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Magnetic Resonance Imaging Features of Degenerative and Inflammatory Temporomandibular Joint Diseases: A Scoping Review

Características Imagenológicas en Resonancia Magnética de las Enfermedades Degenerativas e Inflamatorias de la Articulación Temporomandibular: Una Revisión de Alcance

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SUMMARY: Degenerative and inflammatory diseases of the temporomandibular joint (TMJ) exhibit wide clinical and structural variability. Magnetic resonance imaging (MRI) is considered the reference method for comprehensive TMJ evaluation, as it enables simultaneous visualization of osseous and soft tissues. The aim of this study was to identify and describe MRI imaging features observed in patients with degenerative and inflammatory TMJ diseases, as well as their association with clinical findings reported in the literature. A scoping review was conducted in accordance with the Cochrane Handbook recommendations and PRISMA guidelines. Searches were performed in the Medline, Embase, Scopus, and Web of Science databases, and studies involving humans aged 18 years or older with a diagnosis of degenerative or inflammatory TMJ diseases evaluated by MRI were selected. Seventeen studies were included, comprising a total of 1,644 subjects and 3,288 temporomandibular joints. The most frequent imaging finding was disc displacement, with a predominance of displacement without reduction, followed by joint effusion and disc morphological alterations. At the osseous level, the most prevalent changes were osteophyte formation, condylar deformity, and condylar erosion. The association between imaging findings and clinical symptoms was variable, with significant structural alterations observed in both symptomatic and asymptomatic joints. MRI allows accurate identification of structural and functional TMJ alterations associated with degenerative and inflammatory diseases. However, imaging findings do not always correlate with clinical presentation; therefore, their interpretation should be integrated with clinical evaluation.

KEY WORDS: Magnetic resonance imaging; Degenerative disease; Temporomandibular joint.

INTRODUCTION

The temporomandibular joint (TMJ) is a synovial joint composed of the mandibular fossa of the temporal bone, the articular eminence, and the condylar process of the mandible, which are separated by an articular disc and collectively allow mandibular movements to occur without pain or other functional disturbances (Iturriaga *et al*., 2023). Temporomandibular disorders (TMDs) are considered multifactorial in etiology and may be attributed to both physical and psychosocial factors, involving an absence or deficiency of the joint's adaptive response, which may be associated with pain, joint sounds, locking, or other functional limitations (Li & Leung, 2021). Although pain is not present in all cases of TMDs, when it does occur, its incidence tends to increase over time, with female patients older than 46 years exhibiting a higher risk of progression to degenerative joint disease (Kapos *et al*., 2020).

Degenerative changes in the TMJ result from dysfunctional remodeling due to a reduced adaptive capacity of the articular surfaces or from functional overloading that exceeds the joint's adaptive threshold, leading to degenerative alterations and the development of various

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morphological and functional deformities (Tanaka *et al*., 2008). Among degenerative joint diseases, osteoarthritis is the most prevalent, followed by, juvenile idiopathic arthritis, and rheumatoid arthritis, which in advanced stages may lead to reduced maximum incisal opening, dietary modifications with a preference for soft to liquid foods, and pain associated with decreased mandibular function (Ravelo *et al*., 2025).

CBCT is considered as the gold standard for the assessment of osseous changes in the temporomandibular joint (TMJ), due to several inherent advantages. Such changes may include flattening, erosion, sclerosis, among others (Szczes´niak *et al*., 2024). Nevertheless, CBCT lacks the capability to adequately evaluate soft tissues or to identify conditions such as joint effusion, synovitis, and disc displacement (Dhabale & Bhowate, 2022). Therefore, magnetic resonance imaging (MRI) has been extensively employed as a complementary modality for diagnosis and patient follow-up.

MRI is a non-ionizing imaging modality with high accuracy and contrast resolution that enables visualization of internal structures, assessment of joint motion, and differentiation between soft and hard tissues (Niraj *et al*., 2016). Initially, MRI was used as a diagnostic tool for the temporomandibular joint, salivary glands, and soft tissue pathologies; however, over time, its application has expanded across various dental specialties. Because it does not involve ionizing radiation, repeated examinations can be safely performed for follow-up or monitoring purposes, particularly in children and adolescents (Flügge *et al*., 2023).

