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Condylar asymmetry in patients with juvenile idiopathic arthritis: Could it be a sign of a possible temporomandibular joints involvement?

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ABSTRACT

Objectives: The aim of the study was to evaluate the condylar and ramal asymmetry of the mandible in patients with juvenile idiopathic arthritis (JIA) using orthopantomographies (OPTs).
Methods: A total of 30 JIA patients with confirmed diagnosis of JIA and a routine OPT, seeking for orthodontic therapy, free of specific symptoms of temporomandibular joint involvement, and 30 normal matched subjects with OPT were comprised in the study. The method of Habets et al. was used to compare the condyles and rami in OPT. The significance of between-group differences were assessed using Mann–Whitney test.
Results: The results showed a high significant difference in the range of asymmetry of the condyle, being the patient group highly asymmetrical ($P < 0.0001$). No differences were found in the range of asymmetry of the ramus between groups ($P = 0.47$). The intra-group comparison between males and females showed a difference in the patient group ($P = 0.04$), being the females more asymmetric.
Conclusions: Knowing that the temporomandibular joint (TMJ) is highly susceptible to inflammatory alterations during growth, even in absence of symptomatology, and being the OPT a cost–benefit favorable imaging tool widespread in the dental field, the latter could be used as a first screening examination in JIA patients to calculate the condylar asymmetry index. The use of this screening tool will help the physicians in addressing the patients that should undergo a more detailed TMJ imaging to early detect TMJ abnormalities and to early set up a targeted therapy of the related cranial growth alterations.

Introduction

Juvenile idiopathic arthritis (JIA) relates to a heterogeneous group of diseases of unknown etiology, characterized by chronic inflammation of one or more joints, with an onset before the age of 16 years and a minimum duration of 6 weeks [1]. The prevalence of JIA is reported as 0.07–4.01 per 1000 children, while the annual incidence is 0.008–0.226 per 1000 children, and it manifests in girls more frequently [2].

The disease spectrum goes from self-limited monoarthritis to ongoing multiple joints destruction and may involve severe systemic manifestations [3]. The classification system, first proposed in 1994 (Santiago criteria) [4], was revised twice: in 1997 (Durban) [5] and in 2001 (Edmonton) [1] by the International League of Associations for Rheumatology (ILAR). A new set of criteria for childhood-onset idiopathic inflammatory arthritis, called JIA, was developed, and it is still used. Nowadays, JIA can be classified according to the onset of the disease and to the number of joints affected, as oligoarthritis, when four or less joints are involved and as polyarthritis when five or more joints are involved. A systemic type of the disease also exists (Still's disease) [6].

TMJ involvement by JIA was recognized long time ago, by Still in 1897 [7]. Due to the diagnostic difficulties, the prevalence of TMJ involvement is reported, in several studies, with a wide range, from 17% to 87% [8–12]. The TMJ can be involved by JIA unilaterally

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Table
Demographic and occlusal characterization of the JIA patients and control subjects

	JIA patients			Control subjects		
Gender	Females	Males	Total	Females	Males	Total
Number	23 (76.6%)	7 (23.33%)	30 (100%)	23 (76.6%)	7 (23.33%)	30 (100%)\11
Mean age at OPT (y)	12.35 ± 4.99	14.55 ± 4.21	12.87 ± 4.84	13.39 ± 5.19	14.66 ± 3.47	13.69 ± 4.82
Type of JIA						
Oligoarticular	19	6	25			
Poliarticular	3	0	3			
Other	1	1	2			
Type of occlusion						
Class I	7	3	10	20	7	27
Class II	4	–	4	2	–	2
Class III	–	2	2	1	–	1
Asymmetric	10	2	12	–	–	–
Crossbite						
Dx	1	–	1	–	–	–
Sx	3	–	3	–	–	–
Bilateral	4	–	4	–	–	–
No crossbite	15	7	22	23	7	30

or bilaterally, and in several studies [10,11,13], it has been shown that among patients with TMJ involvement, 40–50% experience unilateral manifestations while bilateral involvement can be up to 74% [14,15].

