

Mandibular condylar hyperplasia: diagnosis and management. Case report

Hiperplasia da cabeça mandibular: diagnóstico e tratamento. Relato de caso

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ABSTRACT

BACKGROUND AND OBJECTIVES: Mandibular condylar hyperplasia is a disease where excessive growth of mandibular condyle, ramus and body elicits facial asymmetry. Its therapeutic management is not a consensus and, due to its complexity, is a challenge for maxillofacial surgeons and orthodontists. This study aimed at discussing clinical, diagnostic and therapeutic aspects of the management of this disease, and at explaining the role of condylectomy.

CASE REPORT: Female patient, 19 years old, Caucasian, looked for maxillofacial surgeon assistance due to facial asymmetry and pain on right temporomandibular joint. Patient had no medical, gestational or family history of facial deformity, or history of previous joint trauma or infection. This was a case of hemimandibular elongation treated with condylectomy.

CONCLUSION: Condylectomy is a safe and effective procedure, without functional joint sequelae, which prevents dental-facial deformity progression, minimizing its psychosocial impact and helping future treatment.

Keywords: Facial asymmetry, Hyperplasia, Mandibular condyle, Temporomandibular joint disorders.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A hiperplasia da cabeça mandibular é uma doença na qual há um crescimento excessivo da cabeça, ramo e corpo mandibulares que causa assimetria facial. A sua abordagem terapêutica não apresenta um consenso e, dada a sua complexidade, constitui um desafio para o cirurgião maxilofacial e para o ortodontista. O objetivo deste estudo foi discutir os aspectos

clínicos, diagnósticos e terapêuticos envolvidos na abordagem dessa doença, clarificando o papel da condilectomia.

RELATO DO CASO: Paciente do gênero feminino, 19 anos, caucasiana, procurou atendimento de um Cirurgião Maxilofacial devido a assimetria facial e dor na articulação temporomandibular direita. Não possuía antecedentes médicos ou gestacionais ou familiares de deformidade facial, nem história de trauma ou infecção articular prévios. Apresenta-se um caso clínico de alongamento hemimandibular tratado com condilectomia.

CONCLUSÃO: A condilectomia é um procedimento seguro e eficaz, sem sequelas articulares funcionais, que evita a progressão da deformidade dentofacial, minimizando o seu impacto psicossocial e facilitando o tratamento posterior.

Descritores: Assimetria facial, Cabeça mandibular, Distúrbios da articulação temporomandibular, Hiperplasia.

INTRODUCTION

Mandibular condylar hyperplasia was first described by Robert Adams in 1836, while describing a case of rheumatoid arthritis¹. It is a temporomandibular joint (TMJ) pathology where there is excessive mandibular growth, in general unilaterally, which leads to esthetic and functional problems². It occurs preferably between 10 and 30 years of age, however there are reports of cases from 9 to 80 years of age, and this discrepancy might be explained by the time patients look for professional treatment^{3,4}. Its etiology is unknown, however several causal factors have been reported, such as post-trauma mandibular condyle hyper-remodeling, joint infection, hormonal disorders, mandibular condyle hypervascularization, intrauterine changes and genetic factors⁵.

In 1986, Obwegeser and Madek have classified mandibular condylar hyperplasia in two major types: hemimandibular elongation and hemimandibular hyperplasia. However, the disease may manifest as hybrid unilateral or combined bilateral⁶. In hemimandibular elongation, growth vector is horizontal with elongation of all components of the affected hemimandible. Major characteristics are contralateral deviation of the chin and of the lower dental midline, contralateral crossbite and ipsilateral molar relationship Class III. On the other hand, hemimandibular hyperplasia is characterized by a tridimensional growth of the affected side, with vertical increase of the lower hemi-third of the face and inferomedial projection of mandibular basilar edge.