Through the use of MRI, it is possible to detect joint abnormalities that cannot be identified with other imaging modalities, with internal derangements related to disc displacement being the most prevalent condition approximately 80 % of cases are asymptomatic; although, joint effusion and disc deformities or perforations may also be observed (Larheim, 2005). Early and accurate joint diagnosis may allow anticipation and optimization of the management of TMJ dysfunctions, as disc displacements without reduction are associated with disc deformities, sclerosis, and joint effusion, which may be related to advanced degenerative joint disease and chronic pain (Dias *et al*., 2025).

Despite the widespread use of MRI as the reference standard for TMJ evaluation, imaging findings associated with degenerative and inflammatory diseases show considerable variability across studies, as well as an inconsistent clinical correlation with reported symptoms. In this context, there is a need to integrate the available evidence regarding MRI-detected imaging features in degenerative and inflammatory TMJ disorders.

The aim of this study was to identify and describe the imaging features observed on magnetic resonance imaging in patients with degenerative and inflammatory temporomandibular joint diseases, as well as their association with clinical findings reported in the literature.

MATERIAL AND METHOD

A scoping review was conducted in accordance with the reported following the updated The PRISMA extension for scoping reviews (PRISMA-ScR) guidelines. This review aimed to address the following research question: ¿What imaging features are observed on magnetic resonance imaging in patients with degenerative articular diseases of the temporomandibular joint? The PICO framework was defined as follows: P:subjects aged 18 years or older with degenerative and/or inflammatory TMJ diseases; I:articular diagnosis by magnetic resonance imaging; C:imaging parameters characteristic of degenerative joint disease; O:prevalence of imaging features and their association with clinical signs.

A systematic literature search was conducted using Medical Subject Headings (MeSH) terms and Boolean operators (AND/OR) in English, Portuguese, and Spanish, covering studies published up to March 2025. The search was performed in the Medline, Embase, Scopus, and Web of Science databases. The terms included using the AND/OR operators were as follows: ((((Magnetic Resonance Imaging [MeSH Terms]) OR (MRI scanner)) OR (Magnetic Resonance Image)) OR (MRI)) AND ((TMJ osteoarthritis OR Temporomandibular Joint Osteoarthritis OR tmj osteoarthrosis OR Temporomandibular Joint Osteoarthrosis OR TMJ-OA OR TMJ arthritis OR Temporomandibular Joint arthritis OR TMJ degeneration)).

Data selection was performed by two independent investigators who were calibrated using a Kappa index (0.72) over a two-week period (V.R. and G.O.). After applying the search terms, duplicate records were removed using Mendeley software version 2.90.0 (Reference Management, Elsevier, London, England). Articles were independently screened by two reviewers based on titles and abstracts according to the predefined inclusion and exclusion criteria (V.R. & G.O.). In cases of disagreement, consensus was reached through discussion or consultation with a third reviewer (M.P.). References that appeared to meet the inclusion criteria were subsequently assessed in full text by the same reviewers. The reviewers were not blinded to the authors or journals of the identified studies.

Studies involving human patients aged 18 years or older with degenerative and/or inflammatory

temporomandibular joint disorders diagnosed by magnetic resonance imaging and without previous interventions were included. Studies were excluded if they involved samples of fewer than 10 patients, subjects with facial deformities or craniofacial anomalies, animal or cadaveric models, or if the full text was not available.

RESULTS

The database search identified 1,949 records, of which 912 were excluded due to duplication (Fig. 1). After duplicate removal, 1,037 articles were screened analysis titles and abstracts. Subsequently, according to the established inclusion and exclusion criteria, 17 studies were selected for full-text review and descriptive analysis (Leeuw *et al*., 1996; Barbiera *et al*., 1997; Bertram *et al*., 2001; Emshoff *et al*., 2002; Bernhardt *et al*., 2007; Campos *et al*., 2008; Honda *et al*., 2008; Ozcan *et al*., 2008; Badel *et al*., 2012; Hiz *et al*., 2012; Kretapirom *et al*., 2013; Uchiyama *et al*., 2013; Li *et al*., 2018; Toshima & Ogura, 2020; Takaoka *et al*., 2021; Kiliç *et al*., 2023; Xu *et al*., 2023).

