Clinical Diagnosis Compared With Findings of Magnetic Resonance Imaging in 242 Patients With Internal Derangement of the TMJ

Richard E. Marguelles-Bonnet, DDS
Professor
Department of Prosthodontics
University Denis Diderot Paris 7
Faculty of Dentistry
Paris, France

P. Carpentier, DDS
Professor
Department of Oral Anatomy
University Denis Diderot Paris 7
Faculty of Dentistry
Laboratory of Orthopedic Research
URA CNRS
Paris, France

J. P. Yung, DDS
Department of Prosthodontics
University Denis Diderot Paris 7
Faculty of Dentistry
Paris, France

D. Defrennes, MD
Department of Maxillofacial Surgery
Lariboisière Hospital
Paris, France

C. Pharaboz, MD
Chairperson
Department of Radiology
Begin Military Hospital
Saint Mandé, France

Correspondence to:
Dr Richard E. Marguelles-Bonnet
5 boulevard du Palais
75004 Paris, France

The aim of this study was to compare the provisional diagnosis based on an initial clinical examination with subsequent findings of magnetic resonance imaging in patients with internal derangement of the temporomandibular joint. Clinical examinations were conducted on 242 patients (198 women and 44 men) who had unilateral (51%) or bilateral (49%) temporomandibular joint internal derangement. They were divided into the following categories: (1) disc displacement with reduction; (2) disc displacement without reduction; (3) "stuck" disc; (4) degenerative arthrosis with or without one of the above; and (5) normal temporomandibular joint of the contralateral side. There was no statistically significant difference in the distribution of disorders on a unilateral or bilateral basis or in the prevalence of disorders in right versus left joints. Based on the high occurrence of matching true-negative data, this study showed a highly statistically significant correlation between the magnetic resonance findings and the clinical data for all categories of derangement. Despite this high correlation, the magnetic resonance imaging and clinical diagnoses matched exactly in only 287 of the 484 joints studied. There was only partial agreement in the remaining 197 joints. The best clinical diagnosis in relation to the magnetic resonance findings was observed in the arthrosis category followed by the categories of normal joint, disc displacement with reduction, stuck disc, and disc displacement without reduction, in descending order. This study strongly suggests that degenerative arthrosis is a result of a long-term displaced disc. The clinical examination alone did not correctly indicate all the structural defects; therefore, it is insufficient for determining the status of the joint.
J OROFACIAL PAIN 1995;9:244–253.

key words: temporomandibular joint, internal derangement, magnetic resonance imaging, anterior disc displacement, arthrosis, "stuck" disc

The diagnostic process of temporomandibular disorders is now well established and the guidelines for screening history, clinical examination, and imaging of the joint have been standardized.[1] The evolution of temporomandibular joint (TMJ) imaging has led to a decrease of interest in both radiography and arthrotomography, but it has increased interest in computerized tomography and magnetic resonance imaging (MRI). The assessment of the disc position using MRI techniques was first restricted to the sagittal plane but has now been combined with coronal views[2,3] and movement simulation (Cine MRI).[4–6]

The aim of this study was to evaluate the accuracy of the clinical diagnosis achieved at the initial examination (assuming that there was not any literature available at this time). The MR images were initially used to evaluate the clinical diagnosis and reciprocally, the MR images were checked against the clinical findings.

Materials and Methods

Patient Selection

Two teams of trained examiners used established methodologies for the initial clinical screening of 242 patients with internal derangements of the TMJ. Of the 242 selected patients seeking health care, 198 were women and 44 were men. The sex ratio was 5:1. Mean age was 25.3 years for the women and 31.4 years for the men. The following steps were used in the clinical examination to assess the clinical status of the TMJ:

1. Range of the mandibular movements was measured with a plastic ruler graduated in millimeters.
2. The TMJ lateral poles and masticatory muscles were manually palpated.
3. Provocation tests of the muscles were performed either by manually counteracting a muscle action, or by having the patient bite on wood sticks, bilaterally or unilaterally.
4. Sounds from the TMJ were identified with a stethoscope.
5. Whether disc clicking was present was determined by palpating at the lateral pole and recording the timing.
6. The Angle Class of malocclusion, intercuspal contacts, centric relation slides to the intercuspal position (ICP), and balancing interferences were recorded.

