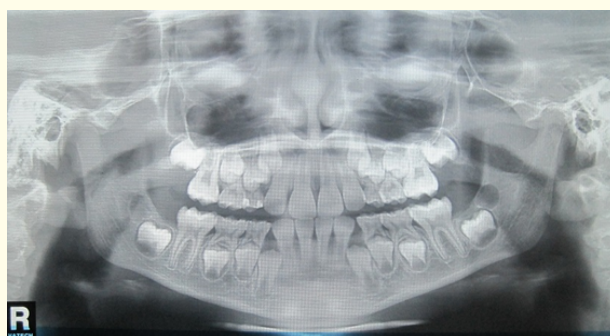


Figure 1: Panoramic radiograph showing displacement of the unilateral condyle fracture.



Figure 2: Computed tomography with 3D reconstruction showing the fracture of the right condyle.

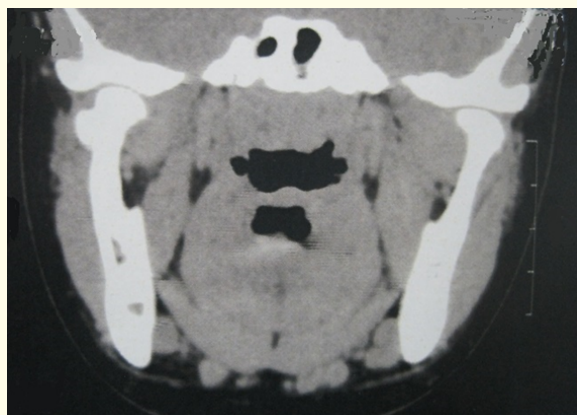


Figure 3: Computed tomography with 3D reconstruction showed no visible changes in relation to ankylosis.

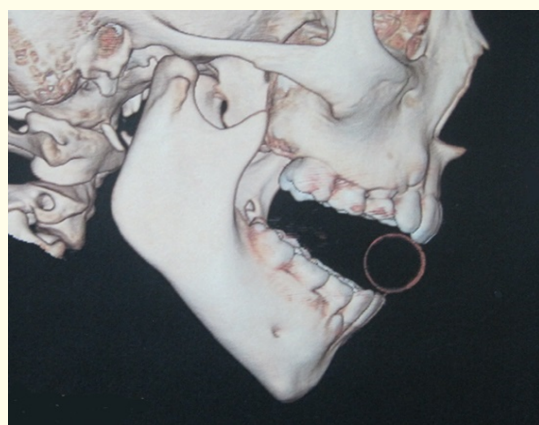


Figure 4: Computed tomography with 3D reconstruction showing the right condyle after the period of bone healing.

Discussion

The jaw is characterized by being the only movable bone of the face. Its main functions are chewing, swallowing, maintaining dental occlusion and phonation. Because of its location in the lower third of the face, its anatomical projection is vulnerable to fractures due to traumas of the most varied types [1-3]. These should be identified and receive appropriate treatment so that there are no changes related to facial function and aesthetics [4].

Facial trauma in children is somewhat uncommon to occur, since the child is in a protected social environment, usually up to five years of age, in addition to having a thinner bone, characterizing a certain flexibility when exposed to a pressure of a trauma.

After five years, the social environment of the child is altered, with its frequency in school activities and the beginning of sports practices, making it more apt to suffer facial traumas [5].

Among all the fractures that occur in the mandibular bone, those related to the condyle are the most common, especially in the region of the cervix, which is the most vulnerable, both in adults and children [6].

The impact on trauma is hardly affected by the pre-auricular region. The most common occurrence is the impact in the region of symphysis or parapophysis of the mandible, which diffuses to the mandibular neck and condyle region, resulting in injuries in the region of the temporo-mandibular joint. If the force is applied against the symphysis region, it propagates bilaterally, traversing the body, the angle and the branch until it reaches the condyles, and can injure them. When applied in the parasymphysis region, fracture cases are usually recorded only on the contralateral condyle [1].

Pre-auricular edema on the affected side, palpation pain, jaw deviation in the mouth opening, midline deviation, muscle spasms, movement restriction, external auditory canal bleeding, limitation of mouth opening, altered occlusion, masticatory difficulty, protrusion, compromised retrusion and laterality, short-blunt injury or hematoma and ecchymosis in the region of mentum are the most characteristic signs and symptoms of mandibular trauma with a condyle fracture [8].