A total of 17 studies were included, all of which aimed to evaluate imaging features observed on magnetic resonance imaging in degenerative and inflammatory temporomandibular joint diseases, as well as their relationship with clinical manifestations and specific structural alterations (Table I). Most studies were conducted in Asia, predominantly in Japan and China, followed by Europe, with investigations originating from Germany, Austria, Italy, and Croatia. In addition, three studies were identified from Turkey, while Latin America was represented by a single study from Brazil.

The included studies analyzed a total of 1,644 subjects, with a mean age of 46.58 ± 8.24 years, and demonstrated a clear predominance of female patients (n = 1,369) compared with male patients (n = 275). Regarding joint diagnosis, temporomandibular joint osteoarthrosis was the most frequently reported condition, followed by rheumatoid arthritis and other forms of inflammatory arthritis. Overall, 3,288 TMJs were evaluated, of which 2,696 (81.9 %) exhibited some degree of structural alteration as evidenced by MRI.

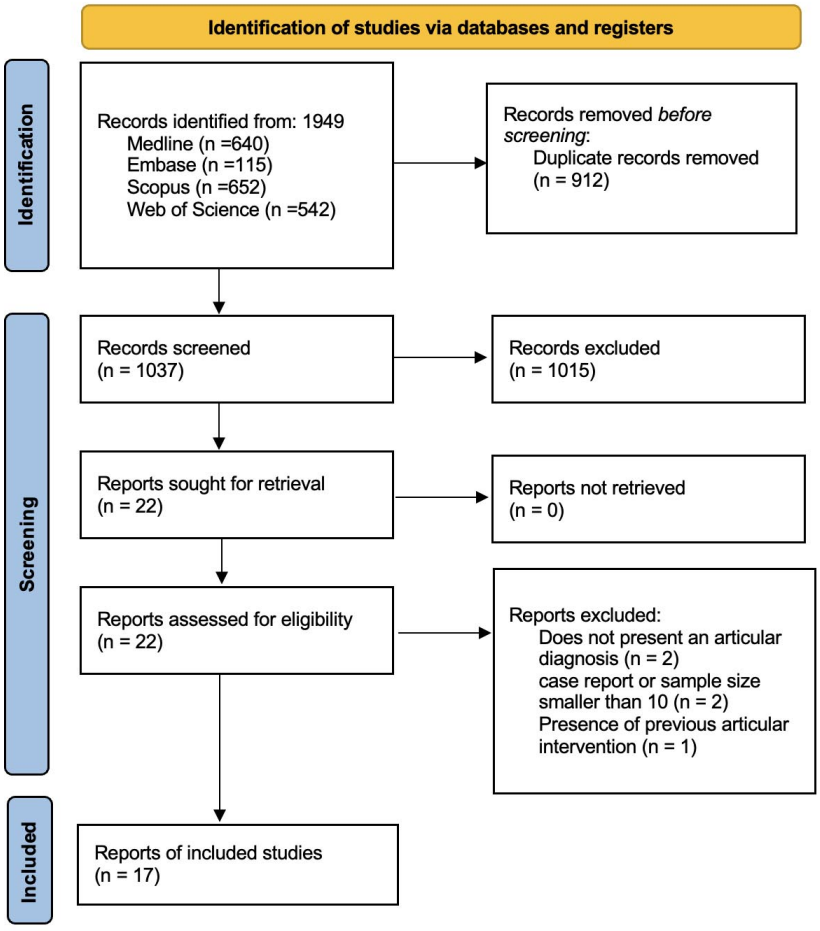


Fig. 1. Flow diagram of the literature search and selection of included studies.

Table I. Studies included in the review, detailing the main objective of each investigation and its country of origin.

