

TEMPOROMANDIBULAR JOINT IN RHEUMATOIS ARTHRITIS – A COMPLEX IMAGING APPROACH

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ABSTRACT

Rheumatoid arthritis (RA) is one of the main chronic inflammatory rheumatic disorders characterized by chronic destructive peripheral arthritis as well as a wide range of systemic features, resulting in irreversible damage, significant disability, functional impairment and altered quality of life. Clinical temporomandibular joint (TMJ) involvement is commonly reported in up to 80% of RA patients. Although conventional radiological examination remains an important tool for diagnosis and assessment of TMJ disease, newer modern techniques including TMJ ultrasound, CT and cone beam CT (CBCT) are largely available and able to depict earlier changes in the TMJ. This report presents the clinical case of an established RA, emphasizing the potential diagnostic algorithm and therapeutic options for TMJ arthritis

Key words: rheumatoid arthritis, temporomandibular joint arthritis, Cone beam computed tomography

INTRODUCTION

Although its fundamental role in nutrition and mastication, temporomandibular joint (TMJ) is frequently neglected by practitioners in routine activity; however, TMJ pathology account for a wide range of conditions, from mechanical and degenerative (osteoarthritis) entities to inflammatory and destructive arthritis. Irrespective of the type of pathology, pain and TMJ dysfunction, particularly when performing mouth opening and restriction of the mandibular motion are commonly reported by the majority of patients suggesting TMJ involvement [1-3].

Rheumatoid arthritis (RA) is one of the main chronic inflammatory rheumatic disorders characterized by chronic destructive peripheral arthritis as well as a wide range of systemic features, resulting in irreversible damage, significant disability, functional impairment and altered quality of life [4-6].

It is a complex multifactorial syndrome, with clinical, pathobiologic and therapeutic heterogeneity, touching up to 2% of the general population. Although RA is typically defined by a bilateral and symmetrical pattern of arthritis involving small joints of the hands and feet, medium and big size joints may also be affected, including TMJ [7].

The prevalence of TMJ arthritis is broadly important; since 1874 when Garrod mentioned for the first time TMJ issues in RA in one out of four patients, different researchers demonstrated clinical TMJ involvement, with a frequency between 2 to 86% depending on patient selection, type of examination and criteria for defining TMJ arthritis [8].

TMJ arthritis during rheumatoid arthritis is typically bilateral and symmetrical, labelled by inflammatory pain and pain during mouth opening, swelling, dysfunction related initially to inflammation and later by tissue damage with gradually impaired joint mobility and significant altered quality of life, accompanied by prolonged morning stiffness (over 30 minutes) [9-11]. Clicking and other joint sounds regularly occur later, particularly during the closing and opening of the mouth. Furthermore, joint ankylosis may develop in severe aggressive destructive TMJ arthritis

Imaging studies play a key role in the diagnosis of TMJ arthritis, assessing not only the severity and structural damage progression, but also monitoring efficacy of therapy [12,13]. Although commonly used, *panoramic X-ray* remains inappropriate for an early and complete diagnosis of TMJ involvement. Modern imaging techniques such as *ultrasound* and *cone beam computed tomography (CBCT)* are actually used for both diagnosis and therapeutic follow-up [14-18].

Ultrasonography is able to identify detailed lesions of all TMJ structures such as the condyle, glenoid cavity, meniscus, ligaments and synovium; inflammatory conditions such as RA are commonly characterized by inflammatory TMJ synovitis, with or without Doppler signal depending of disease activity, and active or inactive erosions [19].

CBCT as the cutting-edge technology in the field of imaging allows three-dimensional viewing of scanned areas; different lesions are highlighted early and with great accuracy

through these exposures, leading to early treatment and the development of an appropriate therapeutic protocol.

Further we will focus on a clinical case of TMJ involvement in a patient known with rheumatoid arthritis, emphasizing the potential diagnostic algorithm and therapeutic options.

CASE REPORT

We present the case of a 44-year-old woman with six years history of rheumatoid arthritis admitted to the outpatient rheumatology department with a complaint of inflammatory pain in the left jaw region and discomfort during mouth opening since last two months.

A complex clinical and imaging approach aiming to investigate disease activity as well as TMJ involvement was performed.

Clinical examination of the left TMJ revealed pain, limited range of motion associated with pain while maximum unassisted mouth opening (20 mm), lateral excursion and deviation of mandible toward left side while opening mouth was noticed. Furthermore, crepitus during mouth opening as well as tenderness on TMJ and masticatory muscles at palpation were also reported.

