



MDJ

Correlation between Clinical Features & MRI Findings in Patients with Internal Derangement of Temporomandibular Joint

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Abstract

Background: Temporomandibular joint disorder (TMD) is a collective term embracing a number of clinically distinct problem including myalgia, internal derangement, arthritic problem & disorders of mobility & growth.

Aim of study: The aim of this study is to make correlation analysis between clinical signs of temporomandibular internal derangement and magnetic imaging for diagnosis of disk displacement with or without reduction and disk configuration.

Material and method: Eighteen patients were examined according to Helkimo index which include impaired TMJ function, impaired range of movement, TMJ tenderness muscle tenderness & pain during mandibular movement.

Results: The results showed significant correlation between Helkimo index and MRI findings, in that as the severity of index increased, there was an increase in progression of disk displacement, and when the index was mild 88.9% of the joints were with normal disk position, the posterior band of disk was on 12 o'clock position on top of condyle and about 11.1% had disk displacement with reduction, the disk return to normal position relative to condyle in open mouth position and no patient had disk displacement without reduction.

Conclusion: There is significant correlation between clinical signs and MRI findings.

Key words: MRI, TMJ.

Introduction

The most common temporomandibular joint (TMJ) arthropathy is internal derangement⁽¹⁾.

It is described as an abnormal positional relationship of articular disk to mandibular condyle and articular eminence. The disorder has been associated with characteristic clinical findings such as pain, joint sound and irregular or deviating jaw function⁽²⁾.

The most common cause of internal derangement of TMJ is disk displacement the position of the disk to condyle is defined by two criteria:

- 1-The central part of the disk is located on anterolateral aspect of condyle.
- 2-The condyle is at 12 o'clock position and centered in the glenoid fossa in centric position⁽³⁾.

Thus if the disk displaced from its normal position on top of condyle and interfere with smooth action of the joint, internal derangement ensure⁽⁴⁾, the most common direction of disk displacement is anterior disk displacement is defined as alteration of position of the disk from its expected normal location on top of the condyle⁽⁵⁾.

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The anterior disk displacement was categorized as anterior disk displacement with reduction if the disk assumed a normal relationship with the condyle in the open mouth position. However if anterior disk displacement remained in an abnormal position relative to condyle in open mouth position it is classified as anterior disk displacement without reduction⁽⁶⁾. Also disk displacement can occur in medial & lateral direction and very rare in posterior direction⁽⁷⁾.

MRI is a principle of nuclear magnetic resonance spectroscopic technique used by scientists to obtain microscopically chemical and physical information's about molecule⁽⁹⁾, its most recently developed modality that has been used for imaging TMJ⁽⁹⁾. Although the application of MRI is limited for dentistry, the technique must be understood by clinicians interested in diagnosis and treatment of TMJ disorders⁽¹⁰⁾. MRI is non invasive technique that uses magnetic field and radiofrequency pulse instead of ionizing radiation⁽¹¹⁾.

This study was carried out to find correlation between clinical & magnetic resonance imaging in patients with internal derangement of TMJ.

Materials and methods

The sample consists of 34 joints for 18 patients (10 Females and 8 males) aged (16 - 45) years. The mean age of patients was (29.76) years. They visited the maxillofacial unit in Al-Salam hospital in Mosul city, suffering from TMJ disorder over the period of 6 months

(December - May, 2003-2004). The patients were selected according to following criteria. Sixteen to forty five years old male & female patients complain from pain in perauricular area & muscle of mastication, clicking or crepitating of TMJ & a limitation or

deviation in mandibular range of motion. Patients' weight should not exceed 100kg, since it affects the reading of MRI. The clinical examination was carried out according to the assessment of clinical dysfunction index – DI⁽¹²⁾.

- A** Impaired range of movement: 1 – Maximum opening of mouth, 2 – Maximum lateral movement to the right, 3 – Maximum lateral movement to the left, 4 – Maximum protrusion.
- B** Impaired TMJ function: Examination of the TMJ function was carried out to investigate the presence of: 1. TMJ sounds, 2. Deviation on maximum opening, 3.Locking.
- C** Muscle tenderness: Six pairs of muscles were assessed and palpated bilaterally extraorally except lateral pterygoid muscle which was examined intraorally: 1 Masseter Muscle, 2.Medial pterygoid muscle, 3.Lateral pterygoid muscle, 4.Anterior temporalis muscle, 5.Sternocleidomastoid muscle, 6.Posterior digastric muscle.
- D** TMJ tenderness: Digital palpation of joint performed both from lateral and posterior aspects.
- E** Pain on movement of the mandible: The patient is asked to perform the following movements: opening and closing, right and left laterotrusion and protrusion. The MRI scanner was carried out with a 1.5 Tesla MR scanner and dedicate circular and polarized transmit and receive TMJ coil, the data were collected on 256X256 matrix with field of view 140mm giving a pixel size of 0.60X0.57mm, with patient in supine position slice thickness 3mm and number of acquisition 4 with spin echo surface coil at T: TR=441 millisecond and TE=20

millisecond and scan time 6.03 minute.