In general, there is maxillary occlusal plane inclination and minimum deviation of the chin and of the lower dental midline in the contralateral sense, being even more frequent an

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ipsilateral deviation. In case of mandibular condylar hyperactivity in a post-puberty phase, there might be ipsilateral posterior open bite due to lack of maxillary compensation⁷. In functional terms, mandibular condylar hyperplasia may course with phonetic, chewing and swallowing difficulties due to occlusal disharmony, nasal obstruction by nasal septum deviation and turbinates hypertrophy, temporomandibular joint disorder and esthetic and self-esteem problems^{7,8}.

Diagnosis is clinical and by images². Approximately 98% of facial growth is complete at 15 years of age in females and between 17 and 18 years of age in males. During growth phase, mandible grows from Condylion (most postero-superior co-point of mandibular condyle) to Point B (point located in the largest concavity of the chin symphysis anterior face) at a speed of 1.6mm/year in females and 2.2mm/year in males. Accelerated growth may indicate active mandibular condyle hyperplasia⁸. Bone scintigraphy with single photons emission computerized tomography (SPECT) of the head is currently the most common method to detect mandibular condylar hyperplasia⁹⁻¹¹. However, it may be inconclusive in case of young patients and with slow-growth hyperplasia¹², or may supply false positive results in cases of inflammation, infection, post-trauma regeneration and malignant processes².

Face X-rays, such as panoramic and face frontal and profile teleradiography, are useful to evidence skeletal changes typical of mandibular condylar hyperplasia⁸. Positrons emission tomography (PET) is starting to be used to study such disease and may contribute in the future for better accuracy of its diagnosis¹³. Treatment depends on mandibular condyle activity (active versus non active hyperplasia), on the level of asymmetry, on malocclusion and age¹⁴. Different therapeutic possibilities have been described, from condylectomy to orthognathic surgery, with or without associated orthodontics². Since mandibular condylar hyperplasia therapeutic approach is not a consensus, and given its complexity, it is a challenge both for surgeons and orthodontists.

This study aimed at systematizing diagnostic process and treatment, clarifying the role of condylectomy, increasingly used technique, by presentation of a case report.

CASE REPORT

Female patient, 19 years old, Caucasian, looked for assistance of a Maxillofacial Surgeon due to facial asymmetry and pain in right temporomandibular joint. Patient had no medical, gestational or family history of facial deformity, or history of previous joint trauma or infection. Clinically, patient presented right laterognathy, top to top in the incisive region, with molar relationship Class III to the left, right posterior crossbite and inferior dental midline deviation less than 4mm to the right and minimal inclination of maxillary occlusal plane to the left (Figures 1a and b). Mouth opening was 40mm, with 8mm of lateral movement to the right, 8mm to the left and 5mm protrusion.

Joint and muscle physical evaluation has shown pain at palpation of right TMJ lateral pole of 3 according to the visual analog scale (VAS) worsened by chewing and lack of joint noises. Panoramic

X-rays have shown elongation of left hemimandible from condyle to chin symphysis, without mandibular canal deviation and morphology of similar mandibular condyles. SPECT has shown mandibular condyle increased uptake to the left with a value of 1.76 (maturity index calculated for a normal population aged above 17 years = 0.618-1.371). Diagnosis was active mandibular condylar hyperplasia of hemimandibular elongation type.