A tentative clinical diagnosis was made and the 242 patients selected were then divided into five categories. The following criteria were used to determine the status of the TMJ through clinical examination:

1. Normal TMJ (NOR): maximum mouth opening of 40 mm or more; normal range of eccentric movements; no palpable or audible joint sounds; no pain; contralateral to a disturbed joint
2. Anteriorly displaced disc with reduction (ADDR): reciprocal clicking and deviation of the mandible in opening and closing movements; no click after disc recapture in protrusion
3. Anteriorly displaced disc without reduction (ADD): a history of reciprocal clicking or traumatic injuries (whiplash, general anesthesia) followed by acute locking and noise suppression; deflection of mandible and restricted opening; decrease of the amplitude of the lateral movement toward the opposite side
4. "Stuck" disc (SD) (restricted movement of the disc in the upper compartment due to adhesions to the temporal fossa): progressive or sudden restricted jaw opening together with elevator muscles contracture and pain located in the joint area; without history of clicking
5. Degenerative arthrosis (AR) with or without one of the above: crepitation during joint function with or without pain

Investigation by MRI

The patients were referred to the Radiological Department, Begin Military Hospital, Saint Mandé, France, which was equipped with a Signa 1.5 Tesla MRI machine (GE, Milwaukee, WI). The total examination time was 45 minutes. Bilateral sagittal proton density–weighted images at 15 different steps inside a full open/close cycle were taken to compute a dynamic sequence of the disc-condyle movement. Bilateral coronal T1-weighted images in closed and half-open positions were used to evaluate sideways TMJ disc displacement.[3,5]

The imaging parameters for sagittal slices were TR = 1800, TE = 21 ms, NEX = 8, and FOV = 13 cm; the slices were 4 mm thick (dot matrix = 256 × 256). Imaging parameters for the coronal slices were TR = 560, TE = 17 ms, NEX = 2, and FOV = 12 cm; the slices were 3 mm thick (dot matrix = 192 × 256). The orientation of the slices was as follows: axial scans allowed the orientation of the coronal and sagittal slices and refined the signal; four straight sagittal slices for each joint were imaged; and two coronal slices (oblique along the condylar axis to appreciate the disc position laterally and medially) were imaged, one at the ICP and one at moderate opening.

The TMJs were labeled according to the following MRI criteria:

1. NOR: In the sagittal plane, the disc was located with its posterior band superior to the condyle (at the 12 o'clock position ± 10 degrees)[6,7] and moved smoothly with the condyle. In the frontal plane, the disc fitted the top of the condyle without transgressing the tangent lines drawn parallel to the sagittal plane through the condylar poles.

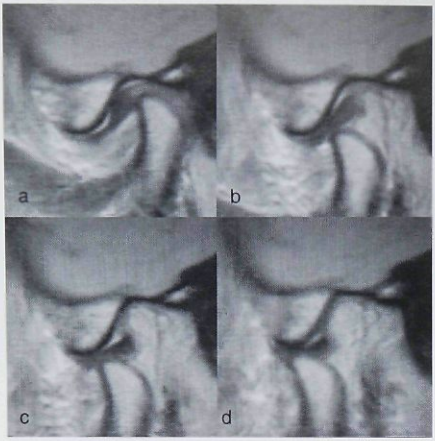

Fig 1 Four steps of the opening movement showing a typical anterior disc displacement with reduction. In the intercuspal position view (a), the disc is not properly located. A hypersignal is apparent in the upper-joint compartment. The disc-condyle relation looks normal in the other views (b to d).

2. ADDR: The disc was anteriorly displaced in ICP and recaptured during opening movement. The timing was not taken into account (Fig 1).
3. ADD: The disc was anteriorly displaced in ICP and remained so during the opening movement (Fig 2).
4. SD: The translation of the condyle occurred mainly in the lower compartment without any significant change of the disc position in relation to the mandibular fossa of the temporal bone (Fig 3).
5. AR: Form of the articular surfaces deviated, regardless of association with anterior osteophytes and/or subchondral cysts. The reduction of the intra-articular space was taken into account but the sharpness of the cortical limits was not—a chemical shifting may cause an artifact in the MR images (Fig 4).

The radiologists were blinded to the results of the clinical evaluation. The images were interpreted twice by two board-certified medical MR specialists.

Statistical Analysis

A contingencies table was established with the clinical examination and MRI data using the Stat Lab computer program (SLP, Ivry sur Seine, France). The χ^2 value was calculated for each category of disorders. Using the χ^2 test establishes a decision rule to verify the hypothesis of independence between two sets of data, such as MRI and clinical findings. When dealing with two-by-two data tables, Yates' corrected χ^2 is needed.