Authors	Objective	Country
Leeuw *et al.*, 1996	To evaluate the current clinical and radiographic status of TMJs with a 30-year history of osteoarthrosis and internal derangements, and to study the relationship between radiographically detectable degenerative changes and disc position.	Germany
Barbiera *et al.*,1997	To define the use of magnetic resonance imaging in the evaluation of rheumatoid arthritis.	Italy
Bertram *et al.*, 2001	To assess the relationship between TMJ pain and MRI findings, internal derangement, and osteoarthrosis.	Austria
Emshoff *et al.*, 2022	To evaluate whether unilateral TMJ pain in patients is associated with MRI findings of osteoarthrosis and/or joint effusion.	Austria
Bernhardt *et al.*, 2007	To assess whether pain and joint sounds in a non-patient group are reliable predictors of degenerative joint diseases.	Germany
Campos *et al.*, 2008	To compare TMJ pain and MRI characteristics in joints with and without degenerative condylar changes.	Brazil
Honda *et al.*, 2008	To evaluate the relationship between degenerative osseous changes of the condylar surfaces and disc displacement without reduction, and whether osseous changes limit disc and condylar movement on MRI.	Japan
Ozcan *et al.*, 2008	To analyze clinical, laboratory, and MRI findings in 43 patients with rheumatoid arthritis and correlate findings related to TMJ involvement.	Turkey
Badel *et al.*, 2012	To compare clinical and radiological findings in patients with unilateral or bilateral TMJ osteoarthritis with or without disc displacement and asymptomatic volunteers without disc displacement.	Croatia
Hiz *et al.*, 2012	To examine TMJ involvement in patients with rheumatoid arthritis in relation to bite force and mouth opening, and to correlate MRI findings with disease duration.	Turkey
Kretapirom *et al.*, 2013	To investigate characteristic MRI findings of rheumatoid arthritis in the TMJs and compare them with MRI findings of temporomandibular disorders.	Japan
Uchiyama *et al.*, 2013	To determine the relationship between the duration of rheumatoid arthritis and TMJ condition using MRI.	Japan
Li *et al.*, 2018	To investigate the diagnostic accuracy of MRI in conjunction with histopathological examination after surgical treatment in osteoarthritis patients and determine its predictive value for TMJ OA diagnosis.	China
Toshima & Ogura, 2020	To investigate MRI characteristics of patients with temporomandibular joint osteoarthrosis.	Japan
Takaoka *et al*, 2021.	To determine categories of TMJ osteoarthritis–associated features and disc positional and dynamic abnormalities.	Japan
Kiliç *et al.*, 2023	To compare the diagnostic accuracy of CBCT alone versus MRI alone in patients with clinical symptoms of TMJ osteoarthritis.	Turkey
Xu *et al.*, 2023	To develop a new MRI-based reconstructed method to measure effusion volume and evaluate its association with TMJ arthralgia.	China

Note: TMJ: temporomandibular joint; MRI: magnetic resonance imaging; CBCT: cone-beam computed tomography; OA:osteoarthritis; RA: rheumatoid arthritis.

During clinical assessment, pain on palpation was the most commonly reported sign, whereas crepitation and joint clicking were observed less frequently, reflecting the clinical variability of degenerative and inflammatory TMJ diseases (Table II). Only the study by Toshima & Ogura (2020), did not report the total number of affected TMJs, providing data solely on the number of subjects.

Regarding MRI-evaluated articular disc imaging findings, disc displacement was the most frequently reported alteration, identified in 1,311 temporomandibular joints. Among these cases, disc displacement without reduction was clearly predominant (1,062 joints), whereas disc displacement with reduction was observed in 249 joints. In addition, seven studies (Leeuw *et al.*, 1996; Barbiera *et al.*,

1997; Badel *et al*., 2012; Kretapirom *et al*., 2013; Li *et al*., 2018; Takaoka *et al*., 2021; Xu *et al*., 2023) reported that, in the presence of degenerative disease with disc displacement, the disc was predominantly positioned anteriorly, while one study (Campos *et al*., 2008) indicated that a posterior disc position was more prevalent in disc displacement with reduction.

Furthermore, eight studies (Barbiera *et al*., 1997; Ozcan *et al*., 2008; Kretapirom *et al*., 2013; Uchiyama *et al*., 2013; Li *et al*., 2018; Toshima & Ogura, 2020; Kiliç *et al*., 2023; Xu *et al*., 2023) reported morphological alterations of the articular disc, including deformation, shortening, and perforation, findings that were more frequently observed in joints with advanced degenerative disease. Joint effusion was described in 341 joints and was mainly reported in studies evaluating inflammatory arthritis and advanced-stage osteoarthrosis. In two studies (Barbiera *et al*., 1997; Li *et al*., 2018), joint effusion was accompanied by disc perforation, while in others it was associated with disc deformation and destruction (Ozcan *et al*., 2008; Uchiyama *et al*., 2013), as well as the presence of pain (Emshoff *et al*., 2002; Toshima & Ogura, 2020; Xu *et al*., 2023). Only the study by Bernhardt *et al*. (2007), reported the presence of posterior ligament fibrosis of the TMJ, which was associated with a reparative mechanism.

