M. Portelli*, E. Gatto*, G. Matarese*, A. Militi*, L. Catalfamo**, E. Gherlone***, A. Lucchese***

University of Messina, Italy
**Department of Orthodontics and Paediatric Dentistry, Dental School*
***Department of Maxillo-Facial Surgery*
****Unit of Dentistry, IRCCS San Raffaele Scientific Institute and Department of Orthodontics, Vita e Salute San Raffaele University, Milano, Italy*

e-mail: marcoportelli79@tin.it

Unilateral condylar hyperplasia: diagnosis, clinical aspects and operative treatment. A case report

ABSTRACT

Background *Condylar hyperplasia of the mandible is an uncommon idiopathic disorder of the jaw characterised by increased volume of the condyle, unilaterally or bilaterally, leading to facial asymmetry, mandibular deviation, malocclusion and articular dysfunction.*
Case Report *The authors present one case of unilateral condylar hyperplasia of a 16-year-old patient affected by severe facial asymmetry. Conventional X-rays examinations, multislice spiral CT and bone SPECT were used for the final diagnosis of primary condyle hyperplasia. The patient was treated with a combined orthodontic and surgical approach.*
Conclusion *Treatment of condylar hyperplasia with a combined orthodontic and surgical approach including condylectomy yield good aesthetic and functional outcomes.*

Introduction

The size of the mandible, including the corpus, ramus, and condyle, as well as the timing and amount of condylar growth, vary considerably between individuals. Masticatory activity related to the consistency of the diet and, as recently shown, genetic predisposition, can be considered potential contributing factors to this individual variation. One of the most common craniofacial malformation is condylar hyperplasia; it can be defined as a three-dimensional enlargement of the mandible, including the condyle and the ramus on the affected side, that ends at the midline of the symphysis. Condylar hyperactivity can be clearly identified only when it occurs unilaterally. Bilateral symmetric cases are very difficult to delineate against mandibular prognathism and seem to be very rare. Unilateral condylar hyperactivity typically becomes apparent at some time during the growth period, most often during childhood. Hence, it constitutes a true disorder of growth [Obwegeser, 2001]. In condylar hyperplasia the chin deviates to the unaffected side and the lower mandibular border is asymmetrical. The occlusal plane is tilted and the patients have different types and severity of malocclusion. Condylar hyperplasia has been first reported in 1836 by Adams; since then, a series of case reports and clinical studies have been published. The epidemiological data have suggested that the incidence of this malformation is similar in all ethnic groups with a predominance in female subjects [Raijmakers et al., 2012]. The aetiology is uncertain, but there is a consensus that the growth in one of the condyles may be accelerated, or that the growth may be prolonged by persistent activity of the condyle after the end of general skeletal growth [Angiero et al., 2009]. Several additional factors such as hormonal influences, hypervascularity, heredity, infection or trauma can be considered in the etiology of this malformation. Not only the macroscopic but also the microscopic morphology of the diseased condyle differs from that of the unaffected side. Gray et al. [1994] reported that the bony trabeculae were often thickened and irregular, resulting in a consistently large volume of trabecular bone and a higher than normal percentage of surfaces covered in osteoids. Histologically, the presence of an uninterrupted layer of undifferentiated germinating mesenchymal cells, hypertrophic cartilage, and islands of chondrocytes in the subchondral trabecular bone, were also typical. Some research workers found that when they compared normal and hypertrophic mandibular condyles, the thickness of the cartilaginous layer seemed to be considerably increased in condylar hyperplasia [Eslami et al., 2003]. Radiological and scintigraphic methods are commonly used for diagnosis and monitoring of its macroscopic aspects [Matarese et al., 2006; Portelli et al., 2013]. Unilateral condylar hyperplasia is diagnosed on the basis of anamnestic and clinical findings and by evaluating conventional radiographs of the patient. Cisneros [1984] was the first to use bone scintigraphy to study patients with mandibular asymmetry. Radionuclide bone scanning is an instant method of comparing the differential activity between the normal and abnormal condyles, reflecting the relative growth rates at the time of the investigation [Robinson et al., 1990]. Most studies

FIG. 1 Intra ed extra-oral pre-treatment.

of condylar hyperplasia have focused only on clinical (gross morphological) or histological aspects, whereas only a few were intended to give insight into the disease-related features. It is, for example, unknown whether non-invasive measures such as scintigraphy can be correlated with histology of affected condyles, and may help to decide the best treatment. Accurate assessment of the active condylar growth center is important because corrective surgery of the facial asymmetry is usually not performed if there is still a possibility of progression of the asymmetry due to unilateral condylar hyperplasia. Various treatment protocols have been published giving the best treatment options [Avelar et al., 2012; Lucchese et al., 2012]. High condylectomy is one of these, as it is expected that the removal of the condyle will stop the growth of the mandible in the diseased region and can therefore provide stable long-term results.