Lab exam revealed high inflammatory syndrome based on both ESR and CRP levels increased up to 2.5 and 3.2 the upper normal limit, respectively, and high titres of rheumatoid factor and anti-cyclic citrullinated peptide antibody.

As TMJ involvement require a dual, rheumatologic and dental evaluation, an extended assessment of TMJ was done by an experienced dentist; moreover, intra orally exam focused on carious, dental erosions and periodontal diseases (inflammation, periodontal pocket, recession) was realized. (Figure1,2)



Figure 1. Deviation aspect of the right-hand side chin



Figure 2. Presence of the 1,75 mm right-hand side lateral deviation during the mandibular dynamics

Imaging studies of TMJ comprised (i) the *panoramic X-ray* depicting irregular erosions in the left condyle and decreased joint space both on right and left side; (ii) *ultrasonography* showing TMJ arthritis with proliferative synovitis and Doppler signal grade II, active erosions of the left condyle; (iii) *TMJ tomography both open and closed mouth* revealing morphological changes of the left condyle with dynamic dysfunction.(Figure 3).

From the static point of view, the present TMJ tomography offers the image of a different positioning of the left condyle compared to the right one, aspects associate moreover with the higher depth of the right-hand side glenoid cavity compared to the left-hand side one.

Regarding the open mouth aspect, we observe the slipping of the left condyle at the articular slop level, compared to the right-hand side one, which position itself such that it does not surpass the articular tuber. The aspects presented at the temporal-mandibular tomography level are perfectly stackable on the mandibular dynamics' trajectories, emphasised in the clinical plan, which offers a much larger length of the condylar trajectory on the left-hand side than on the right-hand side. The difference between the two condylar excursions finds its significance in the presence of the right-hand side chin lateral deviation (Figure 3).



Figure 3. Radiological aspect of TMJ (TMJ Tomography)

Finally, a CBCT was proposed depicting sclerosis of the outer surface of the condylar head and narrowing of the articular space bilaterally, although more on the left side.

The CBCT represents a high-accuracy imagery investigation which offers certain elements in the corroboration of the mandibular dynamic disorders with disorders of the rheumatoid type present at the temporomandibular joint. Following the coronal and sagittal views analysis, in the hypothesis of the closed and open mouth, we

observe the flattening of the upper bony cortical surface at the level of the left-hand side condyle, morphological aspect which creates the practical premises for the forward slip with the surpassing of the articular tubercle while opening the mouth. Equally, the presence of the discrete erosions at the level of the condylar head mostly on the right-hand side, correlates the rheumatoid disorder with the change of the mandibular dynamics, namely the more reduced right-hand side condylar excursion. (Figure 4 a, b)