The left side and right side disorder distributions were compared using the Wilcoxon test. The frequency distribution of the five joint disorder categories was also calculated over the entire population and compared to the frequency distribution of the same disorders over the unilaterally symptomatic patients using the Mann-Whitney *U* test.

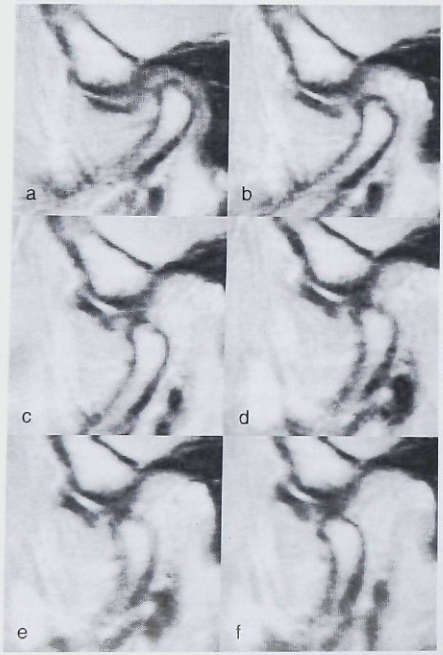

Fig 2 *(Left)* Six steps of the opening movement showing a typical anterior disc displacement without reduction. The disc remains in an anterior position (a to f), deviating in form and folding in front of the condyle. This joint was considered normal at the clinical examination (no pain and no movement limitation).

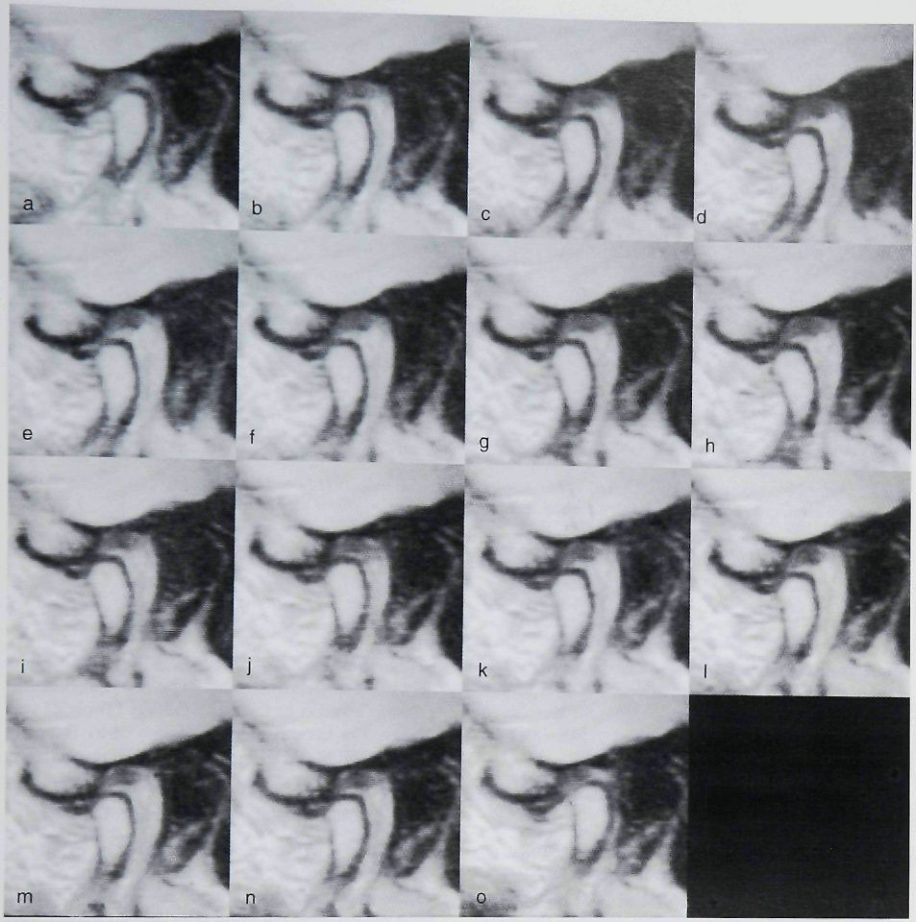

Fig 3 Fifteen steps of the opening (a to g) and closing (h to o) movement showing a locked jaw in normal position. The disc image looks the same in all views. There is an increase of the translatory component of the condylar movement in the inferior compartment. The mouth opening is limited to 1.5 cm without articular or muscular pain.

