

CT Findings of Trifid Mandibular Condyle in a 12-Year-Old Patient: A Case Report and Review

Hallazgos en TC de Cóndilo Mandibular Trífido en un Paciente de 12 Años:
Reporte de Caso y Revisión

Adalsa Hernández-Andara¹; Ana I. Ortega-Pertuz²; Elisabetta Guercio³ & Adriana De Stefano³

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ABSTRACT: Bifid or trifid mandibular condyle is an extremely rare entity, of unknown etiology, although it has been associated with trauma in the condyle growth center. The development of imagining techniques has allowed the exact characterization of these alterations, which were incidentally discovered by routine dental x-rays. The aim of this report is to describe a case of a mandibular condyle with a trifid appearance in a twelve year-old individual with a history of mandibular trauma during childhood and a review of the relevant literature.

KEY WORDS: condylar variation, computerized tomography, temporomandibular joint, trifid condyle.

INTRODUCTION

Bifid or trifid anomalies are rare (Artvinli & Kansu, 2003; Antoniadou *et al.*, 2004; Çagırankaya & Hatipoğlu, 2005) and although their etiology is unknown, it could be associated with an alteration of traumatic origin in the center of the condyle growth (Antoniades *et al.*; Sezgin & Kayıpmaz, 2009). The trifid condyle (TRC) is considered to be a variant of the bifid condyle (Artvinli & Kansu; Antoniadou *et al.*; Millas *et al.*, 2010), as both show a great morphological variability, presenting from shallow pits that divide the condylar head to the presence of a distinctive, coronal sagittal axis or both, at different depths (Antoniades *et al.*; Sezgin & Kayıpmaz; Warhekar *et al.*, 2014).

In recent years, the advancement of three dimensional imaging modalities (Artvinli & Kansu; Antoniadou *et al.*; Çagırankaya & Hatipoğlu; Sezgin & Kayıpmaz; Motta-Junior *et al.*, 2013; Warhekar *et al.*; Prasanna *et al.*, 2015), has allowed the diagnosis of a greater number of cases as these were usually detected as findings in routine radiographic examinations such as orthopantomography, without distinctive signs or symptoms of its presence (Artvinli

& Kansu; Antoniadou *et al.*; Çagırankaya & Hatipoğlu; Millas *et al.*). These anomalies are unilateral most of the times (Çagırankaya & Hatipoğlu; Sezgin & Kayıpmaz; Millas *et al.*; Warhekar *et al.*; Prasanna *et al.*) while its bilateral form is uncommon (Motta-Junior *et al.*). The aim of this report is to describe CT imagining findings in a twelve-year-old male patient who presents a TRC on an apparent trauma etiology and to review relevant literature.

CASE REPORT

A 12-year-old male patient appeared in the Maxillofacial Dental Imaging Unit of the Félix Boada Clinic, Caracas, for evaluation by CT (Brightspeed Elite, GE Healthcare, Chicago, Ill, USA), due to facial asymmetry and a clicking noise in the left TMJ, found during the clinical examination prior orthodontic treatment planning, according to the practitioner referral. The chief complaint was the presence of malocclusions. On questioning, the mother of the

¹ Service of Dentomaxillofacial Imaging, Felix Boada Clinic, Bolívar St., Caracas, Distrito Capital, Venezuela.

² Research Institute, Faculty of Dentistry, Universidad del Zulia, 19 Av., Maracaibo, Zulia State, Venezuela.

³ Graduate Program in Orthodontics, Faculty of Dentistry, University City, Universidad Central de Venezuela, Caracas, Venezuela.

patient reported that he had a history of facial trauma at the age of two with a fissure in the right side of the mandibular body.

An extraoral examination revealed a slight mandibular deviation towards the left side (Fig. 1a), presenting a maximum mouth opening of 43 mm. An Intraoral examination, in occlusion, corroborated the deviation of the midline to the left side, a large overbite and dental crowding. He showed proclination of units 11 and 13, the latter was rotated, as well as the presence of crossbite on tooth 43, which was also proclined (Fig. 1b). There was no pain related to both TMJ.

To evaluate TMJ a CT scan with volumetric reconstruction was performed in a closed mouth position in maximal intercuspation and open mouth in the maximum opening. In closed mouth examination, both condyles were found in anteroinferior position relative to the mandibular fossa of the respective temporal bone (Fig. 2). The morphological anomaly of the mandibular head in the left TMJ was evidenced, corresponding to three articular surfaces suggestive of TRC, which were orientated in a posteromedial, posterolateral and anteromedial direction (Fig. 3).