Table II. Characteristics and imaging findings assessed by magnetic resonance imaging in degenerative and inflammatory temporomandibular joint diseases.

Authors	N	Sex (M/F)	Age (years)	Joint Diagnosis	Affected TMJs	Clinical Assessment	Imaging Diagnosis
Leeuw *et al.*, 1996	46	9 / 37	59.0	Osteoarthrosis	55	15 TMJs with clicking / 18 TMJs with crepitation	TMJs with DDwR and DDwoR
Barbiera *et al.*,1997	14	3 / 11	57.5	Rheumatoid arthritis	24	ND	Disc abnormalities and one case of perforation
Bertram *et al.*, 2001	131	19 / 112	36.4	Osteoarthrosis	176	102 TMJs with pain on palpation and movement	TMJs with DDwR and DDwoR
Emshoff *et al.*, 2022	112	15 / 97	38.2	Osteoarthrosis	173	99 TMJs with pain on palpation and movement	Joint effusion
Bernhardt *et al.*, 2007	77	16 / 61	20–49	Osteoarthrosis	107	21 TMJs with pain on palpation / 34 with crepitation	DDwR, DDwoR, posterior ligament fibrosis
Campos *et al.*, 2008	52	NR	40.8	Degenerative changes	104	56 TMJs with joint pain	DDwR and DDwoR
Honda *et al.*, 2008	28	1 / 27	50.1	Degenerative changes	37	37 TMJs with clicking	DDwoR
Ozcan *et al.*, 2008	43	6 / 37	51.9	Rheumatoid arthritis	86	21 TMJs with clicking / 19 with crepitation	Synovial proliferation, DDwoR, joint effusion, disc destruction
Badel *et al.*, 2012	30	5 / 25	52.5	Osteoarthrosis	35	57 TMJs with pain / 48 with crepitation	DDwoR, osteophytes, subchondral cysts, articular eminence sclerosis
Hiz *et al.*, 2012	30	7 / 23	38.8	Rheumatoid arthritis	55	24 TMJs with pain	Joint space narrowing and condylar destruction
Kretapirom *et al.*, 2013	61	10 / 51	50.0	Rheumatoid arthritis	101	ND	DDwoR, DDwR, joint effusion, disc deformity, condylar, eminence and fossa deformity
Uchiyama *et al.*, 2013	26	3 / 23	52.0	Rheumatoid arthritis	52	ND	DDwR, DDwoR, effusion, condylar deformity and erosion
Li *et al.*, 2018	100	10 / 90	44.8	Osteoarthrosis	153	25 TMJs with clicking / 18 with crepitation / 53 with pain	DDwR, DDwoR, disc perforation, joint effusion
Toshima & Ogura, 2020	61	15 / 46	51.6	Osteoarthrosis	NR	40 subjects with TMJ pain	DDwR, DDwoR, joint effusion
Takaoka *et al*, 2021.	678	149 / 529	44.8	Osteoarthrosis	1,356	ND	DDwR, DDwoR, lateral DD, osteophytes, condylar alteration and deformity
Kiliç *et al.*, 2023	52	7 / 45	30.4	Osteoarthrosis	83	52 TMJs with pain, crepitation, limited movement	DDwR, DDwoR, effusion, condylar deformity
Xu *et al.*, 2023	103	NR	<18	Osteoarthrosis	99	62 TMJs with pain	DDwoR, joint effusion, disc deformity

Note: TMJ: temporomandibular joint; MRI: magnetic resonance imaging; CBCT: cone-beam computed tomography; OA: osteoarthritis; RA: rheumatoid arthritis; DD:disc displacement; DDwR:disc displacement with reduction; DDwoR_disc displacement without reduction; ND: not describe.

