

Original Article

Facial asymmetry and condylar hyperplasia: considerations for diagnosis in 27 consecutive patients

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Abstract: Facial asymmetry associated with condylar hyperplasia (CH) has become the object of study in recent years. The aim of this study is to demonstrate the importance of analyzing the presence of CH in cases of facial asymmetry. Twenty-seven consecutive patients were studied without distinction of age or gender; all the patients consulted for treatment of facial and/or mandibular asymmetry and voluntarily agreed to participate in the study. All the patients underwent facial cone beam tomography and bilateral TMJ as well as a detailed history where they indicated the progression of the disease; in cases of active evolution determined by clinical analysis and imaging, a SPECT analysis was performed to define the isotope uptake. 29.6% of the subjects with scintigram exhibited active CH with a more than 10% difference in uptake between the two condyles; 18.5% presented differences in uptake between 5% and 10%. Active CH was related to the age and gender of the subjects, being more prevalent in women than in men. The aggression level of the uptake was also related to the subject's age. 55% of the subjects presented with some type of orthodontic treatment with no diagnosis of TMJ pathology in the initial consultation. It can be concluded that CH is associated with facial asymmetries and must be studied integrally before assessing treatment options.

Keywords: Condylar hyperplasia, facial asymmetry, condylectomy

Introduction

Facial asymmetry is a common condition in different populations [1] and it can be identified through such methods as facial analysis, 2D or 3D imaging or bone scintigram [2], allowing comparison between the right and left sides to determine the degree of asymmetry.

An important part of facial asymmetries is the phenomenon of condylar hyperplasia, characterized as the abnormally increased bone growth of one mandibular condyle in relation to the other [3], which determines the increased length of the condylar head, condylar neck, mandibular ramus and others [4]. This condition causes a shift in the lower dental midline and the chin [5], which determines relevant functional and esthetic disorders.

When patients with facial asymmetries are not examined correctly, treatment errors may ensue; therefore, supplementary examinations

are fundamental to the diagnosis of CH [6]. The main errors in asymmetrical patients with active CH are trying to correct the facial asymmetry and the occlusal disorder orthodontically when the CH is still active, which causes constant "recurrences" of the treatment [5]. Put another way, treatment recurrence in facial asymmetries can be caused by undiagnosed unilateral condylar growth.

The time of appearance or completion of CH is unknown, as are the major aspects of its natural evolution [3]; much is unknown about this pathology. The aim of this study is to identify the regularity with which CH presents in consultations motivated by treatment for mandibular asymmetry.

Material and methods

The study was conducted at Division of Oral and Maxillofacial Surgery of the Universidad de La Frontera, where 27 consecutive patients were