The right TMJ condylar process was observed within normal imaging patterns (Figs. 4a, b). Open-



Fig. 1. A. Frontal view of the patient, closed mouth, where a mild mandibular deviation to the left is evident. B Frontal intraoral view in occlusion where dental malpositions and mandibular deviation towards the left side are evident.

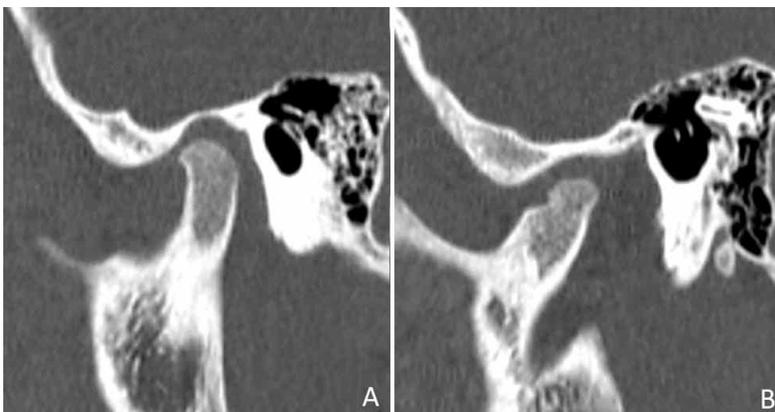


Fig. 2. Sagittal view in CT , closed mouth, where (A) right condyle is seen with a normal pattern image, in anteroinferior situation with respect to the mandibular fossa; (B) alteration of the condylar morphology accompanied by a shallow mandibular fossa; the condyle is situated in an anteroinferior position in relation to the respective mandibular fossa.



Fig. 3. Volumetric CT reconstruction shows a division of the left mandibular head (arrows).

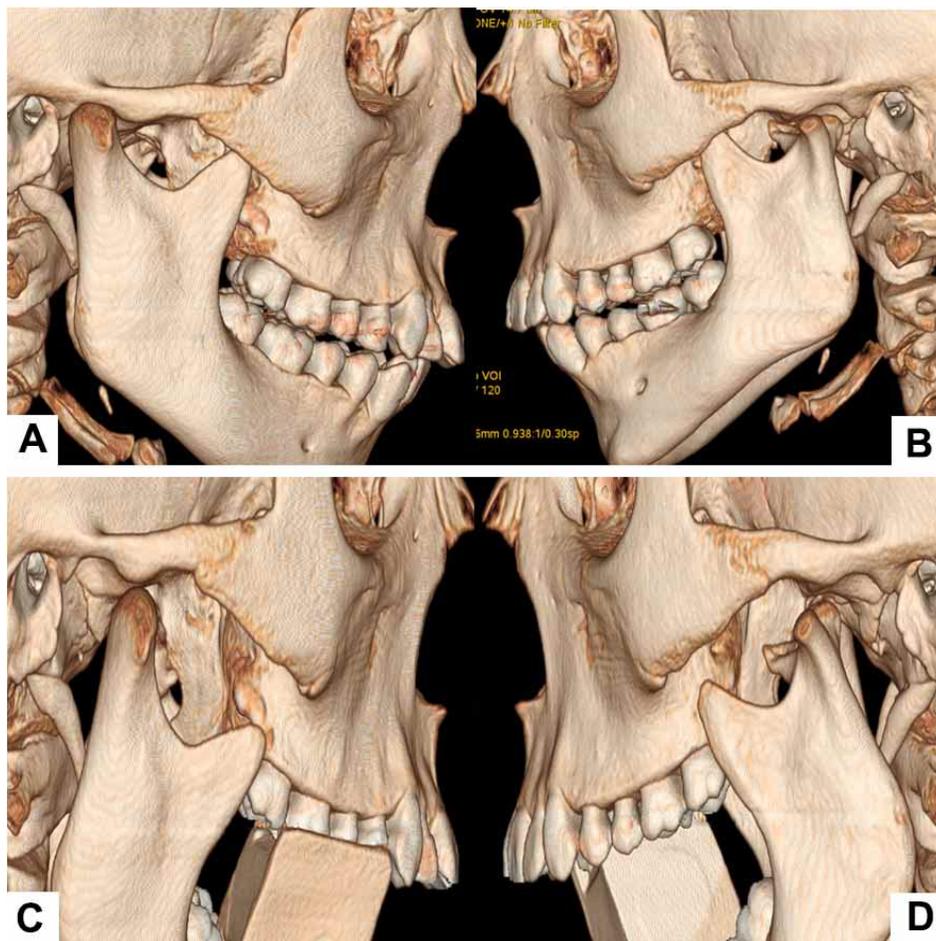


Fig. 4. Lateral views with CT volumetric reconstructions. Closed mouth, show the morphological alteration in the left condyle (A), while the right one presents normal morphological characteristics (B); C and D, open mouth, examination shows the normal mobility of both condyles in relation to the articular tubercle of the temporal bone.

