

The Clinical and Radiographic Features of Temporomandibular Joint Dysfunction in Patients with Rheumatoid Arthritis

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The aims of this study was to investigate the clinical and radiographic features of temporomandibular dysfunction in the patients with RA to elucidate whether the RA patients would be a risk group for TMD. The 35 patients with temporomandibular joint dysfunction were included for this study, of which 15 had rheumatoid arthritis diagnosed by a rheumatologist, and other 20 was control group and they didn't have any history or clinical signs related to it. Clinical symptoms and signs of temporomandibular joint disorders, radiographic and MRI findings of temporomandibular joint were investigated. The results were compared between two groups. In RA group bilateral pain, morning stiffness, reduced opening range, and crepitations were more frequently reported than control group. Radiologic findings such as sclerosis and flattening of condylar head, marginal proliferation, and erosion of glenoid fossa were more frequently observed in RA group than control group. Disk destruction, cortical bone erosion, and intraarticular enhancement were more prominent in RA group. From these results, it can be concluded that many RA patients will develop TMD symptoms and the structural changes of TMJ is more extensive than the usual TMD cases.

Key words: Temporomandibular joint dysfunction, Rheumatoid arthritis, MRI, radiography

I. INTRODUCTION

Rheumatoid Arthritis (RA) is a chronic disease leading to swelling, pain, stiffness, and possible loss of function in various joints. In its later stages, rheumatoid arthritis also affects the temporomandibular joint (TMJ). Clinical and radiological involvement of TMJ in rheumatoid arthritis varies

in the literature. Larheim et al.¹⁾ reported involvement of the TMJ in 50% of rheumatoid arthritis patients, and Ogus²⁾ found a 61% rate of this clinical problem among 62 rheumatoid arthritis patients. Goupille et al.³⁾ reported 61% of the 26 patients with RA had physical signs in the TMJ, compared with 42% in the 26 control subjects, and 69% of RA group had erosive or cystic lesions of the TMJ compared with 31% of control subjects. From these studies it was revealed a pretty many patients with rheumatoid arthritis had signs and symptoms of TMJ involvement. Nevertheless the diagnostic exploration and evaluation for rheumatoid arthritis in the patients with temporomandibular disorders are often neglected.

When the TMJ is involved, there is usually pain,

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tenderness, swelling, crepitation, stiffness on opening the mouth, and limitation of jaw function. Gynther et al.⁴⁾ reported the frequencies of clinical signs and symptoms of TMJ dysfunction in patients with TMJ rheumatoid arthritis. Of 22 TMJ-RA patients, 16 showed reduced opening, 14 revealed crepitation, 11 showed lateral joint tenderness. However, muscle tenderness was revealed only in 2 patients. Recently Ardic et al.⁵⁾ reported a different result that 69.7% of TMJ-RA patients had painful TMJ and 55% had myofascial pain dysfunction according to research diagnostic criteria for temporomandibular disorders (TMD). They assumed that the myofascial pain of the temporomandibular system would be an important cause of pain in rheumatoid arthritis.

In the present study, the clinical and radiographic features of temporomandibular dysfunction in the patients with RA were investigated and compared with those of the usual TMJ disorder patients without RA to elucidate whether the RA patients would be a risk group for TMD.

II. MATERIALS AND METHODS

1. Subjects

The study was conducted in the Department of Oral Medicine, Kyungpook National University Hospital and carried out in total of 35 patients. The patients were divided into two diagnostic groups as follows:

Group A comprised of 15 outpatients with RA referred from the Department of Rheumatology at the same hospital, who had been confirmed as RA patients by the Professor of Rheumatology, fulfilling the criteria of the Revised American Rheumatism Association for RA. The patients were not received any recent treatment of the TMJ symptoms other than analgesics. Mean age of the patients was 59.2 ± 10.4 years and female to male ratio was 20/2.

Laboratory results showed the patients with RA had an elevated erythrocyte sedimentation rate and

C-reactive protein. Active RA was defined by the presence of at least 2 of the following 3 criteria: 6 or more tender joints, 3 or more swollen joints and Westergren ESR of at least 28 mm/h.⁶⁾

Group B as control consisted of 20 patients with TMJ disorder but without RA and other systemic diseases, in which the selection based on age and sex matched to the Group A from the Department of Oral Medicine.

