

Evaluation of the compatibility of clinical primary diagnoses with mri reports in patients with temporomandibular disc displacement

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Abstract

Aim: Temporomandibular joint disorder (TMD) is a common disease group in the community that includes chewing muscles and temporomandibular joint (TMJ) components. TMJ diseases are also the main cause of non-odontogenic pain of the orofacial region. The aim of this study is to evaluate the consistency between clinical diagnosis and Magnetic Resonance Imaging (MRI) reports in patients with reduction with disc displacement (DDWR) and reduction without disc displacement (DDWoR).

Materials and Methods: A total of 62 TMJ anamnesis records and MRI results were evaluated by authors. Radiology reports and anamnesis records were divided into two groups according to the clinical primary diagnosis file as DDWR and DDWoR. The clinical and radiographic results were compared each other and the correlation between these results was evaluated statistically.

Results: The study includes sixty-two patients' MRI reports and TMJ clinical anamnesis files (12 males and 50 female) with a mean age of 31.20±13.66 years. In group DDWoR there is only 41.9 % and in group DDWR there is only 45.2 % correlation found between clinical and MRI reports of the patients. Although the values obtained are statistically significant, there is insignificant agreement between in the TMJ clinical anamnesis file and MRI report results. There is no statistically significant difference between primary clinical diagnosis groups in terms of clinical and MRI diagnosis compatibility.

Conclusion: It is concluded that clinical findings determined by the clinicians do not compatible MRI reports determined by radiologist. This may be due to the subjective nature of the clinical findings, and both MRI and clinical results are needed for precise results.

Keywords: Internal derangement; magnetic resonance imaging; temporomandibular joint

INTRODUCTION

Temporomandibular joint (TMJ) is one of the most complex joints in the body and is part of the stomatognathic system, playing a role in chewing, swallowing, and speech (1). Although many terms have been used in the literature for TMJ disorders, temporomandibular disorder (TMD) is a general term describing a clinical problem involving the TMJ chewing system and surrounding tissues. In the clinical situation described by this term, the main symptoms can be pain and tenderness in the TMJ region and chewing muscles, joint sounds, and mandible movement restriction (2).

TMDs are among the primary causes of pain in the orofacial region (1), with at least one TMD symptom present in 20–30% of the adult population (3). TMDs are also among the most misdiagnosed and undertreated diseases. These conditions are not life threatening, but they negatively affect quality of life (4).

Internal derangement (ID) of the TMJ refers to an abnormal relationship between the disc and the condyle fossa and/or articular eminence. Of the possible internal derangements, the most common are disc displacement with reduction (DDWR) and disc displacement without reduction (DDWoR) (5). Trauma, genetic, biological, and psychosocial factors contribute to its etiology. Among these, trauma caused by occlusion and parafunctional habits is the most common disease factor (5).

Anamnesis, clinical, and radiological examination are commonly used for the diagnosis of TMDs. Different diagnostic systems have been introduced to appropriately evaluate the clinical condition of this complex disorder. The research diagnostic criteria for TMDs provide a useful diagnostic method (6).

Significant developments in TMJ imaging methods in recent years have proven useful in diagnosing TMDs (7). One of these imaging methods, magnetic resonance

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imaging (MRI), determines the position, morphology, and signal intensity of the joint disc, providing valuable data for the diagnosis of TMJ pathologies and evaluation of surgical treatment results (8). The multisection images provided by MRI, which facilitate appropriate assessment of soft tissues of the TMJ, also provide a three-dimensional evaluation of the articular disc and the hard tissues around the disc (9). MRI is based on the principle of sending electromagnetic radio waves to the body in a magnetic field and converting the returning signals into images (10). MRI is considered the gold standard in determining TMJ internal derangement (11).

The aim of this study was to evaluate the concordance between primary clinical diagnosis and MRI reports in patients with DDWR and DDWoR.

MATERIALS and METHODS

The Ethics Committee of Harran University, Faculty of Medicine (HRU/20.06.12), approved this retrospective study. Our study was performed using the records of patients admitted to our clinic, Harran University Faculty of Dentistry, Department of Oral and Maxillofacial Surgery, with the complaint of TMJ diseases and for whom records of both clinical (TMJ primary clinical anamnesis files) and radiological (MRI reports) data between April 2017 and January 2020 were available. Primary clinical anamnesis file and MRI reports of patients who were clinically diagnosed with DDWR and DDWoR were included in the study. The records of patients with any pathological condition other than internal derangement in the TMJ region, who underwent surgery on the joint area, or who had a history of radiotherapy of the head and neck region were excluded from the study. A total of 62 combination TMJ anamnesis records and MRI results compatible with these

criteria were evaluated. Radiology reports and anamnesis records were divided into two groups according to the primary clinical diagnosis, i.e., the DDWR and DDWoR groups and patient age and gender were also recorded. The clinical and radiographic results were compared for all patients and also for two different primary diagnose groups, and the relationship between these results were evaluated statistically.

