Evaluation of the Effects of Rheumatoid Arthritis on the Hard and Soft Tissue Components of the Temporomandibular Joint by Using Magnetic Resonance Imaging

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ABSTRACT

Background : Magnetic resonance imaging (MRI) has been used to visualize the destructive effect of the rheumatoid arthritis (RA) within the body joints , while Temporomandibular joint is often to be neglected.

Aim of the study: to observe the hard and soft tissue changes as well as the clinical involvement that may affect the TMJ in patients with longstanding RA.

Patients and methods: 42 patients (84 TMJ'S), with mean age of (40.6 years) ranged from (28 to 63) years were divided into 2 groups; study (30) and control (12), all study group subjects consisted of patients with confirmed RA according to the criteria of American College Of Rheumatology (1987).Both groups had been examined clinically (at Al-Mustansiriya University/College of Dentistry) and with MRI (at the MRI unit at Al-Kadhmyia Teaching Hospital) in both sagital and coronal planes (open and close mouth) by the use of proton density and T2 weighted protocols.

Results : The clinical involvement was present within (73.3%) of the study sample as the joint's sounds were the predominant feature (80%) , masticatory muscle tenderness tenderness 70% , pain during function 58% ,morning stiffness 36.6% , deviation 43.3% while open bite was present in two cases (6.6%) , 33.3% of the RA patients had at least 3 clinical involvements , 26.6 % had at least 2 clinical involvement, uni-lateral involvement was present in 30% of RA patients, 5 subjects had only right side involvement and 4 patients had only left side involvement while bilateral involvement was present in 50% of RA patients. The mouth opening was significantly lowered (P<0.01) when compared with the control group.MRI findings were present in 80% of the study sample which led to a significant difference statistically when compared with the control group, the most common finding was the condylar head erosion (CHE), complete condylar destruction (score 4) was found in 2 RA patients, internal derangement 73.3%, meniscus perforation 73%, joint effusion 70%, increased joint space 66.6%, and osteophytes formation 60%, unilateral involvement was present in 53.3%, 5 subjects had right involvement only, and 7 subjects had left side involvement, while bilateral involvement was present in 46.7% .

Key Words: Temporomandibular Joint, Rheumatoid Athritis , Magnatic Resonance Imaging , Condylar Head Erosion.

INTRODUCTION

Rheumatoid arthritis is a chronic inflammatory disease characterized by joint swelling, joint tenderness, and destruction of synovial joints, leading to severe disability and premature mortality[(1)].

This inflammatory response particularly affects small joints of the upper and lower extremities including TMJ and it often leads to the deterioration and eventual destruction of articular cartilage and juxta-articular bone, as well as to an inflammatory process surrounding tendons, all of which frequently result in deformities of the affected joints[(7)].

Temporomandibular joints afflicted with RA may produce pain, joint stiffness, difficulties in opening the mouth, and open bite. In severe cases of temporomandibular joint disorders, masticatory movement may be hampered [(2)].

Despite the superior resolution of CT and limited visualization of cortical bone by MRI, most osseous pathology is accurately depicted. Intra-articular abnormalities are readily visible on MRI images, providing further information not available with other imaging modalities [(3)], plus direct visualization of the disk afforded by MRI is a distinct advantage over arthrography.

PATIENTS AND METHODS

This research was carried out on a sample of 42 patients (14 males and 28 female) 84 TMJ's 71.5% of them were previously diagnosed with rheumatoid arthritis according to the revised criteria of ACR (American College of Rheumatology) in 2010 and they were referred from the Rheumatology Unit in Al-kadhmyia Teaching Hospital (all the patients has a medical record within the mentioned hospital) with no other systemic diseases which might have affected the MRI findings .They were divided into two groups (study and control) both groups were clinically evaluated on a dental chair at the Postgraduate Clinic in Al-Mustansirya University/College of Dentistry -Oral Medicine Department regarding the mouth opening ,joints sounds, muscle tenderness, morning stiffness, feeling of pain,pain during movement, and deviation , then the two groups were again examined

radiographicaly by MRI at Al-Kadhmyia Teaching Hospital / MRI Unit done by using proton density T2 weighted protocols in both sagital and coronal plane with bilateral 6x8 cm surface coil placed over the patient's head , each subject was examined -regarding MRI- in two positions , open and the closed mouth.

RESULTS

THE CLINICAL FINDINGS

The clinical involvement was present within 73.3% (see table-1-) of the study group subjects It was found that the mean of the non-assisted mouth opening in the RA group was 3.913 mm while in control group 4.783 mm. The difference was statistically highly significant (P<0.05) (see table-2-), while the most important clinical finding was that the joint sounds 80% , masticatory muscle tenderness 70% , pain during function 58% ,morning stiffness 36.6% , deviation 43.3% while open bite was present in two cases (6.6%),(see table -3-) again all the results were highly significant when compared to the control group (P<0.05) , 33.3% of the RA patients had at least 3 clinical involvements , 26.6 % had at least 2 clinical involvement.