Matherials and methods

In the present study the authors reported a clinical case of a 16-year-old patient affected by unilateral condylar hyperplasia leading to facial asymmetry, mandibular deviation, malocclusion and articular dysfunction. The patient came in 2006 at the Department of Orthodontics of Messina University for a dental visit; an orthodontic check-up was carried out, including intra and extra-oral photos, orthopantomogram, and lateral and posterior x-rays of the head. Impressions in alginate of both the arches were taken to obtain dental casts to analyse the occlusal discrepancies [Portelli et al., 2012]. Multislice spiral CT with an original low dose protocol [Matarese et al., 2006] was carried out to assess morphostructural features; 3D volume reconstructions allowed an accurate evaluation of condyle dimension and morphology. Bone SPECT with TC99m allowed to make the final diagnosis of primary condyle hyperplasia. The patient showed a severe facial asymmetry due to the right condylar hyperplasia characterised by enlargement of ipsilateral condyle, elongation of the condylar neck, outward and downward growth of the body and ramus of the mandible on the affected side, deviation of mandible and chin to the opposite side, slanted occlusal plane for dental compensation, deviation of dental midlines, Angle Class III malocclusion at the right side and Class I molar and canine at left, open-bite of the deformed side, articular dysfunction and muscular pain at the right joint [Portelli et al., 2009]. Figures 1 and 2 show clinical images and diagnostic exams before treatment (T0).

The patient was treated using a combined surgical-orthodontic approach. The first phase was a pre-surgical orthodontic treatment. In March 2006 a multibracket

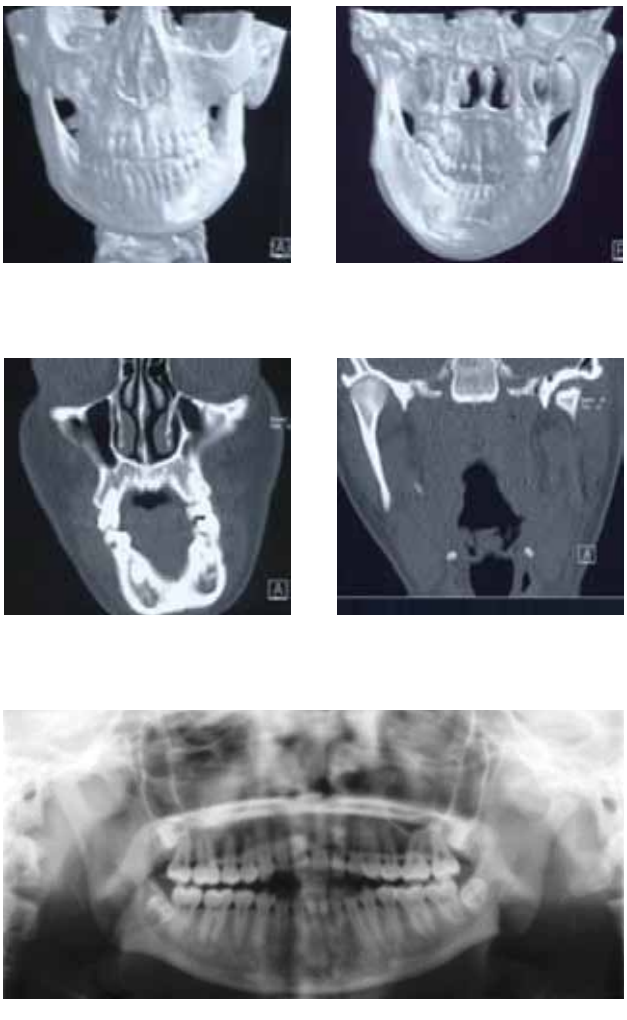

FIG. 2 Diagnostic exams before treatment.

FIG. 3 Pre-surgical orthodontic treatment

orthodontic appliance was bonded to the upper and lower arches using Synergy Brackets (Rocky Mountain Orthodontics, Denver, Colorado, USA) and a 0 .016 inch Thermal Nichel-Titanium wires (Rocky Mountain Orthodontics, Denver, Colorado, USA) engaged with elastomeric ligatures in "C" configuration (Fig. 3).

The treatment progressed and clinical improvements were observed until the ortho-surgery performed on April 2008. The surgical intervention consisted in an access in the pre-tragus area on the right side, identification and "T" incision of the articular capsule, and condylectomy of the right articular head, followed by a bimaxillary surgery. A full-thickness incision was carried out in the upper gingival fornex from tooth 1.6 to 2.6 and in the retromolar area bilaterally. Then, the upper jaw was exposed and a Le Fort I osteotomy was performed with repositioning of the maxillary bone and an asymmetric impaction molar elevation in the right side of 4 mm; cuspid elevation in the same side of 3 mm; molar reduction in the left side of 1 mm; cuspid elevation on the left side of 2 mm; traslation of 2 mm to the left side of the whole upper jaw. Then a posterior retainer of the maxillary bone was made with two stainless steel wires for ostheosynthesis, while the anterior retainer was made with two "L" shaped titanium bone plates with 4 holes and 4 screws. In the lower jaw a sagittal incision at both right and left

FIG. 4 Post-surgical images and orthodontic finishing.

sides was performed and the mandible was placed in occlusion with intermaxillary locking, after a bilateral sagittal split osteotomy. A bone retainer was made on the right side with two standard titanium plates, while the osteotomy on the left side was stabilised by means of three bicortical screws. The clinical changes of the patient after the orthognathic surgery and the final phase of the orthodontic treatment with occlusal finishing with intercuspidal elastics can be seen in Figure 4.

