



**ORIGINAL RESEARCH PAPER**

**Medical Science**

**RELATION OF DISC DISPLACEMENT WITH ARTICULAR BONE ALTERATIONS. LITERATURE REVIEW**

**KEY WORDS:** temporomandibular disorders, internal disorders, disc displacement.

**Javiera Rojas Donaire**

Universidad Finis Terrae.

**María Jesús Zárata Piffardi\***

Universidad Finis Terrae. \*Corresponding Author

**Paulina Gacitúa Cartes**

Universidad de Chile.

**Constanza Reveco Padilla**

Universidad Andrés Bello.

**ABSTRACT**

Temporomandibular Disorders (TMD) are a significant public health problem<sup>1</sup>. The main joint disorders are internal disorders and degenerative changes<sup>2</sup>. Magnetic resonance and computed tomography are the most suitable methods to detect TMDs, since they show relevant information regarding the structures that make up the TMJ.

**INTRODUCTION**

Temporomandibular Disorders (TMD) are a significant public health problem, affecting approximately 5% to 12% of the world population<sup>1</sup>.

One of the most common TMDs is internal disorders (IDs) of the TMJ<sup>3</sup>.

**Temporomandibular joint TMJ**

It is the area in which the jaw articulates with the temporal bone of the skull<sup>4</sup>. Ginglimoarthrodial type joint<sup>5</sup>, since it allows hinge and sliding type movements<sup>6</sup>.

**Anatomical considerations**

Bilateral joint that consists of two synovial joint cavities made up of a fibrous capsule, which gives stability. Interposed between the TMJ condyle and the fossa is the articular disc, which is a dense fibrocartilaginous plate without innervation or vascularization that is normally described with a biconcave morphology<sup>7</sup>.

**Joint disorders**

They are abnormal conditions that affect the chewing muscles, TMJs, and associated neurological structures<sup>8</sup>.

**Prevalence**

TMDs are a significant public health problem, affecting approximately 5% to 12% of the world population<sup>1</sup>.

They can affect individuals of any age group, with the highest prevalence in women between 20 and 35 years of age. In minors and adolescents, the prevalence varies between 6% and 68%<sup>9</sup>.

However, the main joint disorders are internal disorders and degenerative changes in both soft and hard tissues of the TMJ<sup>2</sup>.

**Internal disorders of the TMJ: Disc Displacement**

Disc displacement or internal disorder (ID) is classified as: disc displacement with reduction (DDR) and disc displacement without reduction (DDSR)<sup>6</sup>.

**Disc shift with reduction**

In this case the articular disc has moved anterior to the

condylar head. It can also be displaced medially or laterally. The disc remains in this position as long as the mouth is closed. When the mouth is opened, the disc is again placed in the condylar head.

It may give rise to a click, click and / or popping sound.

Because the disc shrinks during condylar translation, the range of motion is not limited.

**Disc displacement with intermittent locking reduction**

This condition is identical to DDR, with the additional feature of limited intermittent jaw opening on occasions when the disc is not reduced<sup>6</sup>.

**Disc shift without reduction with limited opening**

This diagnosis occurs when the articular disc is not reduced consistently, resulting in a limited opening (<40 mm between the incisal edges with opening assisted by the dentist).

**Disc shift without reduction without limited opening**

This condition is identical to the previous condition, with the exception that the mandibular movement is not limited. It usually follows the previous condition<sup>6</sup>.

**Posterior displacement of the disc**

The posterior band of the disc is in apparent contact with the bilaminar area. With posterior displacement of the disc, deocclusion of the posterior teeth occurs on the affected side, typically decocusing approximately 1 mm. The deviation from the midline to the affected side may not be seen.

**DEGENERATIVE CHANGES: ARTICULAR BONE ALTERATIONS**

Degenerative bone changes in the TMJ are the result of dysfunctional bone remodeling due to a decrease in the adaptive capacity of its articular surfaces and / or due to the functional overload of the joint, which exceeds the normal adaptive capacity<sup>10</sup>. In such cases it may have an association with osteoarthritis<sup>11</sup>.

However, in some cases, the joints undergo degenerative changes that may not exhibit clinical characteristics indicative of the disease, thus emphasizing the importance of diagnosing osteoarthritis through imaging<sup>8</sup>.