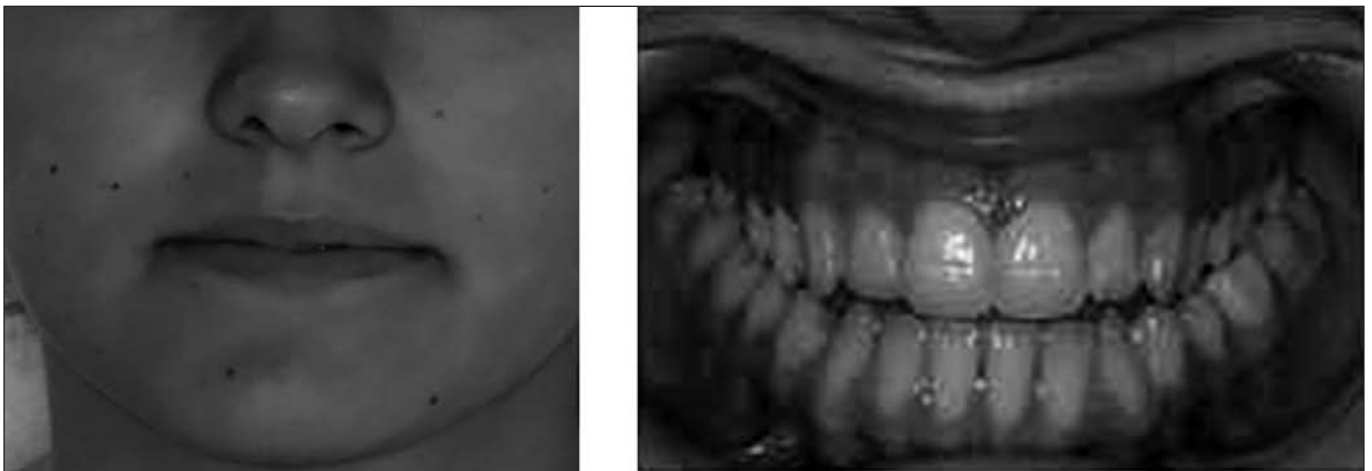
After discussing the case with the team, low condylectomy to the left with removal of 10mm of superior mandibular condyle was proposed to patient. Surgical technique consisted in pre-auricular incision, reaching superficial temporal fascia and dissection until exposure of the superficial portion of temporomandibular joint capsular ligament, followed by "T" incision of the capsule, exposing just inferior articular compartment and leaving intact superior articular compartment. Then, osteotomy was performed with removal of mandibular condyle superior fragment, washing of the cavity with saline and closing by planes from inside out with vicryl 4 zeros, ending with skin intradermal suture with mononylon 5 zeros. In the immediate postoperative period, liquid and doughy diet was instituted, progressing to normal food which has lasted for 5 weeks.

A protocol of joint functional exercises was instituted¹⁵ to recover mandible lateral and vertical movements, minimizing de occurrence of intra-articular adhesions and capsular retractions. Patient was submitted to 10 sessions of physiotherapy (twice a week in the first 14 days and then 1 weekly session) by a physiotherapist post-graduated in Craniomandibular Disorders.

The following techniques were sequentially and progressively carried out along these sessions: massage, masticatory and cervical muscles relaxation (and orientation for self-massage and relaxation); joint distraction (vertical movement downward and slightly forward and medial, to eliminate/fight capsular retractions – cycles of 6 repetitions); joint kinesiotherapy with autonomous and assisted exercises of joint opening as from rest position and maximum protrusion position (cycles of 6 repetitions); joint mobilization exercises with maximum protrusion, left and right laterality and returning to mandibular rest position (autonomous and assisted exercises, cycles of 6 repetitions); mandibular mobilization exercises (as already described) with hyperboloid; mandibular mobilization exercises (as already described) against resistance for muscular reinforcement. Patient was oriented to repeat some exercises in outpatient regimen between sessions and after their end. Pathological exam result has shown bone fragment compatible with hyperplasia type I according to Sloopweg and Muller scale¹⁶. Six month after surgery there has been decreased facial asymmetry and inferior dental midline deviation, with mild anterior open bite (Figures 2a and b). Control SPECT 180 days after surgery has shown left mandibular condyle uptake index within normal parameters, with value of 1.18. Control cone beam computed tomography (CBCT) has shown complete mandibular condyle remodeling, comparatively to the same contralateral structure (Figure 3). Currently patient has adequate mouth opening of 42mm without deviations or joint noises, with lateral movements of 8mm to the right, 10mm to the left and protrusive of 5mm. There is no joint or muscular pain.