Results

Distribution and Homogeneity of the Patients

There was no statistically significant difference in the distribution of TMJ disorders between the groups of men and women ($P < .20$). The clinical diagnosis population involved 123 patients with unilateral disorders (65 left side and 58 right side) and 119 patients with bilateral disorders. There was no statistically significant difference between the left and right sides (Wilcoxon test) and between the unilateral and bilateral disorder distribution (Mann-Whitney *U* test). Therefore, the 242 patients may be considered a homogenous group.

Reproducibility of MR Readings

There was little difference in the categorization of the images by the radiologists. The readings by the

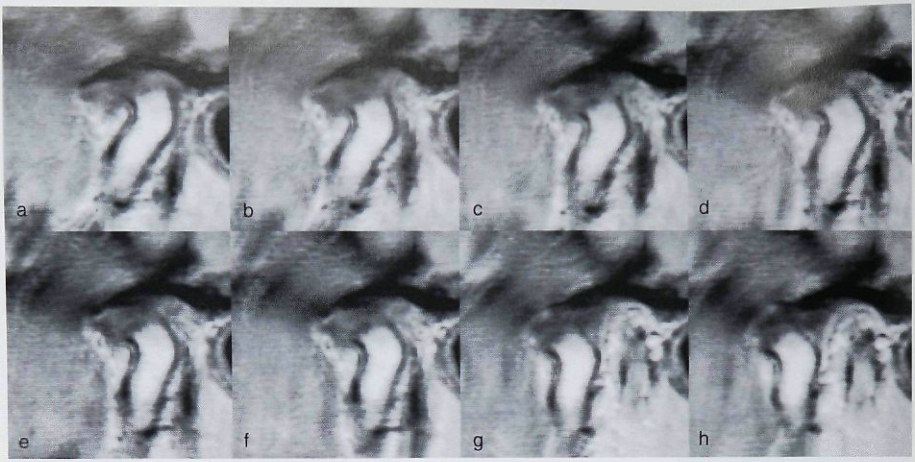

Fig 4 Arthrosis associated with an anterior disc displacement with reduction (a to h). It is difficult to locate the disc, except in intercuspal position (a) and in the wide opening (h).

same radiologist were 95% consistent with each other in the image interpretation. When readings from both radiologists were compared, they were found to be 92% consistent with each other.

Correlation Between Clinical Diagnosis and MRI Findings

The comparison of the initial clinical diagnosis to the MR findings allowed the true positives (yes/yes), the false positives (yes/no), the false negatives (no/yes), and the true negatives (no/no) for each group of disorders to be determined (Table 1).

In the present study there was agreement between the clinical diagnosis and the MR findings in 287 joints. Of the total number of joints studied by MR, 91 were normal, 148 showed ADDR, 189 showed ADD, 62 showed SD, and 55 showed AR. Some joints had more than one pathology. Forty joints had both ADD and AR.

There were false-positive clinical diagnoses in 142 joints and false-negative clinical diagnoses in 72 joints. A total of 119 patients (49%) had bilateral disorders, and 123 patients (51%) had unilateral disorders. Magnetic resonance imaging disclosed 168 patients (69%) who had bilateral pathologies, 57 patients (23%) who had unilateral pathologies, and 17 patients (7%) who had joints that were bilaterally normal. The best clinical diagnosis in relation to the MR findings (Table 2) was observed in the AR category followed by the categories of NOR, ADDR, SD, and ADD, respectively.

Anterior Disc Displacement With Reduction

Of the 165 TMJs clinically diagnosed as having an anterior disc displacement with reduction, only 94 (57%) were confirmed by MRI. Most of the 86 false positives of the clinical exam (60 joints) were labeled NOR (21 joints; 24%) and ADD (39 joints; 45%) in MRI. Reciprocally, 148 cases of ADDR were detected in MR: 94 joints (63.5%) agreed with the clinical findings. Of the 57 false-positive MR exams, 34 joints (60%) were considered NOR and 16 joints (28%) were ADD according to clinical examination. The χ^2 test on the contingencies table of the clinical ADDR and the MRI ADDR findings showed a high correlation (see Table 1; Yates' corrected $\chi^2 = 81.05$; $P < .001$).