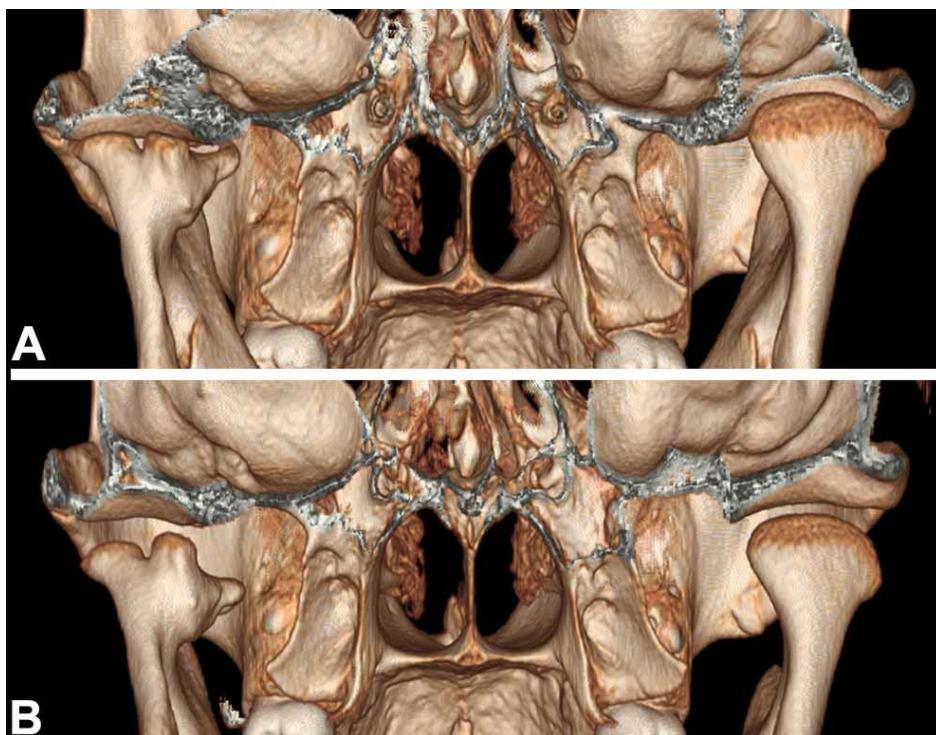


Fig. 5. Postero-anterior view of the CT volumetric reconstructions. A. Closed mouth, B. Open mouth. Figures show the morphological alteration of the left condyle as well as the relationship of both condyles with the respective mandibular fossa.



Fig. 6. CT coronal view; there is no evidence of adaptive changes of the mandibular fossa corresponding to the side of the trifold condyle.

mouth examination revealed the normal mobility of both condyles in relation to the articular tubercle of temporal bone (Figs. 4c, d). The posteroanterior view of the volumetric reconstructions to the closed (Fig. 5a) and open (Fig. 5b) mouth examination show the morphological alteration of the left condyle and the relationship of both condyles with their mandibular fossa. No adaptive morphological changes were observed in the mandibular fossa corresponding to the side of the TRC (Fig. 6). Both mandibular ramus were measured and when compared, minor values were observed in the left side ramus (right: 58.3 mm; left: 48.8 mm). The patient underwent orthodontic treatment for the malocclusions, and follow-up of the TMJ only.

DISCUSSION

Eight cases of TRC were found in a literature review (Artvinli & Kansu; Antoniadou *et al.*; Çagrankaya & Hatipoğlu; Sezgin & Kayipmaz; Millas *et al.*; Warhekar *et al.*; Motta-Junior *et al.*; Prasanna *et al.*) (Table I) although recently, a tetrafid condyle case was reported as asymptomatic without traumatic origin (Sahman *et al.*, 2011). Patients age range was between 11 and 52 years old (mean age, 31.5), with a higher frequency of females. The right side was the most affected. Only one case was bilateral and associated with a syndrome. Three of the reports were trauma-related, and most of the individuals did not report symptoms associated with TMJ dysfunction. However, the clinical examination showed the limitation of the mouth opening and deviation of the mandible.

