

# Anterior dislocation of head of mandible: diagnosis and treatment\*

## *Deslocamento anterior da cabeça da mandíbula: diagnóstico e tratamento*

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### SUMMARY

**BACKGROUND AND OBJECTIVES:** To study the etiopathogeny and diagnosis of anterior dislocation of head of mandible (ADHM), as well as its therapeutic indications: conservative and surgical treatment.

**CONTENTS:** ADHM is characterized by its position anterior to the articular tubercle, configuring an anatomic and functional disharmony where the patient is unable to close the mouth. It may be related to abnormal activity of mastication muscles during mouth opening, to the act of yawning and even to the act of guffawing. Treatment modalities vary from conservative to surgical techniques, depending fundamentally on the complexity and periodicity of the problem. The first options are conservative techniques for immediate reduction, temporary relief or stabilization of the joint; when they fail or the treatment is impossible, surgical techniques may be used.

**CONCLUSION:** Although uncommon in epidemiological terms, ADHM is still a challenge for health professionals due to its complexity and, at the same time, because it is unforeseeable. The treatment of choice depends on professionals' experience and skills. To date, we lack longitudinal studies and ran-

domized clinical trials to compare the therapeutic efficacy of each modality.

**Keywords:** Clinical and surgical treatment, Dislocation of head of mandible, Temporomandibular joint.

### RESUMO

**JUSTIFICATIVA E OBJETIVOS:** Realizar um estudo a cerca da etiopatogenia e diagnóstico do deslocamento anterior da cabeça da mandíbula (DACM), bem como, de suas indicações terapêuticas: tratamento conservador e cirúrgico.

**CONTEÚDO:** O DACM caracteriza-se pelo seu posicionamento anterior ao tubérculo articular, configurando uma desarmonia anatômica e funcional, em que o paciente não consegue fechar a boca. Pode estar relacionada à atividade anormal dos músculos da mastigação durante a abertura bucal, no ato de bocejar e até mesmo no ato de gargalhar. As modalidades de tratamento variam de técnicas conservadoras a técnicas cirúrgicas, dependendo fundamentalmente da complexidade e da sua periodicidade. Optam-se, primeiramente, por técnicas conservadoras para redução imediata, alívio temporário ou estabilização da articulação; frente à falha da(s) mesma(s) ou à impossibilidade de tratamento, pode lançar-se mão de técnicas cirúrgicas.

**CONCLUSÃO:** Apesar de infrequente, em termos epidemiológicos, o DACM continua a desafiar o profissional da saúde, em função de sua complexidade e, ao mesmo tempo, imprevisibilidade. A escolha quanto ao tratamento recai sobre a experiência e manuseio do profissional. Faltam, até o presente momento, estudos longitudinais e ensaios clínicos aleatórios que possam comparar a efetividade terapêutica de cada modalidade.

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**Descritores:** Articulação temporomandibular, Deslocamento da cabeça da mandíbula, Tratamento clínico e cirúrgico

## INTRODUCTION

Temporomandibular joint (TMJ) is a synovial and bilateral joint. It has independent, however simultaneous, movements for each side, thus being considered a single joint<sup>1</sup>. It connects the mandible, represented by its head, to the temporal bone, represented by the articular tubercle and the mandibular fossa. Interposed to these bone structures is the articular disc with the function of regulating anatomic discrepancies existing between their surfaces, of absorbing shocks and of promoting adequate joint movement<sup>1,2</sup>. TMJ in physiological situation, makes rotation movements between the head of mandible and the lower disc surface during the beginning of mouth opening and after the translation movement between upper disc surface and mandibular fossa until complete mouth opening<sup>1-4</sup>.

This final pathway is limited anteriorly by the articular tubercle, which works as a real biomechanical barrier preventing head of mandible of surpassing it. In addition, muscle bundles and medial, lateral, anterior and posterior ligaments are bilaterally inserted and responsible to allow, and at the same time, limit eccentric mandibular movements<sup>1-3</sup>. Thus, TMJ may be considered a ginglymoartroidal joint<sup>2,5</sup>.

Differently from most synovial joints, TMJ surface is coated with a thick fibrocartilage instead of a hyaline cartilage<sup>2,5</sup>. This gives it a higher regenerative capacity faced to a high functional overload.