The main causes of mandible fractures, found in the literature are falls from the height itself or falls from high places, falling from bicycles, automobile accidents. An interesting fact is that the driving of motor vehicles or motorcycles in Brazil is only allowed after the age of 18, limiting this population to suffer traumas only in the condition of passenger or run over. However, the use of the bicycle by this population is increased, which results in a greater number of accidents and, consequently, facial traumas [1]. In addition, the male gender predominates over the female, usually due to greater physical contact in sports or social activities, such as fights.

Regarding the treatment, in the literary findings, there is great controversy on the part of the authors in relation to the best and most efficient conduct in relation to condylar fractures [9]. The evolution of the patient is linked to facts that may interfere with the objective expected by the Buco-Maxillofacial Surgery and Traumatology team, such as: severity of the lesion, anatomical aspects found with fracture, functional aspects, patient's age, their cognitive ability, the patient's adherence to the exercises taught for physical therapy, disorders of the temporo-mandibular joint

and even their social condition. Therefore, the choice of treatment, whether bloody or bloodless, will depend on the factors mentioned above [10].

Because children have an increased osteogenic potential, i.e. osteosynthesis and bone remodeling are achieved within three weeks, and rarely, these fractures do not osteointegrate [10]. This characterizes a better acceptance of the non-surgical treatment for condylar fractures in pediatric patients. This type of treatment may be associated to the use of maxillo-mandibular blockade for two weeks, when allowed, associated with liquid diet, and later, mouth-opening physiotherapy with the use of ice-cream sticks. When it is impossible to receive the blockade, as in cases where the patient has mixed dentures, conservative treatment should be performed only with liquid diet and early physiotherapy, as well as outpatient follow-up. The results have shown to be satisfactory, according to the studies [11].

The patient had satisfactory factors regarding clinical and imaging exams for the application of conservative treatment, with general guidelines regarding liquid diet and physiotherapy with the use of ice cream sticks, because her mouth opening was reduced [12]. There was no need for a surgical approach with the use of rigid internal fixation with titanium plates and screws, since the patient had a good occlusion, no shortening of the ascending limb or considerable displacement of the condylar fragment [13].

Non-invasive treatments may evolve with some type of complication, such as pain, midline deviation in the buccal opening, posterior crossbite, anterior open bite, temporo-mandibular disorders, limited mouth opening, impaired jaw movements, ankylosis, and delayed bone growth, causing compromised facial growth [14]. As reported in the clinical case, after two weeks of treatment, the patient stopped performing the physiotherapy with ice cream sticks, to stimulate the mouth opening, which until now was compromised.

With new imaging, it was possible to observe the anatomical level, which presented ankylosis due to fibrosis or bone calcification between the condyle and the glenoid cavity. Ankylosis is a pathological condition that limits the temporo-mandibular joint, interfering with mastication, phonation, oral hygiene, resulting in a greater number of cavities, difficulty in diet intake, respiratory distress, impairment of muscle function and mandibular growth and facial [2,9,10,14,16,18,26]. It is divided into partial or total, uni or bilateral and fibrous or osseous. It restricts protrusion and laterality movements [14,16].

It is classified according to the place that occurs, being intra- or extra-capsular, according to the involved tissue (fibrous, bony or fibrous-bony) and according to its extension that can be complete (with the joint fully fused with the glenoid cavity) and incomplete (when there is not a total merger). However, it may have involve-

ment only by the condyle, either by the coronoid process or by both [9,16].

It is also classified according to degrees of severity: type I (present but deformed condyle head), type II (bone fusion between the condyle head and the glenoid cavity), type III (bone formation between the branch of the mandible with zygomatic bone) and type IV (temporomandibular joint totally altered in its anatomy) [9,18]. Another classification refers to it as being true (when there is fibrous or bony adhesion to the joint cavity) or false (resulting from pathological conditions that are not associated with the temporomandibular joint) [9,16].

The experience of the Bucco-Maxillo-Facial Surgeon and Traumatologist is limited due to the low incidence of cases, the difficulty, the controversy between authors/professionals and the sequelae that may arise when poorly conducted, therefore, condyle fractures should receive special attention [1,22,27].

The professional's knowledge about a complication, such as ankylosis, makes him apt to conduct the treatment, seeking its intensification and/or alternatives to obtain a favorable prognosis. Outpatient follow-up to check the progress of the case reduces complications. The favorable prognosis is when the treatment allows a recovery of the morphological structure of the condyle, without growth disturbances [1].