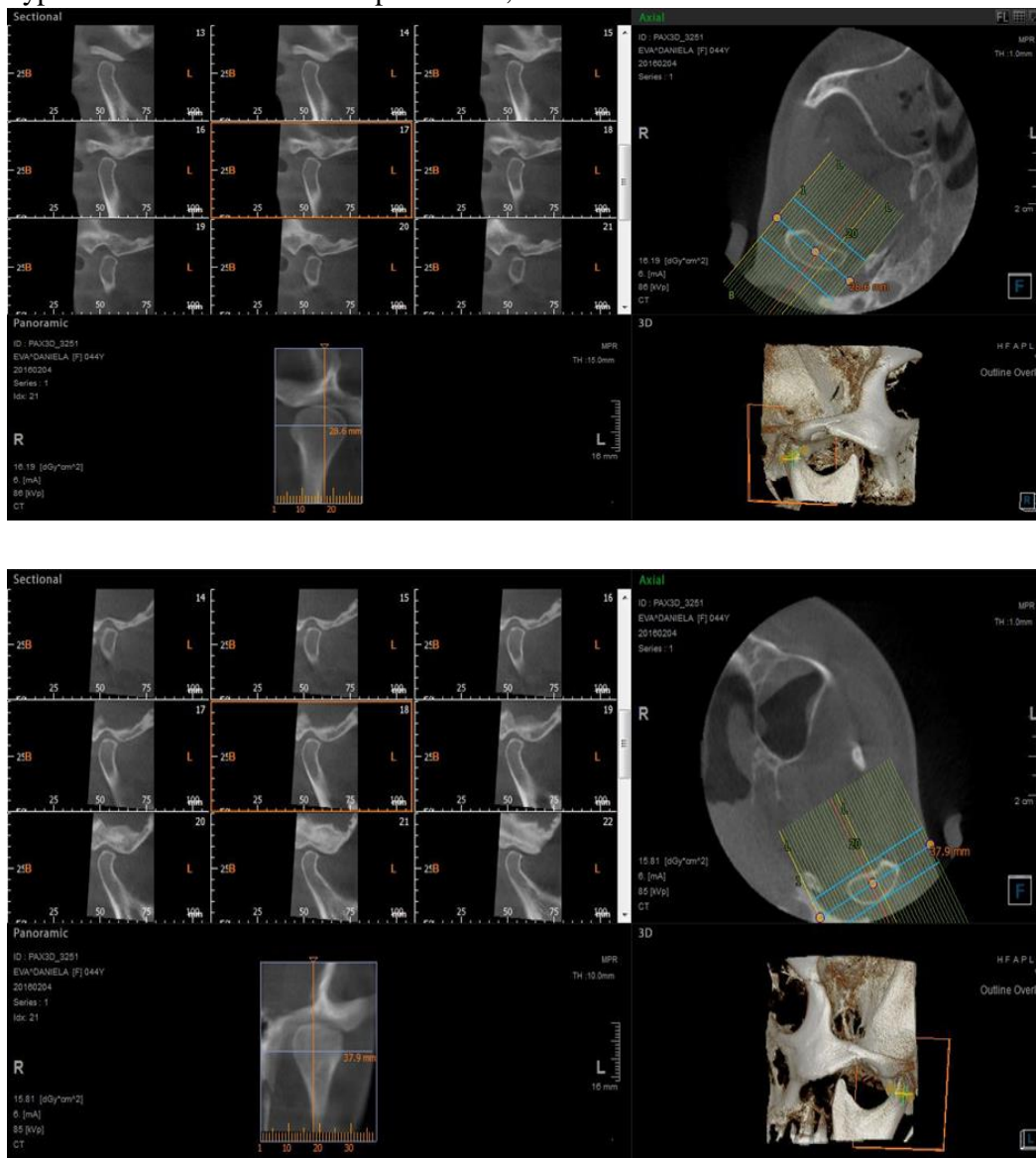


FIGURE 4A, B PRACTICAL ASPECTS OF CLINICAL CASE OF CBCT

DISCUSSION

TMJ arthritis is widely described in patients with different inflammatory immune-mediated rheumatic disorders such as rheumatoid arthritis, juvenile idiopathic arthritis, psoriatic arthritis, systemic sclerosis [3,5,11,19]. Although no clear relation with disease duration and activity, TMJ involvement may become very disabling, with severely impaired quality of life, requiring a complex approach from both multiple sides – rheumatologist, radiologist, dentist, physical therapist.

An overall look shows a highly active RA with a disease activity score DAS28 based on ESR of 5.1 developing a clinically significant TMJ involvement documented on multiple imaging studies. Treatment optimization was mandatory as the disease was suboptimally controlled by current methotrexate 15 mg weekly. The dose was increased reaching the maximal dose of 20 mg weekly and 400 mg daily of antimalarials were added as well as specific measures focused on TMJ arthritis. Physical therapy with laser and ultrasounds aiming to decrease local pain and exercises specifically designed for increasing mouth opening without pain in the TMJ was proposed.

The therapeutic approach of these cases is always anchored in the interdisciplinary registry, requiring both investigations which are typical of TMJ, as well as investigations destined for the rheumatoid pathology.

The temporo-mandibular joint offers a complex pathology, moulded on the rheumatoid disorders which are reflected in the bony structures, aspects which correlate with the mandibular dynamic disorders, in most cases these representing a consequence of the occlusal disequilibria due to

edentation or due to various types of incomplete or depreciated prosthetic rehabilitations. The usual X-rays destined for the TMJ investigations guide the practitioner towards a diagnosis, yet the election methods, known for the accuracy of the details are offered by the CBCT which offers details about the bony surfaces, the possible erosions or any type of change at the bone level.

The complex rehabilitation of these clinical cases is focused both on the therapy at the general level insured by the rheumatology specialist, as well as the specific therapies destined for the functionality of the TMJ, an especially important aspect accruing also to the re-establishment of the correct dento-dental contacts within the context of the morpho-functional re-establishment of each affected dental arch.

In conclusion, our case highlights the involvement of TMJ in RA, the relation between activity and severity of the disease and TMJ arthritis as well as the role of advanced imaging techniques (particularly CBCT) in diagnosing early inflammatory and destructive changes in the TMJ.

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