Results

Significant Correlation between dysfunctional index and each of disk displacement and disk configuration was noticed (table1). It was found that when the result of dysfunctional index is mild most the results of MRI (disk displacement and disk configuration) is normal, i.e.88.9% of joints have normal disk position and 100% of joints have normal shape of disk. On the other hand when result of dysfunctional index is severe largest percent of joints 62.5% have disk displacement without reduction and 62.5% have deformity in shape of disk.

Table (2) show very high significant correlation between locking and each of disk configuration ($P<0.001$). For disk displacement, when there is locking in movement of mandible largest percentage of joints (55.6%) show disk displacement without reduction, while with no locking the largest percentage of joints (68.8%) show no disk displacement. For disk configuration when there is locking in movement of mandible (55.6%) of joints show deformity in shape of disk. However, the joints with no locking were all without deformity in shape of disk. It was show that significant correlation between limitation of mouth opening, limitation of lateral movement, protrusion of mandible, joint sound, and mandible deviation and between each disk displacement and disk configuration.

Impaired function of TMJ muscle tenderness, Joint tenderness, pain in movement of the mandible, were highly significant correlated with disk displacement and configuration.

Table 3 show high significant agreement between disk displacement without reduction and deformity in

shape of disk ($P<0.001$). All joints with disk displacement without reduction have deformity in shape of disk.

Discussion

It was found that the smaller the degree of disk displacement, the milder the degree of internal derangement. This finding was in agreement with that reported by Tollar et .al,⁽¹³⁾

It was found that 13(38.23%) patients which were clinically diagnosed to have internal derangement showed normal condyle – disk relationship in MRI. The reason for false positive diagnosis, the normal non reducing joint may be audible opening, closing on lateral excision clicks which suggests a possible reduction of disk position during clinical examination. This agrees with the results of information about mediolateral displacement of disk in this study & partial anterior displacement are usually unnoticeable on MRI & this result is in harmony with Kertens et . al,⁽¹⁴⁾.

This study exhibits a significant correlation between locking of the mandible and disk displacement especially disk displacement without reduction. The cause may be due to the fact that the disk remains dislocated anteriorly, block the condyle into the intra – capsular position & limited protrusion of the mandible.

This study also shows significant correlation between locking & change in shape of disk, because the disk shape is distorted when the disk is gradually displaced forward related to anterior condylar head, consequently the disk is folded due to pressure from condylar movement, movement of folded disk in glenoid in fossa is restricted and disturbed⁽¹⁵⁾.

The high correlation between limitation of mouth opening, joint sound and muscle tenderness is

complies with the results of Yilmaz et al, (2002)⁽¹⁶⁾, while we high correlation between the mandibular deviation and each of disk displacement and configuration is supported by

Uy – Co et . al (2000)⁽¹⁷⁾.

This study show a significant correlation between joint tenderness and disk displacement and configuration comes in harmony with the results by Emshoff et al, (2003)⁽²⁾.

Lastly, the study exhibits high significant correlation between disk displacement without reduction and disk configuration. Since deformation of the disk frequently found in non reducing condition and the normal biconcave configuration seen to change as a result of displacement, the deformity has been recognized as an important feature of internal derangement of temporomandibular joint and the cause of functional impediment.

The results agree with the result of Ohnuki et. al, (2003)⁽³⁾.

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Table (1) Correlation between dysfunctional index and each of disk displacement and disk configuration.

Dysfunctional index		Mild		Moderate		Severe		P-value
		No.	%	No.	%	No.	%	
Disk Displacement	Normal	8	88.9	5	55.6	0	0	<0.001
	With reduction	1	11.1	4	44.4	6	37.5	
	Without reduction	0	0.0	0	0.0	10	62.5	
Total		9	100	9	100	16	100	
Disk configuration	Normal	9	100	9	100	6	37.5	<0.001
	Deformed	0	0.0	0	0.0	10	62.5	
	Total	9	100	9	100	16	100	

P<0.001=very high significant

Table (2) Correlation between locking and each of disk displacement and disk configuration.

Locking		No		Yes		P-value
		No.	%	No.	%	
Disk Displacement	Normal	11	68.8	2	11.1	<0.001
	With reduction	5	31.2	6	33.3	
	Without reduction	0	0.0	10	55.6	
Total		16	100	18	100	
Disk configuration	Normal	16	100.0	8	44.4	<0.001
	Deformed	0	0.0	10	55.6	
	Total	16	100	18	100	

P<0.001=very high significant

Table (3) Relationship between disk displacement and disk configuration.

Disk displacement Disk configuration	Normal		Deformed		P-value
	No.	%	No.	%	
Normal	13	54.2	0	0.0	<0.001
With reduction	11	45.8	0	0.0	
Without reduction	0	0.0	10	100	
Total	24	100	10	100	

P<0.001=very high significant