Regarding MRI evaluated osseous tissue imaging findings, condylar changes were the most frequently reported alterations **(Table III).** The most prevalent finding was osteophyte formation, identified in 305 condyles (Campos *et al*., 2008; Honda *et al*., 2008; Ozcan *et al*., 2008; Badel *et al*., 2012; Uchiyama *et al*., 2013; Li *et al*., 2018; Takaoka *et al*., 2021), followed by 138 erosions of the condylar surface (Barbiera *et al*., 1997; Campos *et al*., 2008; Honda *et al*., 2008; Hiz *et al*., 2012; Kretapirom *et al*., 2013; Uchiyama *et al*., 2013; Takaoka *et al*., 2021) and 169 cases of condylar deformity (Barbiera *et al*., 1997; Honda *et al*., 2008; Ozcan *et al*., 2008; Badel *et al*., 2012; Hiz *et al*., 2012; Kretapirom *et al*., 2013; Li *et al*., 2018; Takaoka *et al*., 2021).

With respect to adjacent structures, Barbiera *et al*. (1997), reported that in advanced degenerative disease the articular fossa may appear enlarged, wedge-shaped, and severely flattened, whereas the articular eminence may be narrowed and flattened. Only the study by Emshoff *et al*. (2002), reported that joint pain was present in subjects with joint effusion. Conversely, disc displacement without reduction was associated with adaptive changes related to degenerative joint disease, and the presence of pain was not consistently associated with disc displacement.

Table III. MRI findings of the temporomandibular joint and adjacent osseous structures in degenerative and inflammatory diseases.

Authors	MRI descriptions
Leeuw *et al.*, 1996	Thirteen TMJs showed disc displacement with reduction and 26 permanent disc displacement. In most cases, the disc was positioned anteriorly. TMJs with DDwR showed more clicking, whereas those with permanent displacement showed more crepitation.
Barbiera *et al.*,1997	Anterior disc displacement was observed in 3 TMJs. Articular surface erosion was found in 6 TMJs, condylar flattening and shortening in 9, and one case of severe disc perforation. Joint effusion or intermediate-signal tissue was observed in 8 TMJs.
Bertram *et al.*, 2001	Seventy-four TMJs (28.2 %) presented DDwR, and 102 (38.9%) showed disc displacement without reduction.
Emshoff *et al.*, 2022	Joint effusion was observed in 71 TMJs.
Bernhardt *et al.*, 2007	Seventy-three TMJs showed disc displacement (28 DDwR and 45 DDwoR). Posterior ligament fibrosis was observed in 60 TMJs.
Campos *et al.*, 2008	Twenty-nine TMJs showed DDwoR and 47 DDwR. DDwoR was associated with condylar osseous changes. Condylar flattening was observed regardless of disc position in degenerative joints.
Honda *et al.*, 2008	Twenty-three joints presented irregular disc morphology. DDwoR was more frequent in pathological osseous changes. Osseous changes included osteophytes (14), erosions (6), deformities (6), and flattening (11).
Ozcan *et al.*, 2008	The most frequent finding was synovial proliferation (44 TMJs), followed by DDwoR (23), irregular disc morphology and osteophytes (11), effusion (8), and disc destruction (7).
Badel *et al.*, 2012	Anterior disc displacement was observed in 1 3 patients; only one showed DDwR. Flattening and osteophyte formation were observed in eight osteoarthritic joints.
Hiz *et al.*, 2012	Mild condylar irregularity and minimal joint space narrowing were observed in 23 TMJs; significant erosion and narrowing in 22; complete condylar destruction in 10.
Kretapirom *et al.*, 2013	Six TMJs showed DDwR, 57 DDwoR, and 3 lateral DD. Osseous erosion, condylar resorption, eminence/fossa deformity, and effusion were frequently observed.
Uchiyama *et al.*, 2013	DDwR was observed in 7 TMJs and DDwoR in 12. Joint effusion was seen in 40 joints. Limited or absent condylar mobility was observed in 65.4%. Osseous changes included erosion, flattening, osteophytes, and resorption.
Li *et al.*, 2018	One hundred forty-nine TMJs showed DDwoR and four DDwR. Disc perforation (24) and effusion (25) were observed. Osseous changes included condylar deformity, flattening, and osteophytes.
Toshima & Ogura, 2020	DDwR was observed in 12 subjects and DDwoR in 49; 35 subjects presented joint effusion.
Takaoka *et al*, 2021.	MRI revealed 457 TMJs with anterior DDwoR and 88 with lateral DD. Additional findings included flattening, osteophytes, erosions, subchondral cysts, and atrophic deformities.
Kiliç *et al.*, 2023	Joint effusion was detected in 30 joints and disc perforation/degeneration in 11. DDwR was observed in 37 TMJs and DDwoR in 23.
Xu *et al.*, 2023	Fifty TMJs showed shortened discs with inadequate condylar coverage. Effusion was observed in 81 TMJs, 78 of which were associated with anterior DDwoR.

