

## ADVANCED IMAGING FOR THE DIAGNOSIS AND MONITORING OF TEMPOROMANDIBULAR JOINT PATHOLOGY IN SYSTEMIC SCLEROSIS

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### ABSTRACT

Temporomandibular joint (TMJ) involvement with bone resorption of the mandible is a rare complication in systemic sclerosis (SSc), leading to restrictive mandibular movements, malocclusion, difficult swallowing and mastication, and subsequently altered nutrition. We report a case of SSc-related TMJ pathology in a 23-year woman, emphasizing the relevance of advanced imaging. Extensive bone resorption of mandibular condyle revealed on dental panoramic image explains the malocclusion and impaired interincisal opening, while CBCT demonstrates reshaping of the mandibular condyle with cortical lysis, osteophytes, decreased height and flattening. Furthermore, electromyography confirms masticatory muscles involvement.

**Key words:** scleroderma, temporomandibular joint, mandibular condyle lysis, CBCT

### Introduction

Systemic sclerosis (SSc) is a chronic multisystem autoimmune condition characterized by a complex pathobiology focused on vasculopathy, extensive collagen production leading to skin and internal organ fibrosis, and immune system activation [1]. Specific disease features including skin and microvascular damage (Raynaud's phenomenon, digital ulcers) and organ involvement such as heart (myocardial damage, fibrosis of the conduction system, pericardial disease), lung (interstitial lung disease, pulmonary arterial hypertension), digestive (gastroesophageal reflux disease), renal (scleroderma renal crisis) and musculoskeletal (sclerodactyly, synovitis, joint contractures) account for a heterogeneous clinical profile largely correlated with specific serological profile, impaired quality of life and increased mortality rate [2-5].

Moreover, patients with scleroderma often present with different oral manifestations

comprising progressive microstomia with limited oral aperture, sicca oral syndrome (xerostomia and the decrease of salivary secretion), periodontal disease, widening of the periodontal ligament space, bacterial infections and TMJ involvement [1-9]. Orofacial involvement occurs as result of excessive and extensive fibrosis of the oral soft tissue or related to the presence of mucosal vasculopathy. Furthermore, the risk of oral pathology is increased by poor oral hygiene, related to hand disability secondary to sclerodactyly, acro-osteolysis and/or hand arthropathy (non-erosive or erosive arthritis) [1-9].

Often clinically symptomatic (pain, tightness, clicking and locking when opening and closing the mouth.), the SSc-related TMJ pathology is also related to mandibular condylolysis, resorption of the mandibular angle or the coronoid process identified in up to a third of patients leading to severe limitation of mandibular dynamics.

This case highlights the role of advanced imaging for the assessment of TMJ pathology in patients with SSc.

### Case report

A 23-year old woman was referred by the rheumatologist to a dental clinic with progressive limited mouth opening and pain in the left periauricular region associated with tenderness in the masseter muscle and stiffness of the jaws. She was recently diagnosed with SSc (ACR/EULAR SSc Classification Criteria Committee) based on inflammatory polyarticular involvement, mild to severe digital vasculopathy, diffuse skin involvement

and sclerodactyly; she was under specific immunosuppressants (methotrexate) and symptomatic drugs [10].

*Oral assessment.* Intraoral examination identified several dental problems, as follows: 2 mm left-sided deviation of the inferior interincisive line, partially reduced edentulism, periodontal lesions in incipient stages, accompanied by modifications of the gingival festoon in the context of anomalies of tooth position, as well as modifications of the static occlusion parameters with non-uniformly distributed contacts (Fig. 1).



Fig. 1. Intraoral clinical aspects

TMJ assessment. TMJ was clinically symptomatic including pain, preauricular tenderness, stiffness, sounds, malocclusion, reduced maximal interincisal opening with significant impairment of the quality of life. Impaired mandible dynamics, with lateral deviation to the left during mouth opening as well as asymmetrical condylar movements

paths (longer on the right) accompanied by condylar asynergism were also demonstrated.

The panoramic radiograph showed extensive left condylar head resorption, almost to complete flattening. The angle of the mandible, coronoid processes and posterior borders of both ascending rami were not involved (Fig. 2).



Fig. 2. The panoramic radiograph

In addition, the *tomography in open and closed-mouth positions* provided a clear image of the morphological modifications of the condyle and glenoid cavity, pointing out

asymmetrical path movements, as the right condyle path movement is longer than the left one (Fig. 3).

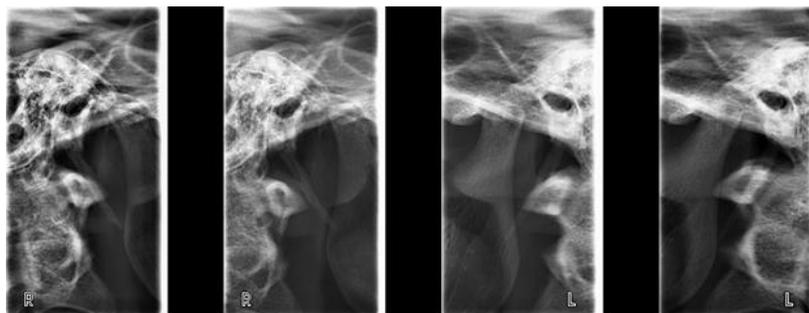


Fig. 3. TMJ tomography

Cone beam computed tomography (CBCT) was also performed; sagittal, transversal and coronal sections and 3D views showed mandibular condylar process remodeling with cortical lysis, small areas of

internal and external osteophytic formation associated with decreased height and flattening of the condylar head, as well as class I mandibular deficiency malocclusion with incongruence at the frontal level (Fig. 4).