**DISC DISPLACEMENT RELATIONSHIP / BONE ANOMALIES**

There is a significant association between disc position and degenerative bone changes in the TMJs, in subjects with Ids<sup>12</sup>.

Several authors reported that the incidence of degenerative changes is almost twice as likely when there is DDR compared to normal discs and is more than four times more likely in the presence of DDSR<sup>8</sup>.

Alterations in the position or morphology of the disc can be interpreted as predisposing factors that increase the risk of signs and symptoms of TMJ disorders or as factors that favor the appearance of long-term degenerative diseases, such as osteoarthritis<sup>13</sup>.

**DIAGNOSTIC METHODS**

The diagnosis implies a combination of a correct filling of the medical history that involves questionnaires, clinical examinations and complementary imaging exams<sup>14</sup>.

As part of clinical examinations, the evaluation of joint sounds is considered a key diagnostic criterion in the determination of TMDs. Unfortunately, the clinical detection of joint sounds is not so easy, and must be performed with the help of a stethoscope<sup>15</sup>.

Gil C et al<sup>16</sup> evaluated the relationship between the clinical and imaging diagnosis of internal disorders and the results confirmed that clinical diagnosis is not a reliable tool compared to imaging findings.

Among the auxiliary imaging exams for TMJ we have: panoramic radiographs that can show alterations or remodeling of the condylar morphology; the transcranial radiography shows the condylar translation, and the computed tomography would show, in detail, the joint morphological changes. Only magnetic resonance imaging (MRI) allows us to visualize if the disc is displaced<sup>17</sup>. This is why MRI is the most reliable imaging technique for evaluating internal disorders<sup>8</sup> since it offers adequate contrast between soft tissue and in order to observe the articular disc, determining its position, its configuration and the shape of its structure,<sup>10</sup> which shows significant differences between normal TMJ and in patients with displacement of the disc. Furthermore, it does not expose the patient to ionizing radiation or biological hazards. This radiographic technique provides clear sectional images of soft and hard tissue structures and reveals intra-articular pathologies associated with Id<sup>18</sup>.

MRI is the Gold Standard for the imaging techniques used to visualize TMJ<sup>8</sup>, which allows the representation of inflammatory changes within the joint space, cartilage abnormalities, bone remodeling and positional changes of the articular disc<sup>15</sup>.

Computed tomography (CT) is considered the best method for studying bone changes in TMJ<sup>16</sup> and is a reliable diagnostic method to determine the presence of morphological changes in the condyle and the articular surface of the temporal bone, which can be interpreted like degenerative bone changes. It can also provide excellent images of the first changes in the bone in the presence of degenerative diseases<sup>10</sup>, such as osteoarthritis, since it allows the elimination of anatomical overlap of structures and measurements and adjustments in brightness and contrast, among other tools provided by the software that it uses for its reproduction improving the quality of the evaluation of the tomographic image<sup>19</sup>.

**CONCLUSION**

- TMDs can affect individuals of any age group; children,

adolescents, adults and older adults.

- The female sex is more susceptible to the development of TMDs.
- There is controversy regarding age and osteoarthrotic changes in TMJ, since some authors postulate that the prevalence increases with age, and others maintain that there is no evidence indicating that osteoarthrosis is age dependent.
- There is a strong correlation between degenerative bone changes and ID, with DDSR generating the greatest joint changes.
- Clinical diagnosis alone does not correspond to a reliable tool, it must be complemented with radiographic methods.
- MRI and CT are the most suitable methods to detect TMDs, since they show relevant information regarding the structures, with MRI being the Gold Standard for visualizing TMJ, since it provides clear, sectional images of soft and hard tissue, revealing pathologies associated with ID.