The main objectives are restoration of mouth opening and masticatory function, followed by good occlusion, facial symmetry and phonation [3]. The anatomical complexity of the region and complications peculiar to the types of treatment also characterize it as questionable. Conservative treatment can lead to negative results, such as malocclusion, pain and temporo-mandibular dysfunction (TMD). On the other hand, the surgical treatment presents technical difficulties, such as the difficult repositioning of the condyle in the glenoid cavity, the installation of the fixation material (plates and screws) and the potential risk of facial nerve or maxillary artery injury due to the pre-headset [20].

If there is no impairment of dental occlusion, the treatment chosen is the conservative treatment, which is done through a liquid diet in the first month after trauma, followed by a pasty diet in the second and third months, and ambulatory follow-up to verify facial growth, occlusion and mandibular movements [11,12]. In literary findings, it is the most indicated for pediatric patients, possibly associated or not with the use of maxillo-mandibular block [13].

You should opt for the simpler treatment that results in an appropriate reduction [23]. Some cases are treated surgically to correct sequelae resulting from poor clinical evolution of conservative treatment and to restore vertical dimension [12].

The majority of mandibular fractures are treated with bloodless treatment, ranging from simple functional physiotherapy with the use of ice cream sticks (wooden spatula) or with elastics until the use of maxillo-mandibular block, associated to a liquid diet [12,19,20,25]. Fractures with displacement or luxation of the glenoid cavity should preferably be treated by surgical reduction by rigid internal fixation with miniplates and resorbable screws, which do not interfere with the growth and development of facial bones, avoiding malformation, as well as do not interfere in the morphology of the dental eruption [23]. Titanium miniplates and screws may be used, but these should be avoided [27].

Maxillo-mandibular blockade and internal fixation with steel wire should be avoided, as they may result in iatrogenic dental avulsion in a deciduous or mixed dentition [23].

Sequelae such as temporomandibular joint ankylosis (hypomobility or total immobility of the mandible), persistent pain, deformities, malocclusion, facial asymmetry and infections may occur [8,9,23]. Patients younger than 10 years of age have a greater predisposition to the development of ankylosis after trauma [9,10].

Ankylosis is a pathological condition that limits the temporomandibular joint, interfering with mastication, phonation, oral hygiene, resulting in a greater number of cavities, difficulty in diet intake, respiratory distress, impairment of muscle function and mandibular growth and facial [2,9,10,14,16,18,26]. It is divided into partial or total, unilateral or bilateral and fibrous or osseous. Restricts the protrusion and laterality movements [14,16].

It is classified according to the place that occurs, being intra- or extra-capsular, according to the involved tissue (fibrous, bony or fibrous-bony) and according to its extension that can be complete (with the joint fully fused with the glenoid cavity) and incomplete (when there is not a total merger). Still, it may have involvement only by the condyle, only by the coronoid process or by both [9,16].

It is also classified according to degrees of severity: type I (present but deformed condyle head), type II (bone fusion between the condyle head and the glenoid cavity), type III (bone formation between the branch of the mandible with zygomatic bone) and type IV (temporomandibular joint totally altered in its anatomy) [9,18]. Another classification refers to it as being true (when there is fibrous or bony adhesion to the joint cavity) or false (resulting from pathological conditions that are not associated with the temporomandibular joint) [9,16].

Its ossification occurs through an intra-articular hemorrhage, due to the fragile vascular plexus damaged by the trauma [9]. Indicates in his work that simple and less severe fractures should receive functional treatment due to the possibility of ankylosis and growth disorders. This treatment can be applied with or without maxillo-mandibular block, in the latter case with only physiotherapy and/or functional orthopedics [27].

The most frequent cause for ankylosis is trauma, followed by local or systemic intra-articular infection. We can still list inflammatory diseases, previous surgeries, congenital ankylosis, Paget's disease, infantile/juvenile rheumatoid arthritis, ossifying myositis and neoplasms (rare in children) [10,14,16-18,26]. Complications following ankylosis may occur, such as limited mouth opening, re-ankylosis, and occlusal disorders [18].

Conclusions

Conservative treatment is a viable option, with a low failure rate. We can conclude from this study that in cases in which the pediatric patient presents mixed dentition, which imposes limits on the treatment methods, the use of ice cream sticks for physiotherapy to improve the mouth opening associated with liquid diet in the first month, showed to be an efficient alternative with satisfactory results observing the outpatient follow-up aiming at identifying and treating as soon as possible changes in the child's development.

Conflict of Interests

There is no conflict of interest between authors.

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