Note: TMJ: temporomandibular joint; MRI:magnetic resonance imaging; DD: disc displacement; DDwR: disc displacement with reduction; DDwoR: disc displacement without reduction.

DISCUSSION

TMJ Osteoarthritis (OA) has a clinically relevant prevalence and is recognized as a chronic degenerative joint disease that affects both the articular cartilage and the subchondral bone (Cardoneanu *et al*., 2022). The term arthrosis is used to describe the same entity from a predominantly structural perspective, characterized by chondrocyte dysfunction and loss, progressive degradation of the extracellular matrix, and subchondral bone remodeling processes responsible for the morphological and functional changes observed in the TMJ (Wang *et al*., 2015; Li *et al*., 2021). Both conditions may develop in the absence of clinical signs, and the severity of degenerative disease does not always correlate with pain intensity (Gandhi *et al*., 2024).

Based on the present review, clinical symptoms were present in only a limited number of cases associated with the reported alterations, with several diagnoses representing asymptomatic imaging findings. Studies such as those by Uchiyama *et al*., (2013) and Li *et al*. (2018), have reported that the presence of joint pain is associated with disease duration and advanced stages of degenerative joint involvement, in which mandibular condylar erosion was observed within 5 to 10 years of joint degeneration, whereas resorption appeared in patients with more than 20 years of disease progression.

The presence of excessive or prolonged mechanical overload on the TMJ may lead to uncontrolled cortical bone degradation, flattening of the articular compartments, and osseous alterations such as sclerosis and osteophyte formation; additionally, it may result in articular disc deformity and a chronic degenerative process (Cardoneanu *et al*., 2022). In the present review, the most prevalent diagnostic features observed in patients with osteoarthritis or rheumatoid arthritis included flattening and deformity of the mandibular condyle, reduction of the joint space, and the presence of joint effusion. Alterations in the shape or function of the articular disc and inflammatory signs in adjacent soft tissues showed the strongest association with joint pain. Li *et al*. (2024), compared subjects with temporomandibular disorders and joint effusion with those without effusion and found that joint sounds, muscle contracture, and anterior disc displacement with reduction were high-risk factors for joint effusion. Joint pain demonstrated a strong association with the presence of effusion, with an odds ratio of 8.463, indicating that patients with joint pain were more than eight times more likely to present joint effusion than those without pain. This finding reinforces the clinical value of joint pain as a relevant marker of active intra-articular inflammation in patients with temporomandibular disorders.

Several studies (Ferras *et al*., 2012; Kim *et al*., 2016; Choi *et al*., 2025) have highlighted the diagnostic value of cone-beam computed tomography (CBCT), as it provides high diagnostic accuracy and detailed anatomical assessment of morphological changes in osseous structures. However, CBCT exposes patients to ionizing radiation and does not allow evaluation of soft tissues. In contrast, MRI enables visualization of the condylar process, the articular disc, and periarticular soft tissues and is considered the gold standard for TMD evaluation, as it allows dynamic imaging and assessment of joint changes during movement, thereby facilitating evaluation of joint function (Zhou *et al*., 2025).

Cortés *et al*. (2011), reported that the use of MRI allows comprehensive assessment of articular disc morphology and its position within the joint, while also enabling evaluation of the risk of developing degenerative joint diseases in subjects with temporomandibular disorders, as an association exists between disc displacement without reduction and degenerative osseous changes. Kiliç *et al*. (2023), compared the diagnostic accuracy of CBCT alone and MRI alone in patients with clinical symptoms of TMJ osteoarthritis and observed that CBCT was more sensitive than MRI for detecting condylar erosion, condylar osteophytes, flattening of the condyle, and flattening of the articular eminence. Regarding disease progression, they also found that the severity of degenerative changes detected by CBCT was associated with abnormal disc position on MRI. Alkhader *et al*. (2010), evaluated the diagnostic accuracy of MRI for assessing osseous abnormalities of the TMJ and reported high specificity (85-98 %) for identifying joint changes and deformities. However, MRI may present certain limitations in detecting osseous deformities due to its limited spatial resolution, related to slice thicknesses of 3 mm or greater. Based on the present analysis, all included studies consistently demonstrated that MRI allows detection of both structural and functional TMJ alterations, including disc displacement, osteoarthritic changes, joint effusion, and condylar erosions.