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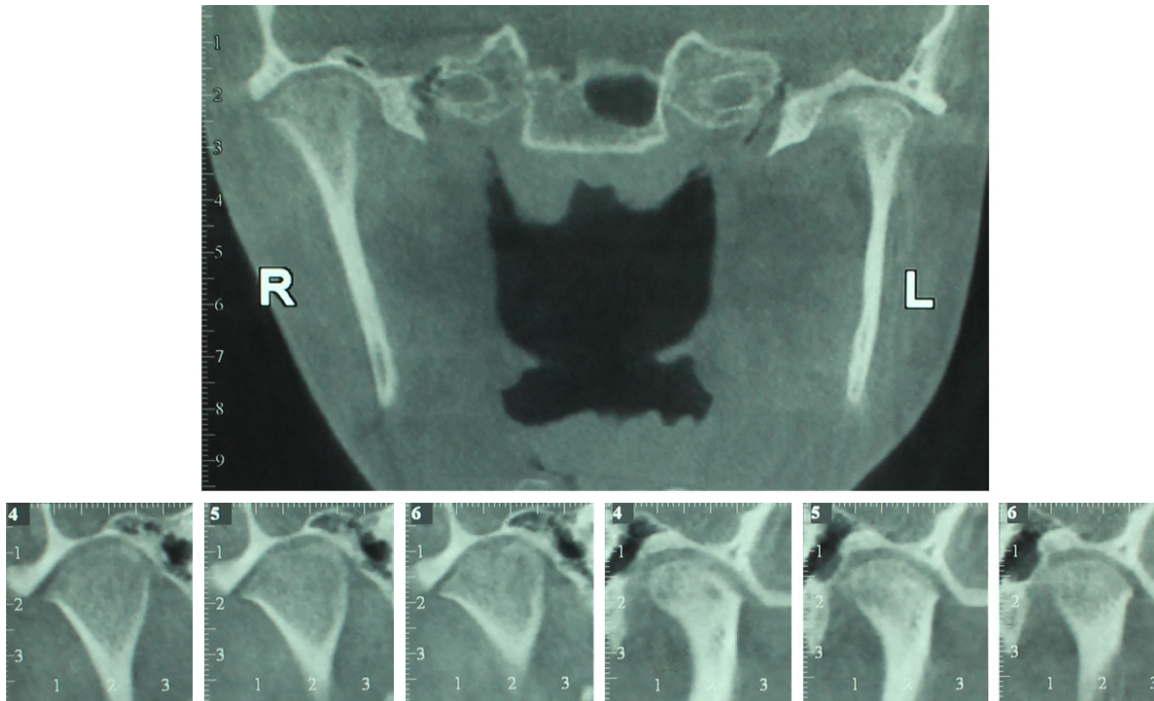


Figure 1. Condyle characteristics in cone beam CT used to determine the need for study with SPECT. Decrease in cortical size in the upper sector of the condyle is observed in coronal cut.

assessed between 2011 and 2012; was accepted patient that consult correction of mandibular or facial asymmetry. There was no discrimination for age or gender; in all the patients a clinical study and standardized imaging were performed including facial analysis, dental analysis and 3D image analysis using PlanMeca® computed tomography cone beam (CBCT) in a 24x40 window that recorded the facial condition in bone tissue and the condition and morphology of the bilateral TMJ (**Figure 1**).

The diagnostic exams were performed by an experienced maxillofacial surgeon; in the medical history questions asked of the subjects included the progression of the asymmetry in the last year and associated symptomatology. When the patient's response indicated an increase in the asymmetry or when the three-dimensional images revealed one condyle of comparatively greater volume, the upper pole of which presented a poor or no cortex, a single-photon emission computed tomography (SPECT) was analyzed due to the likely existence of active bone metabolism and thus hyperplasia in the region.

The SPECT was performed on a SOPHA DSXC with application of Tc-99m MDP. After 3 h of endovenous application, the study was performed, with anterior and posterior images being obtained. Hyperfixation of the radiotracer was determined to be active CH when the difference in uptake between the two condyles was over 10%. Subjects with differences in uptake between 5% and 9.9% were recorded. The variables were studied using SPSS 20.0, Chicago, IL using ANOVA, chi-squared and Pearson coefficient, considering statistical significance when $p < 0.05$.

Results

Twenty-seven subjects took part in our study, of which 70.4% were female (19 subjects) and 29.6% were male (8 subjects). 55.5% consulted at Division of Oral and Maxillofacial Surgery, presenting with some type of fixed orthodontic system already installed with different evolution times. The subjects' age was between 13 and 30 years with an average of 19.07 years (± 4.55 years). It was observed that the presence of facial asymmetry was statistically more associated with women ($p < 0.05$). Were no present statistical differences between gender



Figure 2. Characteristics of facial bones related to the greater condylar volume observed in cone beam CT. Facial asymmetry is evaluated with chin, dental and nasal position.

and complexity of pathology ($p=0.917$) and age was not related to condylar hyperplasia ($p=0.561$); the activity of CH side was no related to age ($p=0.561$).