TMJ may be the primary source of several changes and diseases: infectious and traumatic arthritis, neoplasias, fractures, mandibular dislocation and ankyloses<sup>3</sup>.

It may also be secondary to degenerative, endocrine, rheumatological and vascular changes<sup>2</sup>. In this context, head of mandible dislocation represents a challenge to health professionals, as well as to patients, due to its unforeseeable occurrence in daily situations (yawning, singing) and to its associated functional repercussions: dysphagia, dysphonia<sup>3</sup>. For such, aiming at finding adequate and relevant articles for this review, the following keywords were combined: luxa-

tion, dislocation of the TMJ, prolonged TMJ dislocation, habitual dislocation, treatment of chronic subluxation, recurrent dislocation of TMJ and treatment of dislocation.

For this search strategy, the following databases were used: LILACS, MedLine, Pubmed and BBO, from 1970 to 2010, supplemented by manual search in journals and book chapters. This research was limited to studies in humans written in the following languages: Portuguese, Spanish and English.

## DISLOCATION OF HEAD OF MANDIBLE

The head of mandible may be limited to the TMJ complex, or surpass its anatomical limits. In this sense, one may find it displaced to the front (anterior) of the articular tubercle, to the back (posterior) of the retroarticular process, medially or laterally to the mandibular fossa, as well as anterior and superior to it, being located in the infratemporal fossa<sup>3,5,6-8</sup>. The first dislocation form, that is, anterior (ADHM) is particularly more frequent than the others, and may be related to abnormal activity of muscles of mastication during mouth opening, yawning and even guffawing<sup>3,9</sup>. The other less frequent directions are in general associated to traumas to the craniofacial complex<sup>5,6,10,11</sup>. Regardless of the orientation, all these situations are characterized by total or partial loss of contact between joint surfaces, as well as by the incapacity of returning to the original position without intervention and repositioning of displaced head of mandible<sup>3,5,12-14</sup>.

Self-reducible ADHM, on the other hand, is conceptually defined as subluxation due to the spontaneous reduction by patients' themselves<sup>5,9</sup>.

In ADHM, also called open lock, there is the impossibility of closing the mouth, since the head of mandible surpasses articular tubercle. This situation may be associated to joint hypermotility, as well as to the mild inclination and height of the tubercle, resulting in anterior lock maintained by mandible levator and protruding muscles<sup>5,15</sup>. Such condition may be incidental, habitual or recurrent, depending on the episode frequency<sup>3</sup>. A precise diagnosis is fundamental to establish adequate treatment, considering the dynamics performed by TMJ, influenced not only by the muscular function but also by dental occlusion<sup>3</sup>.

ADHM treatment modalities vary from conserva-

tive to surgical techniques, fundamentally depending on its complexity and periodicity. One should first choose conservative techniques for immediate reduction, temporary relief or joint stabilization; if they fail or treatment is impossible, surgical techniques may be used.

## ETIOLOGY OF ANTERIOR DISLOCATION OF HEAD OF MANDIBLE

ADHM triggering factors are mainly related to maximum mouth opening, such as in the case of long dentistry procedures or tracheal intubation for general anesthesia, for example. The act of mouth opening and closing during meals; yawning and guffawing may also precipitate dislocation<sup>3,5</sup>.

Causal ADHM factors are based on anatomic and morphofunctional criteria<sup>5</sup>. To understand this, one should understand predisposing factors, fundamentally related to joint surface bone architecture, to muscle activity, as well as to the integrity of ligaments which constitute the temporomandibular joint<sup>3,5</sup>.

Congenital or acquired malformations may lead to anatomic incongruence of such structures: low and inclined articular tubercle and / or shallow fossa may allow the head of mandible to move anteriorly beyond normal, predisposing to ADHM<sup>5</sup>.

Once displaced, what keeps it anteriorly to the articular tubercle is possibly a decomposition of forces on the one side, pulling the head of mandible to the front (protruding muscles), antagonized by ligaments action<sup>3,9,14</sup>. Ligaments fatigue and changed activity of muscles of mastication may be associated to mandibular instability, which may, as a consequence, increase the chances of dislocation, considering the presence of muscle fibers of the lateral pterygoid muscle and temporomandibular ligament fibers inserted both in the head of mandible and in the articular disc.