Table 1: Percentage of the clinical involvement within the study & control group

	Study Group Sum=60		Control Group Sum=24		Chi-Square	P-Value
	No.	%	No.	%		
Clinical Involvement	44	73.3	8	33.3	53.00	P<0.01*

Table 2: The mean of the non-assisted mouth opening in both study and control group

	No.	Mean	SD	T-Test	P-Value
Study	30	3.913	0.331	5.492	P<0.01*
Control	12	4.783	0.483		

Table 3: clinical involvement within the study group compared to the control group

	Study group Sum=30		Control group Sum=12		Chi-square	P-value
	No.	%	No.	%		
Normal muscle tone	9	30	10	83.3	19.0	P<0.01*
Masticatory muscle tenderness	21	70	2	16.7	23.0	
Normal joint sounds	12	20	18	75	27.23	P<0.01*
Joint Sounds	48	80	6	25	54.1	
Normal muscle tone	9	30	10	83.3	19.0	P<0.01*
Masticatory muscle tenderness	21	70	2	16.7	23.0	
Patients without morning stiffness	11	36.7	10	83.3	21.0	P<0.01*
Morning stiffness	19	63.3	2	16.7	22.0	
No pain on palpation	18	30	18	75	15.39	P<0.01*
Pain on palpation	42	70	6	25	48.2	
No Pain during movement	50	33.3	23	75	73.9	P<0.01*
Pain During movement	10	16.6	1	4.16	11.8	
Normal mouth opening without deviation	17	56.7	12	100	2.90	P<0.01*
Deviated mouth opening	13	43.3	0	0.0	43.4	
Normal occlusion	28	92.9	12	100	40.1	P<0.01*
Open bite	2	7.1	0	0	3.0	

uni-lateral involvement was present in 30% of RA patients, 5 subjects had only right side involvement and 4 patients had only left side involvement while bilateral involvement was present in 50% of RA patients. Although there was a difference regarding the involvement between the right and the left joint but statistically was considered as non-significant.

Table 4: clinical involvement in a RT. and LT. TMJ pattern

Clinical involvement	RT. joint	LT. joint	Chi square	P value	SIG
Pain on palpation of TMJ	20	22	0.903	0.311	NS
Joint sounds	5	4	1.63	0.075	NS
Pain during movement of the TMJ	5	5	0.38	0.38	NS
deviation	7	6	0.42	0.333	NS
Muscle tenderness	10	11	0.93	0.32	NS

Figure (2): Deviation during maximal mouth opening(to the left)

The MRI findings

MRI findings was present in 80% of the study sample which led to significant difference statistically when compared with the control group (P<0.05) (see table-5-), the most common finding was the condylar head erosion (CHE), complete condylar destruction (score 4) was found in 2 RA patients (see fig.1), internal derangement 73.3%, meniscus perforation 73%, joint effusion 70%, increased joint space 66.6%, and osteophytes formation 60%, again all findings were highly significant (p<0.05) when compared to the control group.(see table -6-) . Unilateral involvement was present in 53.3%, 5 subjects had right involvement only, and 7 subjects had left side involvement, while bilateral involvement was present in 46.7% . There was no statistical difference (non-significant) between the right and left TMJ's MRI findings involvement when compared together . (see table 7)

Table (5): percentage of the MRI findings involvement within the study and control groups

	Study group Sum=60		Control group Sum=24		Chi-square	P-value
	No.	%	No.	%		
MRI involvement	48	80	8	33.3	56.00	P<0.01*

Table (6) : MRI findings involvement findings in both study and control group compared to each other

	Study group		Control group		Chi-square	P-value
	No.	%	No.	%		
Normal disk position	16	26.7	16	66.7	32.0	P<0.01
Internal derangement	44	73.3	8	13.3	56.3	
Intact disk	16	26.6	16	66.6	22	P<0.01
Disk perforation	44	73.3	8	33.3	56.3	
No effusion	18	30	24	100	42	P<0.01
Effusion	42	70	0	0.00	43.4	
Normal joint space	20	33.3	16	66.7	28.8	P<0.01
Joint space increased	40	66.6	8	33.4	48.7	
No osteophytes formation	24	40	20	60	36.7	P<0.01
Osteophytes	36	60	4	40	40.6	