Figures 1a and b. Right laterognathia, with ipsilateral posterior crossbite and mandibular dental midline deviation to the right



Figures 2a and b. Occlusion at the end of six months

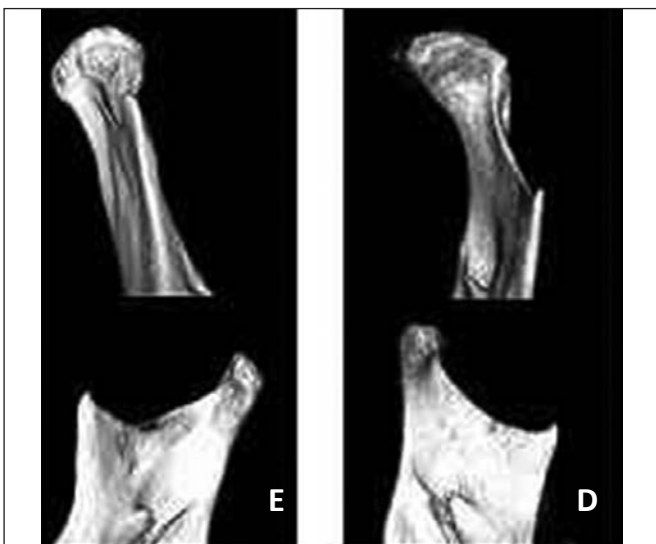


Figure 3. Tridimensional reconstruction of left mandibular condyle on cone beam computed tomography, where surgery was performed. It is possible to observe remodeling and similarity with right, non-operated mandibular condyle, eight months after surgery.

DISCUSSION

When mandibular condylar hyperplasia is suspected, initial clinical evaluation shall include documentation with extra and intraoral photographs, study models and some imaging exams, such as panoramic and face profile and frontal tele-radiography. Mandibular condyle growth activity should be evaluated by means of skeleton bone scintigraphy with SPECT of the head^{12,17}.

A difference in activity above 10% between both mandibular condyles^{18,19} is suggestive of active hyperplasia. If there is no active mandibular condylar growth, the case is treated as facial asymmetry, in general requiring orthodontic-surgical-orthodontic approach. If mandibular condylar hyperactivity is confirmed, the treatment varies. After six months to one year of clinical observation with serial comparison of study models, face photographs and X-rays, and depending on the mandibular condylar hyperactivity severity, maxillofacial surgeon may decide to follow up the case and repeat SPECT at six months, or perform condylectomy¹⁷. Condylectomy may be isolated^{17,20} or simultaneously associated to orthognathic surgery^{8,21}.

Less recent studies suggested hypercorrection of mandibular lateral deviation estimating the excessive growth that would still happen in the hyperplastic mandibular condyle⁸ or wait for the end of the hyperplastic growth and then correct dentofacial deformity^{18,22}. Condylectomy is currently considered a safe surgery and the only way to definitely eliminate mandibular condylar growth center which is hyperactive^{12,23}. It may be performed in early ages^{4,23,24}, before the end of growth, because its advantage is, on the one side, spontaneous remodeling of facial and condylar soft tissues²⁴ and on the other, prevention of maxillary occlusal plane inclination. Mandibular hypercorrection with orthognathic surgery is not recommended, because its results are unpredictable⁸.

Conversely, the option of waiting for the end of excessive mandibular growth, which will in general occur in the third decade of life, may bring severe functional, esthetic and psychosocial consequences, in addition to impairing the success of the orthodontic-surgical treatment^{2,12,23}. After condylectomy, authors suggest repetition of scintigraphy within six months, as seen in our case report. In the lack of excessive uptake and clinical confirmation of end of growth, dentofacial deformity treatment should continue. In our case, notwithstanding left mandibular condylar uptake index being within normal parameters, with the value of 1.18, there was still some uptake difference between both condyles, with more intensity to the left. A possible justification would be a still active bone remodeling since surgery had been performed only six month ago. Studies with a large number of cases are needed to evaluate the ideal period to repeat postoperative SPECT to minimize false positive results due to bone remodeling during this period.