Capsular ligament fibers, once broken, remain stretched, not returning to their original size<sup>5,12,14-16</sup>. This may generate a vicious cycle with increased recurrence of the number of dislocations, in addition to worsening the situation<sup>3,17</sup>. Secondary predisposing factors, such as internal TMJ disarrangements, occlusal disorders (decreased vertical dimension), trauma and changes caused by systemic modifications

(rheumatoid arthritis, epilepsy, Parkinson's disease or extrapyramidal reactions faced to neuromodulators) may also be present<sup>3,14</sup>.

## CLINICAL CHARACTERISTICS

Anterior dislocation of head of mandible affects 3% to 7% of general population, especially female patients<sup>3,5</sup>, who are unable to close their mouths. Face deformities (elongation of lower third of face), preauricular depression, false prognathism and functional injuries (difficult swallowing, speaking and mouth opening and closing) may be found<sup>3,5</sup>. If such condition is established, there may be pain related to the dislocation itself, as well as related to severe contraction of muscles of mastication, especially the lateral pterygoid muscle<sup>9,12,15</sup>. There is also reflex pain triggered by muscle spasms, which will amplify pain – positive biofeedback. At palpation, the head of mandible is out of the mandibular fossa, which may be confirmed by image exams (conventional X-Rays and CT), where we can see the “empty fossa” being the head of mandible in front of the articular tubercle<sup>3,5,18,19</sup>. ADHM may be unilateral or bilateral. In the former, the chin is anterior in protrusion to the same side. In the latter, there is anterior bilateral open bite, being the mandible displaced anteriorly, and the mid line may present without deviation. ADHM may be incidental as well as become recurrent, when there are more than two episodes in a period of six months<sup>3</sup>.

The inability to close the mouth may be even associated to a different phenomenon: anterior head of mandible lock in front of the anterior articular disc band<sup>3,20,21</sup>. Differently from ADHM, in this form of dislocation the head of mandible may be below or inferior to the articular tubercle, not surpassing it. This dislocation is in general related to an increase in the friction area between the upper articular disc portion and the mandibular fossa. In general, it affects young people without previous history of dislocations and is in general spontaneous, with no need for maximum mouth opening to trigger it.

Spontaneous reduction, without professional handling, is common<sup>21</sup>. Clinical characteristics and image exams provide the differential diagnosis between this type of displacement and ADHM. Treatment aims at decreas-

ing attrition between involved surfaces by washing the upper disc compartment with arthrocentesis<sup>21</sup>.

## TREATMENT

ADHM treatment should be fundamentally based on the attempt to replace the mandible in its fossa to stabilize it<sup>5</sup>. Conservative therapy is indicated for acute cases and for patients unable to perform a procedure due to their general status or due to financial conditions (Chart 1). This way, we are looking for an immediate head of mandible reduction without interfering with its etiology. It may also be palliative.

Manual reduction or mandibular handling consists in repositioning the head of mandible in its fossa through intraoral approach<sup>5,22</sup>. This is done with patients sat down with their head supported. In unilateral and bilateral ADHM, the professional in front of the patient positions the thumb protected with gauze on the occlusal face of molars or on the alveolar rim, corresponding to the dislocation site (left and / or right). A firm pressure is applied downwards and backwards, aiming at unlocking the mandible<sup>5</sup>. There are variants of this technique, such as the use of both thumbs ipsilaterally, reducing just the affected side or reducing one side and then reducing the other (bilateral dislocation)<sup>22</sup>. Extraoral approach is less common, but feasible.