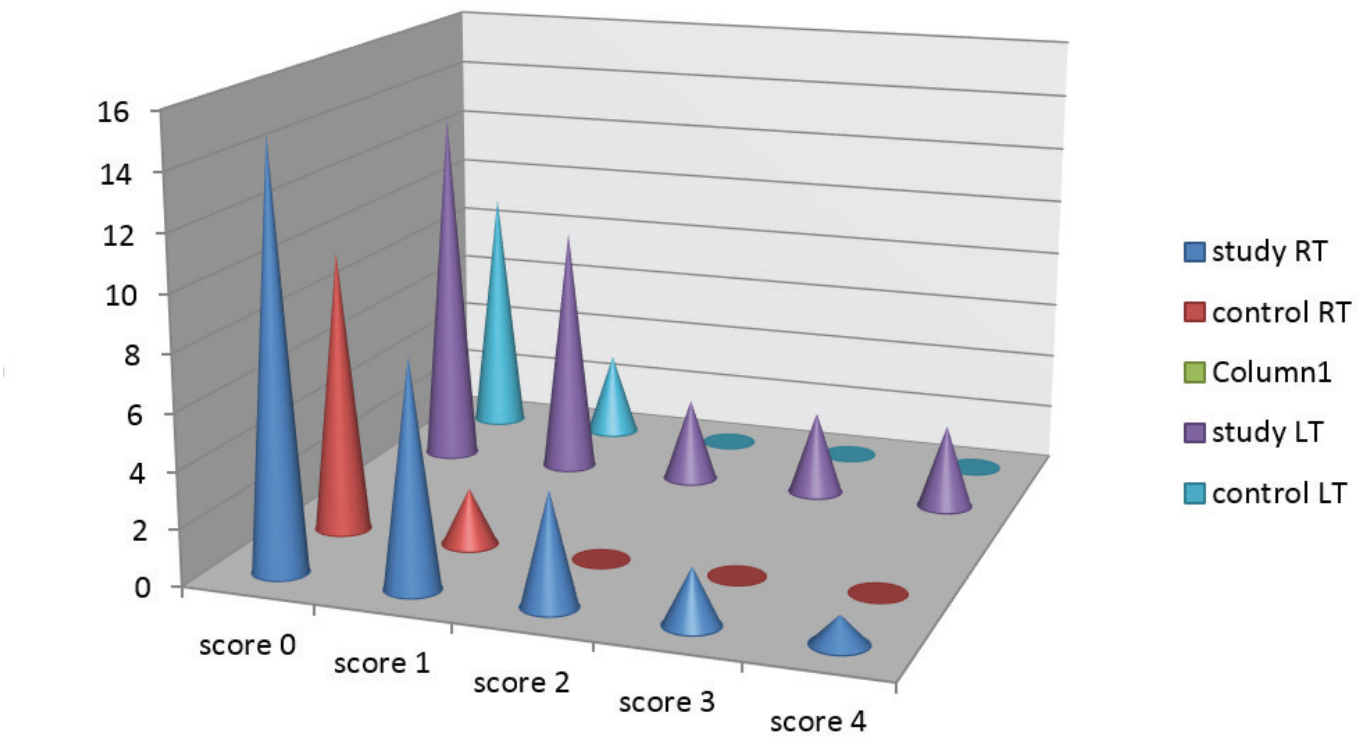

Figure 1: Condylar Head Erosion involvement in both study and control group (RT. & LT pattern)

Table 7: MRI findings involvement in a RT. LT. TMJ involvement

	RT. joint	*LT. joint*	*Chi square*	*P value*	*signal*
Increased joint space	22	18	1.82	0.311	NS
perforation	20	24	1.62	0.44	NS
Joint effusion	20	22	1.63	0.251	NS
Osteophytes	20	16	1.92	0.093	NS

DISCUSSION

The temporomandibular joint (TMJ) may be affected in many rheumatic diseases especially rheumatoid arthritis[7], but the mentioned joint is often neglected during studies and clinical practice In the current study among rheumatic diseases rheumatoid arthritis is the one to be investigated regarding it's role in the clinical and radiographic picture presentation of disability of the TMJ .

It was found that the incidence of RA was more in females than males and that was in agreement with other studies like (Lin YC, 2007)[6] and with (Lipisky 1998)[7]. The age range (45.6 years) ranged from (28 to 63) years and the duration of the disease was (20.6 years) and its effect upon RA subjects coincided with the criteria of RA according to British Society of Rheumatology ,2008.[3] ,and other articles[6,9].

The clinical involvement was present within (73.3%) of the study subjects while joint sounds was considered the most predominant feature and that was in agreement with other previous studies [5,6,9].

While the MRI findings involvement was present

within (80%) of the study group subjects, CHE was considered the most predominant feature and that was in agreement with other previous studies[11,12].

All the recorded clinical and MRI findings were in agreement with other previous studies[1.2.4.5.9.10], but in different percentages and that may be due to the selection of the sample regarding the age ,gender distributions,method used in the measurement, and the type of radiographic aid.

CONCLUSION

MRI is an excellent diagnostic aid of the TMJ in patients with RA The clinical and radiographic findings in the RA group were much more than that in the control group, but the changes are not always bilateral, a significant correlation was found between the extent of MRI findings and the duration RA disease.

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