2. History and Examination

After completion of the screening questionnaire about self-assessment of jaw function, a comprehensive clinical history was taken for all patients. And clinical examination for TMJ and masticatory muscles were performed according to the examination protocol used in the Department of Oral Medicine, including measurements of the mandibular movement, palpation of the temporomandibular joints and masticatory muscles, and evaluation of noises from the joints.

3. Radiologic Examination and Interpretation

Panoramic and transcranial views of the TMJ were taken for each patient in two positions of the mandible, in the centric occlusion and with maximum opening. The following abnormalities were evaluated: (a) surface erosion of the condylar head, (b) presence of small cyst-like areas indicating bone loss in condyle, (c) osteophyte formation, (d) sclerosis and flattening of condylar head and the total loss of condyle. According to these changes, the radiographic appearances were assigned to one of the four grades as follows:

Grade 0 : Normal joint, with a well-defined, corticated margin to the joint surfaces.

Grade 1 : Minor changes such as erosion and sclerosis.

Grade 2 : Moderate erosion and irregularities on the surface texture of the condyle. Changes in the form of condyle.

Grade 3 : Severe changes or total erosion of the condyle with loss of the original articular surfaces⁷.

4. Analysis of Magnetic Resonance Imaging

Magnetic Resonance Imaging (MRI) is the most commonly employed imaging technique to visualize the soft tissues of the TMJ. MRI images were recorded using the Sigma 1.5 Tesla MR imaging system (General Electric, Milwaukee, WI, USA) with the use of a 7.62 cm surface coil (GE Medical system). These images were obtained with the patients maintaining a closed and open-mouth position and were oriented perpendicular (sagittal) to the long axis of the condyle head.^{8,9} Position of the disk, shape of cortical bone, and intraarticular enhancement of signal intensity were evaluated from the MRI images.

5. Statistical Analysis

All data were analyzed with SAS statistical package 8.01 (SAS Institute Inc, Cary, NY, USA) and expressed as the mean and standard deviation (SD).

III. RESULTS

1. Subjective Symptoms

The distribution of the subjective symptoms of the patients was shown in table 1. Pain of the masticatory muscles and temporomandibular joints was recorded in both groups. RA patients had unilateral pain in 26.7% and bilateral pain in 86.7%, while the control group had them in 10.0% and 15% respectively. Morning stiffness was revealed in 73.3% of RA group and 15% in control group. The frequencies of bilateral pain and morning stiffness showed a statistically significant difference between two groups. However, there were not any significant difference in the frequencies of TMJ pain at rest or on mouth opening, locking of the jaw, or circadian pain pattern between two group.

2. Clinical Findings

The reduced opening range was recorded in 80.0% of RA group, while 40.0% in control group. The crepitation was recorded in 73.3% of RA group, while 30.0% in control group. They showed a significant difference statistically. However, the frequencies of joint tenderness and clicking didn't

Table 1. The percentage distribution of subjective symptoms of TMJ disorders in RA and control groups.

Subjective symptoms	RA group (n=15) (%)	Control group (n=20) (%)	p-value*
Unilateral pain	4 (26.7)	2 (10.0)	0.1954
Bilateral pain	13 (86.7)	3 (15.0)	0.0001
Pain in the TMJ region with mandible at rest	5 (33.3)	5 (25.0)	0.5892
Pain in the TMJ region on mouth opening	7 (46.7)	9 (45.5)	0.9920
Diurnal pain	6 (40.0)	7 (35.0)	0.7619
Nocturnal pain	8 (53.3)	9 (45.0)	0.6254
Locking of the jaw	3 (20.0)	1 (5.0)	0.1675
Morning stiffness	11 (73.3)	3 (15.0)	0.0005

* p-values are computed by chi-square test.

Table 2. The percentage distribution of clinical findings of TMJ dysfunction in RA and control group.

Clinical Findings	RA Group (n=15) (%)	Control Group (n=20) (%)	p-value*
Tenderness to palpation of muscle	9 (60.0)	14 (70.0)	0.5374
Reduced opening range	12 (80.0)	8 (40.0)	0.0180
Deviation of the mandible on maximum opening	4 (26.7)	5 (25.5)	0.9111
Clicking	9 (60.0)	7 (35.0)	0.1418
Crepitation	11 (73.3)	6 (30.0)	0.0111

* p-values are computed by chi-square test.