Statistical analysis

Statistical analysis was performed using IBM SPSS V23. The Shapiro–Wilk test was used to determine whether age variables were normally distributed or not for both primary clinical diagnose and MRI report diagnoses. Non-normally distribution of age variables observed for both groupings. Than Mann Withney U test used for statistically evaluation of age variable for different clinical diagnose groups (including 2 group), and Kruskal Wallis Test used for MRI diagnose groups (including 3 groups). Compatibility between the TMJ anamnesis file and MRI records was examined with the Kappa statistic. Comparison of clinical primary diagnosis files with MRI reports for the two primary diagnosis groups was performed using the two-ratio test to compare proportional outcomes from the two data sources. Results are presented as frequency and percentage. The significance level was set at $p < 0.05$.

RESULTS

The study included files comprising MRI reports and TMJ anamnesis files for 62 patients (12 males and 50 females; mean age, 31.20 years (Table 1)). As a result of statistical analysis, when the ages of patients in the diagnosis groups based on clinic and MRI reports are compared, there is no statistically significant difference between the diagnose groups for both groupings (Table 1).

Table 1. Age and gender distribution for both groups. There was no statistically significant difference between the diagnose groups for both groupings

Groups	n	Gender		Mean age±Std. Dev. (min/max)	p	
		M	F			
Clinical diagnose	DDWoR	31	6	25	32.45 ±14.8 (15-78)	
	DDWR	31	4	27	29.96±12.4 (15-63)	0.568
	Total	62	12	50	31.20 (15-78) ±13.66	
Radiological diagnose	DDWoR	18	5	13	32.27±11.71 (20-64)	
	DDWR	21	3	18	27.71±10.65 (15-50)	0.420
	Normal	23	4	19	33.56±17.02 (15-78)	
Total	62	12	50	31.20 (15-78) ±13.66		

Table 2. MRI diagnosis distribution for primary clinical diagnose groups

Clinical Primary Diagnose Reports	n	MRI Diagnose Reports			p
		DDWoR	DDWR	Normal	
DDWoR	31 (100%)	13 (41.9%)	7 (22.6%)	11 (35.5%)	0.798
DDWR	31 (100%)	5 (16.1%)	14 (45.2%)	12 (38.7%)	

In the TMJ anamnesis file, 31 patients were diagnosed with DDWoR. Based on MRI reports, 13 of these patients were diagnosed with DDWoR, 7 with DDWR, and 11 as normal. Similarly, of 31 patients diagnosed with DDWR in the TMJ anamnesis file, 14 were diagnosed with DDWR, 5 with DDWoR, and 12 as normal (Table 2). There was no statistically significant difference between primary clinical diagnosis groups (i.e., the DDWR and DDWoR) in terms of the compatibility between clinical and MRI diagnosis ($p=0.798$) (Table 2). Overall, compatibility was observed between clinical and MRI reports in 27 (43.5%) of the 62

patients. 23 joints were diagnosed as normal in MRI reports which are diagnosed clinically abnormal joints (Table 3). Different categorization was made on MRI reports in 12 (19.4 %) patients. The Kappa value was 0.176 ($p = 0.016$) (Table 3). Although these results were statistically significant, there was no significant agreement between the diagnoses in the TMJ anamnesis file and those in the MRI reports. On the contrary, the results showed significant incompatibility between diagnoses in the TMJ anamnesis files and those based on MRI findings.

Table 3. Distribution of diagnosis in MRI reports for primary clinical diagnosis

	Clinical primary TMD diagnose	Compatible TMD diagnostic rate		Normal TMJ diagnostic rate		Different TMD diagnostic rate		Kappa Value	p
		n	%	n	%	n	%		
Group 1	DDWoR (31)	13	21	11	17.7	7	11.3		
Group 2	DDWR (31)	14	22.5	12	19.4	5	8.1		
Total	62 (100 %)	27	43.5	23	37.1	12	19.4	.176	0.016

DISCUSSION

Internal derangement of the TMJ is defined as an abnormal location of the joint disc located between the tuberculum articulare and the condyle (5). Disc displacement is thought to play a role in the development of IDs. However, the relationship between TMJ-related signs and disc displacement remains unclear (12).