It has been well established that the TMJ is characterized by adaptive growth and maintains greater remodeling capacity in the adulthood, with respect to other joints [16,17]; when JIA involves the TMJ, one of the two sides might be affected more severely with respect to the other, leading to asymmetrical mandibular growth, unstable occlusion, disturbed TMJ and masticatory function, asymmetrical loading of joints and muscles, TMJ pain, and a compromised esthetic appearance [8,18,19]. Joint asymmetries may develop with reduced growth especially on the affected side, and the chin deviating to the same side, often associated to a molar asymmetrical Class II malocclusion [20–22]. Recent studies show that early and appropriate treatment of TMJ involvement by JIA determines positive results and can improve mandibular vertical growth [19,23–25].

Advances in diagnostic technology have allowed us to gain accuracy in identifying early signs of impairment of joint structures. Using the Cone Beam Computed Tomography (CBCT) method, it was shown that condylar asymmetry was a common feature in children with JIA. The degree of asymmetry was variable, but significant in the majority of the subjects [2,26,27]. Farronato et al. [27] showed a significant difference between the volumetric values of the affected versus normal side; this was true especially for the condyle region, but there was no statistical difference between right versus left side [28].

Orthopantomography is a widespread, non-invasive method for evaluating the dental development during growth; sophisticated methods for diagnosing condylar lesions [29] are used for a precise diagnosis.

The aim of the study was to evaluate, using OPTs, the condylar and ramal mandible asymmetry of JIA patients, with respect to normal subjects. The hypothesis was to detect condylar and ramal asymmetry in OPT, as an indicator of TMJ involvement.

Material and methods

Subjects

A total of 30 patients (23 girls and 7 boys; mean age = 12.87 ± 4.8477 years) with a confirmed diagnosis of JIA according to the ILAR 2003 criteria and 30 orthodontic subjects were included in this retrospective study after informed consent was obtained. Patients were included if they had (1) a confirmed diagnosis of JIA, (2) regular follow-up by a pediatric rheumatologist, and (3) no history of temporomandibular disease (TMD). All patients had a panoramic radiograph.

Patients were excluded if they had (1) incomplete medical records, (2) presence of congenital or acquired facial anomalies (e.g., hemifacial microsomia, cleft lip and palate, Treacher Collins syndrome, or TMJ ankylosis), (3) a history of facial fractures, (4) previous intra-articular procedures (e.g., steroid injections or operations), (5) TMD, and (6) presence of medical comorbidities not allowing for OPT radiography (e.g., severe scoliosis limiting neck movement).

Patients were referred to the Orthodontics divisions for routine orthodontic and dental screening; until that moment, patients were free of specific symptoms and no involvement of TMJ was suspected. Patients were asked about the first manifestation of JIA and if they have ever suffered of TMJ symptomatology (articular clicking, locking, or functional limitations).

The control group was selected to be age and sex matched with the first group and was comprised of 30 patients, JIA free, with normal occlusion, 23 girls and 7 boys; mean age = 13.69 ± 4.822 years. The inclusion criteria were (1) no significant medical history, (2) normal growth and development, (3) bilateral molar class I with minor or no crowding, (4) no crossbite, (5) no functional deviation of the mandible, and (6) no history of trauma or previous orthodontic or prosthodontic treatment or maxillofacial or plastic surgery. The age and sex distributions in the two groups are shown in the Table.

Clinical and instrumental data

For each patient, the occlusal diagnosis was evaluated clinically and on the model casts.

To quantify asymmetries between the mandibular condyles and the rami, the method introduced by Habets et al. [30] was used. This method compared vertical heights of the mandibular right and left condyles and rami. Panoramic radiographs were traced and measured with a digital calliper by one operator (R.C.) in a blind way, not knowing whether they belonged to patient or control group.

The outlines of the condyle and the ascending ramus of both sides were traced on acetate paper. On the tracing paper, a line