Table 3. The percentage distribution of radiographic evidence of TMJ involvement in RA and control groups.

Radiographic evidence	RA group (n=15) (%)	Control group (n=20) (%)	p-value*
Surface erosion of the condylar head	11 (73.3)	9 (45.0)	0.0937
Bone loss on condyle	3 (20.0)	1 (5.0)	0.1675
Osteophyte formation	6 (40.0)	3 (15.0)	0.0940
Sclerosis and flattening of condylar head	9 (60.0)	2 (10.0)	0.0016
Marginal proliferation	8 (53.3)	4 (20.0)	0.0398
Gross deformities	4 (26.7)	2 (10.0)	0.1954
Erosion of glenoid fossa	5 (33.3)	1 (5.0)	0.0277
Total loss of condyle	1 (6.7)	0 (0.0)	0.2414

* p-values are computed by chi-square test.

show any significant difference between two group (Table 2).

3. Radiographic Evidence

A dominant feature in the RA patients was surface erosion of the condylar head, sclerosis and flattening of condyle head, marginal proliferation, osteophyte formation, and erosion of glenoid fossa. However, there are statistical significance between RA and control groups in the frequencies of sclerosis and flattening of condyle head, marginal proliferation, and erosion of glenoid fossa (Table 3).

The stage grading of radiographic evidence of TMJ abnormalities in RA and control groups was presented in Table 4. Normal radiographic appearance of the TMJ in Ra patients was found in

6.7%. Minor changes comprised 46.7%, moderate changes 33.3%, and severe changes or total loss of condyle 13.3%. In control group a normal joint was detected in 45.0%, and minor changes were

Table 4. Stage grading of radiographic evidence of TMJ abnormalities in RA and control groups

Grade	RA group (n=15) (%)	Control group (n=20) (%)	p-value*
Grade 0 (Normal)	1 (6.7)	9 (45.0)	0.0427
Grade 1 (Minor)	7 (46.7)	8 (40.0)	
Grade 2 (Moderate)	5 (33.3)	2 (10.0)	
Grade 3 (Severe)	2 (13.3)	1 (5.0)	

* p-values are computed by chi-square test.

Table 5. MRI findings of TMJ involvement in RA and control groups.

Findings		RA group (n=15) (%)	Control group (n=20) (%)	p-value*
Disk position	Normal	2 (13.3)	12 (60.0)	0.0190
	Anterior	7 (46.7)	5 (25.0)	
	Invisible	6 (40.0)	3 (15.0)	
Cortical bone	Normal	3 (20.0)	13 (65.0)	0.0324
	Osteophytes	3 (20.0)	2 (10.0)	
	Erosions	9 (60.0)	5 (25.0)	
Intraarticular enhancement		9 (60.0)	2 (10.0)	0.0028

* p-values are computed by chi-square test.

encountered in 40.0%, while moderate and severe changes only in 10.0%, 5.0% respectively.

4. MRI Findings

MRI findings of both groups were presented in Table 5. In the patients with RA, MRI showed a normal disk position in 13.3%, anterior disk position in 46.7%, completely destroyed disk in 40.0%, while the control group had normal disk position in 60.0%, anterior disk position in 25%, completely destroyed disk only in 15.0%. The cortical erosion was detected in 60.0% of RA group, while 25% in control group. The interarticular enhancement was found in 60.0% of RA group, while only 10.0% in control group.

IV. DISCUSSION

Views on the extent of the clinical involvement of the TMJ in RA differ widely among various authors. This variation might be associated with different types of examination, type of the selection of patients and the use of different criteria for classifying TMJ involvement in RA. The most common signs and symptoms of TMJ and masticatory muscle dysfunction in patients with RA were myofascial pain in 86.7%, morning stiffness in 73.3%, reduced opening distance in 80.0%, tenderness of muscles on palpation in 60%, and

TMJ crepitation in 73.3%. Especially the frequency of TMJ crepitation was significantly higher in RA group than control group. This indicates that RA involves the TMJs and affected the function of the masticatory system.

