Fractures of the mandibular condylar processes – literature review

Case report

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Abstract: Fractures of the mandibular condylar processes are often-met injuries of lower region of face. The cause of that state is dynamic development of municipal transport and the increase of aggression in human relations. Many classifications of fractures of mandibular condylar processes are in literature. The choice of therapy is a subject for debate among doctors. Contemporary literature does not give an unequivocal answer to the question whether in the case of fractures of mandibular condylar processes non-invasive treatment should be applied or whether the method of surgical supply of fractures is better.

Keywords: Mandibular condylar processes • Fracture of the mandible • Treatment of the mandibular fractures

Fractures of the mandibular condylar processes are often-met injuries of lower region of face. According to different authors they constitute 15–52% of mandibular fractures [1-3]. In patients at developmental age, this number is from 28% to 60% of all fractures of the bone [4,5]. Mandible, due to its frontal location to head skeleton, is largely exposed to injuries, the number of which has significantly increased in recent years [6]. The authors see the cause of that state in dynamic development of municipal transport, and also in the increase of aggression in human relations [2,6,7]. Goldman reports that there are geographical differences regarding the causes of fractures of joint processes. In the Netherlands the leading cause is bicycle accidents, in large US cities it is beatings, whereas in the middle east of the USA it is motor vehicle collisions [7]. Zix writes that the most common cause of mandibular fractures in North America, Northern Europe, Australia and New Zealand is violence. In his study on Switzerland we read that of all the mandible fractures caused by traffic accidents, 99% are damages of the condylar processes, whereas sports related injuries concerned 3,5% [2]. Among the people who suffered an injury as a result of practicing sport Lee mentions mainly children who fell from the bike [2]. Jurkiewicz-Ciurlej also states that most often fractures of the condylar processes in children are the result of a fall from a bicycle, which represents 48% of cases [4,5]. According to Wanyura traffic accidents accounted for only 20% of the causes of the injuries of condylar processes, beating 64%, sports injuries 3% [8]. Fractures of this region much more often relate to men than women. Zachariades provides that the ratio comes to 3,5 : 1, whereas Wanyura in his research claims that the ratio amounts to 5,1 : 1 [2,8].

Fractures of mandibular joint processes according to majority of authors most often appear in patients in their third decade of life [2,7,8]. They are least often found in the first decade of life, which according to Zachariades may result from omission [2].

The kind of fracture depends on the direction, size and place of operation of the force, the age of the patient, the state of bone tissue, the state of dentition. Most of the injuries are unilateral, with a marked tendency to appear on the left side [2,8]. Most often found fractures are unilateral fractures of condylar processes, which
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relate to 60 % to even 91 % of cases [2,3,8]. Kukula provides that even 70% of the cases are indirect fractures with concomitant fractures of body of the mandible [3]. This is confirmed by Wanyura’s study, where among the 100 treated persons in 63 cases the fracture of condylar process was accompanied by mandibular body or angle fracture [8]. Diagnosis of fracture of mandibular condylar process is made based on clinical and radiological examination.

In radiological diagnostic of this type of injuries the most commonly used projections are:
- P-A skull projection [4,8,9]
- oblique-lateral X-ray [4,9]
- routinely a pantomographic radiograph is done [4,8,9]
- additional information can be provided by layered images of joints in clenching and opening [8,9]
- X-ray in the projection of Waters [8]
- X-ray in the occipital-nasal projection according to Clementschitsch [9].

Authors more and more often indicate the need to supplement diagnostics with the performance of CT in frontal slice, as well as 3D CT which allows for the better visualization of the fracture line and their spatial reconstruction [4,8,9]. It plays a significant role for the choice of the method of treatment, because authors emphasize the diagnostic problems associated with the due evaluation of the degree of the dislocation, direction, as well as the mutual relation of overlapping fragments. Determining the position of articular heads and their rotation with regard to the articular also constitute the problem, thus enriching diagnostics with performing the MRI for thorough depicting of articular structures is being considered [9].

In the clinical examination authors of the literature most often observed:
- pain and swelling in the region of the temporomandibular joint on the side of the fracture
- limited mobility of the mandible
- problems in abduction and adduction of the mandible [2,4,9].
- In the case of unilateral fractures:
  - at abduction deviation of the mandible into the ill side,
  - features of the crossbite,
  - dislocation of maxillary midline diastema [2,4,9].
- In bilateral fractures the following were stated:
  - restricted forward movement of the mandible,
  - restricted or infeasible lateral movements of the mandible,
  - features of the open bite,
  - maxillary midline diastema in accordance with the midline of the body [2,4,9].

- Many classifications of fractures of mandibular condylar processes are in literature [3,4,10,11]. In Anglo-Saxon literature authors quite often refer to the classification according to Spiessl and Schroll which distinguish 6 types of fractures [4]:
  1. closed fracture of the neck
  2. high fracture of the neck, when the condyle stays in the articular fossa
  3. low fracture of the neck with a dislocation
  4. high fracture of the neck with a dislocation
  5. fracture of the head of the mandible (endocavitary).
  6. Kukula mentions the Yamaoki classification, as often quoted [3]. It presents itself as follows:
    - breaking off the head of the condyle process (above the attachment of the lateral pterygoid muscle)
    - breaking the neck of the condyle process
    - breaking at the base of the condylar process, running obliquely backwards and downwards
    - sagittal split of the condyle process distinguished by Yamaoka on the basis of the CT test (described in 9,8% of the cases) [3].

4. According to Kukula every listed form of the fracture can be accompanied by [3]:
  - lack of displacement of the fragments,
  - drawing the stump of the condylar process aside at the kept contact of the articular head with the articular acetabulum
  - fracture-subluxation, when the head of the mandible is leaning out from the articular cavity at an angle of 40 degrees, and the surfaces of fragments touch one another,
  - fracture-dislocation—the head of the mandible is displaced beyond the articular cavity and tilted back from the long axis in original position at an angle not bigger than 40 degrees, the contact of the surface of the fracture can be kept,
  - total detachment of the process with displacement of the smaller fragment into nearby tissues.
  - Bartkowski, on the other hand, propagates the simple and practical classification according to Berch and Krywines [10]:

  * Condylar fracture—the fracture line runs within the head of the condyle and is a rare occurrence.
  1. High subcondylar fracture—the fracture line runs within the neck of the condyle.
  2. Low subcondylar fracture—the fracture line runs obliquely downwards from the semilunar indentation to the back edge of the ramus of the mandible. These can be complete, incomplete and greenstick fractures [10].
  3. Anatomical classification of fractures of mandibular condylar processes was described by Wanyura [11]:

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