In all the patients the previously indicated protocol was performed and the need for support with SPECT was determined in 16 of the 27 subjects (59.3%). The result of the studies determined that 5 (18.5%) subjects presented a difference in isotope uptake between 5% and 9.9%, whereas 8 (29.6%) subjects presented a difference greater than 10%, which is interpreted as active condylar hyperplasia. Only 3 subjects presented a difference in uptake below 5%.

In the subjects with a difference in uptake greater than 10%, there was an average difference of 18.9% in uptake between the two condyles, and in the total of the SPECT studies an average difference of 12.6% in uptake between the two mandibular condyles was observed. There was a statistically significant relation between the subject's age and active CH. In addition, the most aggressive pathologies were observed in men.

Discussion

The results in this investigation show that active CH in facial asymmetries must be stud-

ied in depth before initiating surgical or non-surgical treatments. Of all the subjects studied with SPECT, 50% presented more than 5% differences in uptake, which indicates a clear influence of the condylar pathology on the generation of asymmetry; non-surgical treatments are not useful at this stage of active growth since it is a condition where there is no information to date regarding the point at which the pathology ends, so that it is not predictable to conduct a corrective non-surgical therapy in that phase [7].

The study by Raijmakers [8] indicated that there is a clear tendency for women to be more affected by CH; Raijmakers reports that probable hormonal differences between men and women might explain this situation, which was confirmed by our results. Experimental studies have shown a relation between sexual hormones and condylar growth [9] and a relation between osteoarthritis and condylar bone physiology in women has also been reported, pointing to hormonal changes as an important cause [10, 11].

One important consideration is the limited number of clinical series in the international literature dealing with CH and facial asymmetry; the broadest published series is by Nitzan [3] with 61 patients, Saridin [12] with 47 subjects, Villanueva-Alcojol [13] with 36 subjects and Chan [14] with 23 subjects. Thus, there are not enough studies to identify the parameters of the disease.

In terms of age, the average of our population is also related to other international studies that show a greater presence in the stage of 15 to 24 years [3, 12]. The subjects that sought treatment were under 30 years of age probably because as the subject gets older, the demand for treatment decreases [15], so that some pathologies present after age 30 may not be completely studied.

Pripatnanont [6] reported that SPECT together with studies with models, serialized radiographs and photographs could reveal the patient's conditions and determine the state and progress of the CH; currently, the use of cone beam CT is widely related in TMJ study [16, 17] so that its use combined with SPECT may reveal the patient's condition more clearly. Other histopathological studies have also

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looked for a way to make the diagnosis, although it would be necessary to obtain the surgical specimen to do so [16], which involve surgery.

One of the relevant aspects of this investigation is that of all the patients evaluated for facial asymmetry, approximately 30% presented active CH and 20% CH at a lower level of activity, which makes it possible to suggest that patients with facial asymmetry must be evaluated for a probable CH as the cause of the mandibular asymmetry. There are very few investigations that estimate the prevalence of CH in facial asymmetries and associated factors, which prevent clear results from being obtained with respect to the disease; in fact, Saridin [18] studied 52 subjects with probable CH using SPECT, indicating that in 50% unilateral condylar growth was confirmed, which is consistent with our results.

With these data it is possible to see a clear relation between the two conditions of facial asymmetry and CH [13] (**Figure 2**); however, analysis of condylar pathology in the presence of facial asymmetries is not a completely defined protocol [5]; this situation is made all the more complex because the treatment of these subjects is multidisciplinary, with the participation of specialties like orthodontics, surgery, rehabilitation and physiotherapy, so that depending on the interlocutor the treatment could vary.

Finally, we can conclude that CH presents in its active form in approximately 30% of the subjects that consult for treatment of mandibular asymmetry and it presents with signs of recent activity in 20% of the same subjects. The study of TMJ and condylar hyperplasia must be incorporated into all treatment protocols for facial asymmetry as a starting off point for any treatment.

Disclosure of conflict of interest

None.

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