The results of the radiographic examination of the patients of RA group also suggested that the TMJ would be one of target tissues of RA. Erosion of glenoid fossa had a dominant feature in the RA patients in 75.3%. Sclerosis and flattening of condylar head was also a common finding in 60.0% of RA patients while the control group had only 10.0%. According to the changes of grading, it showed that evidence of TMJ diseases in the RA group was relatively high. This also emphasized how important it is to find the general joint problems when analysing the patients with TMJ disorders. This can probably be interpreted as the TMD symptoms were relatively significant for RA patients.

In this study, MRI was a sensitive method for the detection of TMJ abnormalities in RA and control patients. MRI demonstrated inflammatory changes within the bony and soft tissues of the TMJ that were not visible on conventional radiographs. In the patients of RA group, completely destroyed disk was detected in 40.0% while the control group in only 15.0%.

TMJ involvement was reported as almost pathognomonic of RA. The patients with RA had

manifested as an inflammatory change in a variety of different synovial joints. According to Larheim¹⁰, the TMJ was reported to be involved in at least half of all patients with RA. Synovial proliferation and destructive pannus formation are important pathogenetic factors in destroying both cartilage and bone¹¹. Abnormal condyles showing cortical erosion and condylar marrow signal changes may indicate bone marrow involvement. Rheumatic TMJ involvement was known to lead to a risk of severe growth changes in the craniomandibular complex. In addition, the clinical findings of dysfunction were also related to the radiographically demonstrated TMJ changes. Due to the adaptive changes, anterior open bite was often not a common clinical feature. However, the presence of anterior open bite had been shown to indicate severe destruction of TMJ in patients with RA.

In this study, crepitation and reduced movement of the TMJ were revealed to be the most distinct signs of dysfunction in RA patients. Crepitation and reduced movement of the TMJ were more frequent in RA patients but pain in the masticatory muscles and clicking were found in both groups. It may be stated that involvement of the TMJ was a frequent finding in RA and also the masticatory muscles were frequently involved because the myofascial pain was a common finding in RA group. Compared with the control group, changes in the morphology of the condylar head and articular eminencia, marginal irregularities were the most common abnormalities demonstrated in the RA patients.

From this study, it can be concluded that many RA patients will develop TMD symptoms and the structural changes of TMJ is more extensive than the usual TMD cases.

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국문요약

류마티스성 관절염 환자에서 나타나는 측두하악관절장애의 임상적 및 방사선학적 특징

경북대학교 치과대학 구강내과학교실

아슬람 알 메히디 · 허윤경 · 최재갑

이 논문의 목적은 류마티스성 관절염 환자에서 나타나는 측두하악관절장애에 대하여 임상적 및 방사선학적 특징을 평가하는 것이다. 경북대학교병원 류마티스내과에서 류마티스성 관절염을 가지고 있는 것으로 판명된 환자 중에 측두하악관절 기능장애의 증상을 나타내는 환자 15명을 실험군으로 하고, 경북대학교병원 구강내과에서 측두하악관절장애로 진단된 환자 20명을 대조군으로 하였다. 류마티스성 관절염 환자에서 근막동통, 아침경직감, 측두하악관절 운동범위의 감소, 염발음의 발생빈도가 각각 86.7%, 73.3%, 80.0%, 73.3%이었으나, 대조군에서는 각각 55.0%, 15.0%, 40.0%, 30.0%로 나타나 류마티스성 관절염 환자에서 측두하악관절장애의 증상의 발생 빈도가 훨씬 높게 나타났다. 방사선학적 특징 중에 두 군 간에 발생빈도에 있어서 유의한 차이를 나타내는 소견은 과두의 평탄화와 경화, 변연골증식, 관절와의 침식 등이었으며 모두 류마티스성 관절염 환자에서 많이 나타났다. 또한 MRI 사진에 의해서 확인된 바에 의하면, 관절원판의 변위와 관절원판의 파괴, 피질골의 침식이나 증식 등의 소견이 류마티스성 관절염 환자에서 유의하게 높은 빈도로 나타났다. 결론적으로 류마티스성 관절염 환자에서 측두하악장애의 발생빈도가 매우 높고 관절의 구조적 변화도 일반적인 측두하악장애 환자에 비해 더 심하게 나타남을 알 수 있었다.

주제어 : 측두하악관절장애, 류마티스성 관절염, MRI