**REFERENCES**

- Schiffman et al. Diagnostic Criteria for Temporomandibular disorders (DC/TMD) for Clinical and Research Applications: Recommendations of the International RDC/TMD Consortium Network and Orofacial Pain Special Interest Group. *J Oral Facial Pain Headache*. 2014;28(1):1-26.
- Stern M. Clinical Assessment of Patients with Orofacial Pain and Temporomandibular Disorders. *Dent Clin N Am* 2013;57:393-404
- Maglione HO, de Zavaleta LA, Laraudo J, Falisi G, Fernandez F, et al. Temporomandibular dysfunction: internal derangement associated with facial and/or mandibular asymmetry. *Cranio*. 2013;31:276-282.
- Kannan A, Sathivasubramanian S. Comparative study of clinical and Magnetic resonance imaging diagnosis in patients with internal derangement of temporomandibular joint. *J Indian Acad Oral Med Radiol* 2011;23:569-75.
- G Pérez, J Reyes, et al. Anatomía de la articulación temporomandibular. *Med Oral*. 2011;XIII:69-72.
- Young A, et al. Internal derangements of the temporomandibular joint: A review of the anatomy, diagnosis, and management. *The Journal of the Indian Prosthodontic Society*. 2015;15(1):2-7
- de Farias J. F. G., Melo S. L. S., Bento P. M., Oliveira L. S. A. F., Campos P. S. F., de Melo D. P., et al. Correlation between temporomandibular joint morphology and disc displacement by MRI. *Dentomaxillofac Radiol*. 2015;44:20150023
- Dias I. M., Devito K. L., Tavares M. L. F., Leite I. C. G., deS Tesch R. et al. Evaluation of temporomandibular joint disc displacement as a risk factor for osteoarthritis. *J. Oral Maxillofac. Surg.* 2015;45:313-317.
- Minghelli B, Cardoso I, Porfirio M, Barreto V, Almeida L. Prevalence of temporomandibular disorder in children and adolescents from public schools in Southern Portugal. *North Am J Med Sci*. 2014;6(3):126-132.
- Cortés D, Exss E, Marholz C, Millas R, Mondaca G, et al. Association Between Disk Position and Degenerative Bone Changes of the Temporomandibular Joints: An Imaging Study in Subjects with TMD. *J Craniomandibular Pract*. 2011;29:117-126.
- Bertram S, Moriggl A, Rudisch A, Emshoff R, et al. Structural characteristics of bilateral temporomandibular joint disc displacement without reduction and osteoarthritis are important determinants of horizontal mandibular and vertical ramus deficiency: a magnetic resonance imaging study. *J Oral Maxillofac Surg*. 2011;69:1898-1904.
- Hee-Seok R, Wook K, Young-K K, Jeong-Yun L, et al. Relationships between disk displacement joint effusion, and degenerative changes of the TMJ in TMD patients based on MRI findings. *J Craniomaxillofac Surg*. 2012;40:283-286.
- de Oliveira R, de Lima N, de Souza L, Lopes K, et al. Magnetic resonance images of patients with temporomandibular disorders: prevalence and correlation between disk morphology and displacement. *Eur J Radiol*. 2013;82:990-994.
- França J, Matos B, De Sena B, Marques L, Gameiro G, Castelo P, Pereira L, et al. Accuracy of temporomandibular joint disc displacement diagnosis in panoramic radiography: Validation by magnetic resonance imaging. *Rev Odonto Cienc*. 2012;27(4):283-288.
- Deregibus A, Castrolforio T, De Giorgi i, Burzio C, Debernardi C, et al. Diagnostic concordance between MRI and electrovibratography of the temporomandibular joint of subjects with disc displacement disorders. *Dentomaxillofac Radiol*. 2013;42.
- Gil C, Santos KCP, Dutra MEP, Kodaira SK, Oliviera JX, et al. MRI analysis of the relationship between bone changes in the TMJ and articular disc position in symptomatic patients. *Dentomaxillofac Radiol* 2012;41:362-377.
- Maldonado N, DDSK, et al. Cambios morfológicos de la ATM en desplazamientos discales evaluados por medio de imágenes por resonancia magnética. *Carta Odontologica*. 2016
- Jung YW, Park SH, On SW, Song SI, et al. Correlation between clinical symptoms and magnetic resonance imaging findings in patients with temporomandibular joint internal derangement. *J Korean Assoc Oral Maxillofac Surg*. 2015;41:125-132.
- Santos T, Gonzales H, et al. Cambios osteoarthroticos condíleos relacionados al espesor de la superficie articular del temporal y espacio articular temporomandibular según tomografía computarizada cone beam. *KIRU*. 2014;11(1):56-68.