Fig. 4. CBCT aspects of the right/left ATM

Finally, we checked for the masticatory muscle involvement as mandible dynamics could also be related to impaired muscle function; electrodes were applied bilaterally directly on temporal, masseter and genioglossus muscles. Electromyography

confirmed increased activity of left-side masticatory muscles, while decreased activation of masticatory muscles on the right-side and an iso-linear trajectory derived from the right temporal muscle (Fig. 5).

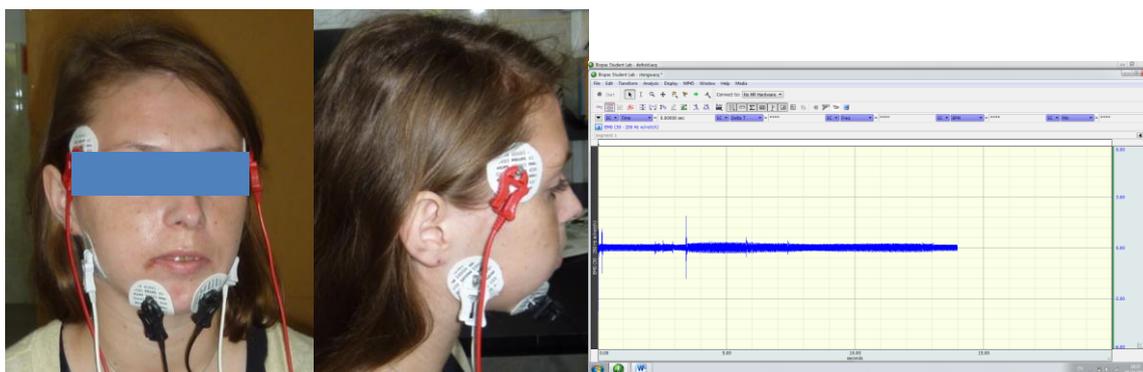


Fig. 5. Aspects of electrodes and electromyographic activity of masseter muscle: left side

The diagnosis of SSc-related temporomandibular disorder was concluded.

A complex management was proposed to our patient aiming at deconditioning, repositioning and, subsequently, mandibular

reconstruction. Oral rehabilitation comprised conservative techniques for the correction of the static and dynamic occlusion (rest, reassurance and jaw-opening exercises) as well as physical therapy for improving

myofascial pain and jaw movements (ultrasound, laser, massage on the bilateral masseter and temporal muscles and exercises); morphological and functional reconstruction at the frontal level by means of PMMA crowns was also performed bearing in mind to reconstruct the architecture of the gingival festoon, and a relaxant nocturnal occlusal splint was indicated.

The patient was regularly monitored; significant improvement in TMJ symptoms was reported at one month, particularly for increased mouth opening, decreased myofascial pain, while muscle flexibility was only partially upgraded, probably due to SSc itself.

### DISCUSSIONS

We presented a case of unilateral extensive mandibular condylitis with subsequent altered mandibular dynamics and impaired functioning of masticatory muscles in a young female with a recent onset SSc, emphasizing the importance of a standardized imaging assessment.

Although patients with SSc present a wide range of oral changes, only up to one third develop mandibular resorption, particularly in longstanding disease; the most commonly affected remains the mandibular angle (40%), but also the condyle (20%) and the coronoid process (20%), even atrophy of the mandible with significant lesions [8, 9].

Periodontal status revealed minor changes in this case, including widening of the periodontal ligament space, but without signs of root resorption. Oral vasculopathy is the main factor responsible for local ischemia and susceptibility to develop periodontal disease, with or without increased tooth mobility, gingival recession and reduced amount or absence of the attached gingiva [1]. However, dental erosions as a result of local acidic environment subsequent to SSc gastroesophageal reflux was not reported.

Early diagnosis and treatment are essential in such cases to avoid extensive damage and surgery for correction, as SSc is characterized by progressive fibrosis and ischemic damage with potential negative impact on factors impairing on oral hygiene status (mouth opening, hand dysfunction).

Treatment protocol focuses on several mandatory stages as deconditioning, provisional restorations, intraoral splint, followed by a successful implant-prosthetic rehabilitation with ceramic crowns.

### CONCLUSIONS

Regular dental follow-up is always required in SSc patients as oro-facial manifestations, including TMJ pathology, may develop. A complex imaging is essential for early diagnosis and intervention leading to successful functional outcomes, even in extensive mandibular condylitis as in this case

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