Degenerative diseases of the TMJ are not necessarily associated with progressive functional impairments, such as limited mouth opening or pain on TMJ palpation; therefore, the prevalence of certain MRI findings may be more closely related to aging than to pathological changes (Eriksen *et al*., 2020). For this reason, MRI provides high specificity in the identification of internal joint structures and is considered the imaging modality of choice for follow-up and monitoring of degenerative TMJ diseases (Sefer & Erguven, 2024).

The results of this systematic review indicate that a substantial proportion of TMJs evaluated by MRI exhibited significant structural alterations, even in the absence of

clinical symptoms. The most frequent imaging findings included disc displacement, particularly without reduction, joint effusion, and osteoarthritic changes of the mandibular condyle, such as flattening, erosions, and osteophyte formation. These findings reinforce the concept that degenerative and inflammatory TMJ diseases may follow a progressive and clinically silent structural course, and that MRI should be interpreted as a complementary tool within a comprehensive diagnostic approach. This approach allows identification of articular remodeling patterns and tissue changes associated with advanced stages of disease, rather than serving as an isolated predictor of pain or joint dysfunction.

CONCLUSION

Magnetic resonance imaging provides detailed information on the structural and functional alterations of the temporomandibular joint, allowing early identification of imaging features associated with degenerative and inflammatory diseases, such as disc displacement, joint effusion, and osteoarthritic changes of the mandibular condyle. These findings may be present in both symptomatic and asymptomatic individuals. MRI represents a fundamental tool for the diagnosis, follow-up, and longitudinal monitoring of TMJ joint diseases when integrated with clinical evaluation.

RAVELO, V.; OLATE, G.; TORRES, H.; OLATE, S. & PARRA, M. Características imagenológicas en resonancia magnética de las enfermedades degenerativas e inflamatorias de la articulación temporomandibular: Una Revisión de Alcance. *Int. J. Morphol., 44(4)*:1380-1388 2026.

RESUMEN: Las enfermedades degenerativas e inflamatorias de la articulación temporomandibular (ATM) presentan una amplia variabilidad clínica y estructural. La resonancia magnética (MRI) constituye el método de referencia para la evaluación integral de la ATM, al permitir la visualización simultánea de tejidos óseos y blandos. El objetivo de este estudio fue identificar y describir las características imagenológicas observadas mediante resonancia magnética en pacientes con enfermedades degenerativas e inflamatorias de la ATM, así como su asociación con los hallazgos clínicos reportados en la literatura. Se realizó una revisión de alcance de acuerdo con las recomendaciones del Manual Cochrane y las directrices PRISMA. Se efectuó una búsqueda en las bases de datos Medline, Embase, Scopus y Web of Science, seleccionándose estudios en humanos mayores de 18 años con diagnóstico de enfermedades degenerativas o inflamatorias de la ATM evaluadas mediante MRI. Se incluyeron 17 estudios que analizaron un total de 1.644 sujetos y 3.288 articulaciones temporomandibulares. El hallazgo imagenológico más frecuente fue el desplazamiento discal, predominando el desplazamiento sin reducción, seguido de la presencia de derrame articular y alteraciones morfológicas del disco. A nivel óseo, los cambios más prevalentes fueron la formación de osteofitos, la deformidad y la erosión condilar. La asociación entre los hallazgos imagenológicos y la sintomatología clínica fue variable, observándose alteraciones estructurales significativas tanto en articulaciones sintomáticas como asintomáticas. La resonancia magnética permite identificar de manera precisa las alteraciones estructurales y funcionales de la ATM asociadas a enfermedades degenerativas e inflamatorias. Sin embargo, la presencia de hallazgos imagenológicos no siempre se correlaciona con la expresión clínica, por lo que su interpretación debe realizarse de forma integrada con la evaluación clínica.

PALABRAS CLAVE: Resonancia magnética; Enfermedad degenerativa; Articulación temporomandibular.

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