Early identification of active hyperplasia may allow for the resolution of the case just with condylectomy and orthodontics, avoiding posterior orthognathic surgery^{2,20,25}. Condylectomy aims at removing joint cartilage responsible for active growth¹⁷. This cartilage is considered a center of craniofacial growth. In a normal mandibular condyle this growth is complete at approximately 20 years of age¹. In 1977, histological constitution of the joint surface of mandibular condyle was described in four layers, with maximum total thickness of 0.48mm: fibrous joint layer, proliferative layer, transition layer and hypertrophic cartilage layer²⁶. More recently, these four layers were called: articular zone, proliferative zone, fibrocartilaginous zone and calcified cartilage zone²⁷.

The proliferative layer is responsible for hyperactive mandibular condylar growth^{1,27}. With regard to articular surface histology in mandibular condylar hyperplasia, there is no consensus in the literature. Several authors have observed the presence of a continuous layer of undifferentiated mesenchymal germ cells^{2,28-30}, chondrocyte islands in subcondral trabecular bone^{2,4,5,28-30}, increased thickness of bone trabeculae and of different layers²⁸⁻³⁰, or just of the hypertrophic cartilage layer^{2,4,31}. Sloopweg and Muller have histologically classified mandibular condylar hyperplasia in four types¹⁶, but their accurate reproduction in further studies was not always possible².

While some authors suggest that hyperplasia severity and increased uptake in scintigraphy are directly related to increased frequency and depth of penetration of chondrocyte islands in the subcondral bone^{28,29}, others have not found differences between cases and controls in the frequency and depth of penetration of chondrocyte islands in the subcondral bone³¹. No previous authors have found relationship between histological findings and scintigraphic findings^{2,16}.

This difference in results may be explained by the reduced number of cases involved in most studies, by the variability of mandibular condylar hyperplasia level and by limitations in imaging exams documentation. So, in the lack of scientific evidence to support an ideal condylectomy depth, this varies from mandibular condyle osteoplasty (2-3mm)¹⁷⁻³⁰, to high condylectomy (4-5mm)^{2,12,23,30,32,33} to low condylectomy (8-12mm)^{20,25,34}. High condylectomy allows the removal of cartilaginous surface and subcondral bone, eliminating growth center². In recent studies, some authors have chosen to remove excessive condylar height as compared to the healthy side, procedure they call proportional low condylectomy, which in some cases reaches almost 12mm.

An advantage of this procedure would be less need for posterior orthognathic surgery, being enough the orthodontic treatment with elastic traction to correct remaining occlusal changes^{20,25}. A possible limitation of this technique is intra and interindividual variability in the measurement of the image of the length of normal and hyperplastic mandibular ramus. Authors favor condylectomy since it has more predictable results. In our case, there was a considerable face asymmetry, with progressive worsening of occlusion. Patient was young, with good remodeling and adaptation potential and active hyperplasia. So, gathering all these factors, we decided for a 10mm condylectomy to even mandibular ramus height and center chin and mandibular incisive midline the most.

Patient is still under orthodontic treatment to prepare for future orthognathic surgery or just mentoplasty. Literature points condylectomy as a safe surgery with minimal consequences for jaw function in the long run^{2,12,23,32,35}. A study evaluating jaw function after such procedure has observed higher prevalence of joint pain in operated patients. However, authors refer that this does not interfere with quality of life of patients and question whether it would be more associated to baseline joint disease than to the surgery³². Other authors have not observed any type of joint impairment^{2,12,35}. A possible explanation would be the fact that superior articular compartment remains intact³². In our case, disappearance of right TMJ pain may have been due to decreased joint overload caused by continuous and accelerated unilateral mandibular growth.

CONCLUSION

Mandibular condylar hyperplasia treatment is still controversial. Condylectomy is considered a safe, effective and essential surgery to prevent exaggerated growth of this active structure. It should then be considered first line therapeutic option for mandibular condylar active hyperplasia.

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