The etiology of the alterations of the condylar morphology in its bifid or trifold variants is not clearly understood as the reports of cases have associated these conditions to a history of trauma (Artvinli & Kansu; Sezgin & Kayipmaz). On the other hand, it has been suggested that they are the product of alterations in development (Moffett, 1966; Gunlach *et al.*, 1987) endocrine disorders, nutritional deficiencies and infection. However, irradiation or genetic factors may also be linked (Artvinli & Kansu; Antoniadou *et al.*; Quayle & Adams, 1986). In our case, the patient reported facial trauma during early childhood, which supports the idea that the development of the left condyle could be influenced by pre-existent trauma. The symptomatology associated with bifid or trifold condyle is diverse. It ranges from articular noises to pain, restriction of mandibular opening, inflammation, facial asymmetry, jaw deviation during mouth opening, among others (Antoniades *et al.*; Sezgin & Kayipmaz; Warhekar *et al.*). In the case here described the patient showed middle-line deviation and facial asymmetry probably due to the alteration of the left condyle morphology which also affected the length of the ipsilateral mandibular ramus.

Although TRC may be varied, in the present case the left condyle showed a division in the mandibular head into posteromedial, posterolateral and anteromedial segments, separated by grooves that produced its trifold appearance. Faced with the finding of a morphological alteration suggestive of TRC on a conventional radiograph, the case study is complemented by imaging methods that help to rule out other conditions, such as degenerative changes in TMJ, fibrous or osseous ankylosis, primary or metastatic benign or malignant tumors (Warhekar *et al.*; Sahman *et al.*). These methods are important in the differential diagnosis of symptomatic cases (Warhekar *et al.*).

In this sense, CT examination of the case was essential to characterize the condition in the three planes, to evaluate the morphology of the mandibular fossa and the articular tubercle of the temporal and also to determine the size of the mandibular ramus in both sides. Despite the presence of noise in the left TMJ, no additional tests such as MRI were performed, due to the difficulty of its execution in such a young patient. He was treated initially with orthodontics and follow-up of both TMJs' function and morphology.

Table I. Literature review of the trifold condyle case reports.

	Author	Year	Cases	Age/ Gender	Side		Trauma	Symptoms	Imaging method
					L	R			
1	Artvinli & Kansu	2003	1	25/F	T	B	Yes	Mandibular slightly deviated to the left side. "Weakness" of the jaws after chewing.	OP, CT
2	Antoniades <i>et al.</i>	2004	1	15/M	B	T	Yes	Limited mouth opening. Mandible deviated to the right side.	OP, CT
3	Çagirankaya & Hatipoglu	2005	1	52/F	N	T	No	Mandible deviated to the right side.	OP, CT
4	Sezgin & Katipman.	2009	1	31/M	N	T	Yes	Mandible deviated to the right side.	OP, CBCT
5	Millas <i>et al.</i>	2010	1	27/F	N	T	No	Right TMJ dysfunction, hypomovility, mandibular deviated to the right side, limited mouth opening.	CT, MRI
6	Warhekar <i>et al.</i>	2011	1	37/F	N	T	N	Diffuse painless swelling over the right masseteric region. Mandible deviated to the right side. Clicking noise in the right TMJ.	OP, CT
7	Motta-Junior <i>et al.</i>	2013	1	17/M	T	T	N	Associated with Frey's syndrome	OP, CT
8	Prasanna <i>et al.</i>	2015	1	26/F	A	T	N	Facial asymmetry, micrognathia, mandible deviated to the left side, limited mouth opening.	OP, CT, MRI

F female, M male, L left, R right, T trifold, B bifid, N normal, A absent, OP orthopantomography, TMJ temporomandibular joint, CT computed tomography, CBCT cone beam computed tomography, MRI magnetic resonance imaging.

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RESUMEN: El cóndilo bifido o trívido es una entidad extremadamente rara de etiología desconocida, sin embargo, ha sido asociada con trauma en el centro de crecimiento condilar. El desarrollo de técnicas imagenológicas ha permitido la exacta caracterización de estas alteraciones, las cuales son incidentalmente descubiertas durante radiografías de rutina. El objetivo de este reporte es describir un caso de un cóndilo mandibular con apariencia trívida en un paciente de 12 años de edad con historia de trauma en la mandíbula durante la primera infancia y una revisión de la literatura relevante.

PALABRAS CLAVE: variación condilar, tomografía computarizada, articulación temporomandibular, cóndilo trívido.

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Corresponding author:
Adalsa Hernández-Andara
Service of Dentomaxillofacial Imaging
Felix Boada Clinic
Bolívar St.
Caracas
Distrito Capital
VENEZUELA

Email: adalsah@gmail.com

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