Figure 5 shows the final photos of the patient after debonding of the fixed appliances, and the removable appliance used for retention.

FIG. 5 Intra and extra-oral images after debondig and removal of retention appliances.

FIG. 6 One year (A) and three years (B) follow up.

Results

The treatment outcomes achieved were the following: correction of dental crowding in both arches, bilateral molar and canine Class I, correction of overjet and overbite, coincidence of dental midlines, dental occlusal plane correction, facial symmetry with correction of chin deviation and mandibular and maxillary plane inclination. TMJ pain on the right side improved significantly, as well as mouth opening and protrusive and lateral excursion of the mandible. One- and three-year follow-ups are respectively reported in Figure 6 A and B, and show that clinical outcomes remained stable over time.

Conclusion

The treatment of unilateral condylar hyperplasia with a combined orthodontic and maxillofacial treatment including condylectomy yields good aesthetic and functional results [Olate et al., 2013]. Conventional orthognathic surgery is not adequate in certain cases of active condylar hyperplasia. This surgery allows the correction of aesthetic and occlusal deformity, but does not halt growth progression, which is only achieved by condylectomy [Pereira-Santos et al., 2013]. Articular function after condylectomy is good if the patient follows a postoperative physiotherapy treatment. Therefore, high condylectomy should be considered for the elective treatment of active condylar hyperplasia in adults and is more advisable for treatment of younger patients.

References

› Angiero F, Farronato G, Benedicenti S, Vinci R, Farronato D, Magistro S, Stefani M. Mandibular condylar hyperplasia: clinical, histopathological, and treatment considerations. Cranio 2009 Jan;27(1):24-32.

› Avelar RL, Becker OE, Dolzan Ado N, Göelzer JG, Haas OL Jr, de Oliveira RB. Correction of facial asymmetry resulting from hemimandibular hyperplasia: surgical steps to the esthetic result J Craniofac Surg 2012 Nov;23(6):1898-900.

› Cisneros GJ, Kaban LB. Computerized skeletal scintigraphy for assessment of mandibular asymmetry. J Oral Maxillofac Surg 1984: 42: 513–520.

› Eslami B, Behnia H, Javadi H, Khiabani KS, Saffar AS. Histopathologic comparison of normal and hyperplastic condyles. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2003;96:711–7.

› Gray RJ, Horner K, Testa HJ, Lloyd JJ, Sloan P. Condylar hyperplasia: correlation of histological and scintigraphic features. Dentomaxillofac Radiol 1994;23:103–7.

› Lucchese A, Gherlone E, Portelli M, Bertossi A. Tooth orthodontic movement after maxillofacial surgery. Eur J Inflamm 2012; 10(2): 227-236.

› Matarese G, Portelli M, Mazza M, Militi A, Nucera R, Gatto E, Cordasco G. Evaluationof skin dose in a low dose spiral CT protocol. Eur J Paed Dent 2006;2:77-80.

› Obwegeser HL. Mandibular growth anomalies: terminology, aetiology, diagnosis, treatment. Ed. Springer-Verlag: Berlin; 2001.

› Olate S, Netto HD, Rodriguez-Chessa J, Alister JP, deAlbergaria-Barbosa J, deMoraes M. Mandible condylar hyperplasia: a review of diagnosis and treatment protocol. Int J Clin Exp Med 2013 Sep 25;6(9):727-37.

› Pereira Santos D, De Melo WM, Souza FA, DeMoura WL, Cravinhos JC. High condylectomy procedure: a valuable resource for surgical management of the mandibular condylar hyperplasia. J Craniofac Surg 2013 Jul;24(4):1451-3.

› Portelli M, Matarese G, Militi A, Nucera R, Triolo G, Cordasco G. Myotonic dystrophy and craniofacial morphology: clinical and instrumental study". Eur J Paediatr Dent 2009; 10 (1): 19-22.

› Portelli M, Matarese G, Militi A, Cordasco G, Lucchese A. A proportional correlation index for space analysis in mixed dentition derived from an Italian population sample. Eur J Paed Dent 2012; 13(2); 113-117.

› Portelli M, Cordasco G, Militi A, Nucera R, Giudice A, Gatto E, Lucchese,A. Low-dose protocol of the spiral CT in orthodontics: Comparative evaluation of entrance skin dose with traditional X-ray techniques.Prog Orthod 2013 Sep 10;14:24.

› Raijmakers PG, Karssemakers LH, Tuinzing DBFemale predominance and effect of gender on unilateral condylar hyperplasia: a review and meta-analysis. J Oral Maxillofac Surg 2012 Jan;70(1):72-6.

› Robinson PD, Harris K, Coghlan KC, Altman K. Bone scans and the timing of treatment for condylar hyperplasia. Int J Oral Maxillofac Surg 1990: 19: 243–246.