Clinical assessment of TMDs based on physical examination, symptom history, and previous reports have suggested that disc displacement can usually be determined clinically (13). Imaging methods are important for diagnosing problems created by internal derangement, which are common in TMJ (8). A good history should be obtained for the diagnosis of TMJ disorders and intraoral and extraoral clinical examination results should be evaluated together with radiological findings. For the evaluation of radiological findings, the anatomy of the TMJ must be characterized (14).

Previous studies have indicated that TMDs are most common between ages 20 and 40 and exhibit female predominance (15-17). In accordance with this information, the average age of patients in the present study was 31.2 years, and the female/male ratio was 4.16. This female predominance is thought to be caused by more common emotional stress and parafunctional habits. The age distribution and age comparisons of the patients were evaluated according to both clinical and MRI reports. No statistically significant difference was found between the diagnostic groups in both groupings (clinical and MRI). We think that the patients show a similar age distribution in both diagnostic methods.

To correctly diagnose and treat TMDs, the appropriate imaging method is important. Choosing the correct method plays an important role in decreasing morbidity and limiting economic and emotional stress. Cone

beam computerized tomography (CBCT), arthrography, panoramic radiography, and MRI are typically used for diagnostic assessment of the TMJ (18). TMD diagnosis fundamentally depends on patient anamnesis and clinical and radiological assessments. In general, the clinical diagnosis should be confirmed by radiological examination. Although it is generally believed that imaging methods should always be used in internal derangement patients (6), the primary clinical diagnosis and MRI reports were consistent in our study, with 45.2% and 41.9% of patients diagnosed as DDWR and DDWoR, respectively.

However, MRI reports were significantly different from preliminary diagnoses based on clinical examination. This discrepancy occurred due to the significant difference between clinical diagnosis and radiological images; thus, it is important to review diagnostic criteria with the physicians performing clinical examinations and to convey to them the radiologists' knowledge of TMJ anatomy and diseases, which will underpin their interpretation of the MRI images. In both cases, we believe that both clinical assessment and MRI reports should be carefully evaluated. With regard to disc displacement (the first stage of internal derangement), in cases such as fibrous adhesion and perforation, MRI alone is not sufficient for diagnosis. It would be better to support MRI findings with clinical data (8).

A study comparing MRI and clinical evaluations (19) found that in 61% of cases, the TMJ was normal on MRI examination, despite patients' complaints related to the temporomandibular joint. In agreement with this previous study, we found that 37.1% of patients with TMJ complaints showed normal MRI reports. In another study, Brady et al. (13) showed that incorrect categorization was made based on MRI in 16.7% of joints. Likewise, in our study 19.4 % of MRI reports were not compatible with clinical reports.

Sağlam et al. (20) compared pre and post-treatment clinical data in patients with internal derangement based on MR images to confirm the diagnosis. They concluded that the clinical evaluations performed before and after treatment were similar to the pre- and post-treatment MR findings. In another study comparing clinical findings with MRI results, Koca et al. (21) concluded that there is an important relationship between clinical data and MRI findings. In addition, Brady et al. (13) showed agreement between clinical and MRI categorization in 56 of 72 (77.7%) joints. In our study, the agreement between clinical assessment and MRI diagnosis was only 41.9% in DDWoR and 45.2% in DDWR.

In previous studies, normal disc position was observed in 13.8% of symptomatic patients, and displacement was seen in 30% of asymptomatic patients (22-23). In our study, the proportion of normal MRI images in symptomatic patients was higher than in previous reports (37.1 %, Table 3). We believe that this difference may have resulted from socioeconomic, cultural, and demographic differences in the patient population.

Takahara et al. (24) reported a stronger association between TMJ pain and MRI findings in individuals with DDWoR than in those with DDWR. In our study, non-significant associations were found between the primary clinical diagnosis and MRI reports in both the DDWoR group (41.9%) and DDWR (45.2%) group. Comparing the two clinical diagnosis groups, we found no significant differences between the DDWoR and DDWR groups in terms of clinical and MRI diagnosis compatibility ($p>0.05$).

CONCLUSION

There was a weak relationship between the primary clinical diagnoses and MRI diagnoses; this relationship was not significantly different between the DDWoR and DDWR diagnosis groups. Clinical findings by clinicians are often not compatible with MRI reports determined by radiologists. This may be due to the subjective nature of the clinical findings. It is important that both MRI and clinical results increase their diagnostic accuracy.

Conflict of interest: The authors declare that they have no competing interest.

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