Displaced head of mandible is pressed to below the

Chart 1 – Modalities of conservative treatment

Non Invasive	Mildly Invasive
Manual Reduction <sup>5,22</sup>	Sedation <sup>23</sup>
Muscle Relaxants <sup>23</sup>	Infiltrative Anesthesia <sup>19,24</sup>
	Botulinum Toxin <sup>24-26</sup>
	Sclerosant Agents <sup>19,27</sup>

Chart 2 – Invasive surgical procedures

Restriction of Mandibular Movements	Free Mandibular Movements	Others
Steel wire technique <sup>17</sup>	Eminectomy <sup>12,32-35</sup>	Median Mandibulotomy <sup>29</sup>
Miniplates <sup>12,15,30</sup>	Arthroscopic Eminoplasty <sup>36,37,39</sup>	
Lateral pterygoid muscle miotomy <sup>3</sup>		
Temporal tendon scaring <sup>3</sup>		
Articular capsule plication <sup>3</sup>		
Oblique osteotomy of zygomatic bone root <sup>16,38</sup>		
Cortico-medullary graft <sup>30</sup>		
Alloplastic graft <sup>31</sup>		

zygomatic arch with the thumb of the hand corresponding to the affected side; with the other hand, the operator tries to stabilize patient's head<sup>5</sup>. The combination and the attempt of intra and extraoral access are free, depending essentially on professional's ability and skills<sup>5</sup>.

The level of muscle contracture and the time elapsed between dislocation and treatment may however make difficult the manual reduction, being necessary the use of other measures<sup>3,5,7,23</sup>. One may use muscle relaxants and sedatives for severe muscle spasms, muscular infiltration of local anesthetics around the mandibular fossa and muscles of mastication to help reduction. In some cases it is spontaneous with no need for additional manual handling<sup>3,5,9,19,23</sup>. Case reports mention the use of botulinum toxin in the lateral pterygoid muscle as one more conservative alternative for ADHM, with satisfactory results<sup>12,24-26</sup>.

Sclerosant substances injection (alcohol, iodine, 3% sodium tetradesulfate, autologous blood) around pericapsular ligaments and inside the capsule to produce local inflammatory reaction and to stimulate tissue fibrosis may also be used when the goal is to limit head of mandible movements<sup>3,12,14-16,19,27</sup>.

Articular pain, face deformity, functional changes and dislocation periodicity may be indicators of surgical interventions. This treatment modality is indicated for cases where clinical handling does not give good results, in addition to situations where dislocation recurrence has become chronic<sup>6,12,15,28-31</sup>.

Priority is given to anatomic, muscular and ligament stability<sup>14,23</sup>. The goal is a curative and preventive therapy to prevent future dislocations.

For such, several techniques and approaches were developed and enhanced (Chart 2).

Surgical procedures involving the articular tubercle

aim at increasing its height through a support (grafts and metal devices), or totally or partially remove it (eminectomy and eminoplasty)<sup>3,12,14-16,30,32-37</sup>. The first approach aims at limiting mouth opening, while the other aims at promoting free mandibular movements, preventing anterior dislocation of head of mandible. As with the first approach, mandible movements may also be limited through the scaring of the temporal muscle tendon, miotomy of lateral pterygoid muscle, articular capsule plication, oblique osteotomy of zygomatic bone root, steel wire in the articular tubercle, miniplates, cortico-medullary and alloplastic graft<sup>3,12,14-17,30,31,38</sup>.

Arthroscopic eminoplasty has some advantages as compared to traditional eminectomy because similar results are obtained with less invasive procedure<sup>36,37,39</sup>. Physical therapy, occlusal adjustment and psychological evaluation should be considered when evaluating the patient, both for conservative and surgical treatment. In addition, it is important to limit wide mandible movements, especially mouth opening, by verbally orienting patients or using intra or extraoral devices (maxillomandibular block, prosthetic fixtures, skeletal anchorage, chin support, movement limiting devices)<sup>13,15</sup>. The aim is the healing of injured articular ligaments. Time for such will vary from three to six months, fundamentally depending on the extension of the injury<sup>3</sup>.

## CONCLUSION

Although infrequent in epidemiological terms, ADHM still challenges health professionals due to its complexity and, at the same time, its unforeseeable character. Each clinical situation requires an individual approach of predisposing and perpetuating factors. Choice of treatment will depend on the professional's experience and skills, and he is in charge of evaluating benefits and possible risks for each approach. To date, there are no prospective, randomized, double-blind clinical trials evaluating different treatments and their respective indications. Most of them are case reports or a series of retrospective cases with short follow-up, very often without previous and adequate imaging techniques for the procedure. All these factors end up making difficult the comparison of the effectiveness of each therapeutic modality, be it clinical, surgical or combined.

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Presented in November 08, 2010.

Accepted for publication in February 24, 2011.