Anterior Disc Displacement Without Reduction

A total of 146 TMJs were clinically diagnosed as having an anterior disc displacement without

Table 1 Contingencies Established by χ^2 Test

		MRI										
		NOR		ADDR		ADD		SD		AR		
Clinical		No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	Total
NOR	No	321	40	247	114	197	164	311	50	309	52	361
	Yes	72	51	89	34	98	25	111	12	120	3	123
ADDR	No	249	70	265	54	169	150	276	43	271	48	319
	Yes	144	21	71	94	126	39	146	19	158	7	165
ADD	No	258	80	206	132	255	83	295	43	315	23	338
	Yes	135	11	130	16	40	106	127	19	114	32	146
SD	No	374	85	315	144	276	183	406	53	406	53	459
	Yes	19	6	21	4	19	6	16	9	23	2	27
AR	No	354	88	297	145	282	160	384	58	414	28	442
	Yes	39	3	39	3	13	29	38	4	15	27	42
Total		393	91	336	148	295	189	422	62	429	55	484

Table 2 Hypothesis Testing of a Proportion

	N Clinic	N MR	P Clinic (%)	P MR = P0 (%)	Z value	*P*
NOR	51	91	10.53	18.80	4.59	< .01
ADDR	94	148	19.42	30.57	5.27	< .01
ADD	106	189	21.90	39.04	7.18	< .01
SD	9	62	1.85	12.81	7.14	< .01
AR	27	55	5.58	11.36	3.14	< .01

N Clinic = number of matching clinical diagnoses; N MR = number of matching MR findings; P Clinic = proportion of matching clinical diagnoses; P MR = proportion of matching MR findings; Z value = observed value.
One-sided test: hypothesis = P Clinic ≥ P MR (reference P0).

reduction, and this diagnosis was supported by MRI in 106 joints (73%). Of the false-positive clinical exams, 8% were NOR, 13% were ADDR, and 15% were SD. Magnetic resonance imaging disclosed 32 AR joints (26%) among the clinical ADDs. Of the 189 cases of ADD shown in MRI, 106 correlated with the clinical findings. Of the 99 MRI false positives, 25 joints (25%) were clinically NOR and 39 joints (40%) were ADDR. The clinical examination also predicted 29 AR joints (29%) in the MRI ADD group. The χ^2 test on the contingencies table of the clinical ADD and the MRI ADD findings showed a high correlation (see Table 1; Yates' corrected $\chi^2 = 96.4$; $P < .001$).

Stuck Disc

Of the 27 TMJs (5% of the study) that were clinically diagnosed with SD, only nine were confirmed by MRI. The MRI rated six TMJs as NOR, four as ADDR, six as ADD, and two as AR. Reciprocally, 62 cases of SD were disclosed by MRI, while only nine (14.5%) had been diagnosed in the clinical examination: 12 joints were clinically diagnosed as NOR (19%), 19 as ADDR (31%), 19 as ADD (31%), and four (6%) as AR. The χ^2 test on the contingencies table of the clinical SD and the MRI SD findings still showed a positive correlation (see Table 1; Yates' corrected $\chi^2 = 10.69$; $P < .005$).

Arthrosis

Of the 42 TMJs that were clinically detected as having degenerative arthrosis with or without a disc derangement, 27 (64%) were confirmed by MR. The 28 false positives (69%) from the clinical examinations were mainly represented by the ADD group. The MRI disclosed 55 AR joints, and 27 joints (49%) were correlated with the clinical examination. The $\chi 2$ test on the contingencies table of the clinical AR and the MRI AR findings showed a high correlation (see Table 1; Yates' corrected $\chi 2 = 122.8$; $P < .001$).

Table 3 Magnetic Resonance Pathologies Contralateral to a Unilateral Normal Joint at the Clinical Examination

	MR category of contralateral TMJ				
	ADDR	ADD	SD	AR	NOR
58 Left side NOR clinical	15	27	11	10	7
65 Right side NOR clinical	21	29	8	8	10
Total: 123 NOR clinical	36	56	19	18	17

Table 4 Contingencies Established for ADDR, ADD, and AR*

		Clinical AR		
		No	Yes	Total
Clinical ADDR	No	281	38	319
	Yes	161	4	165
	Total	442	42	484
		MRI AR		
		No	Yes	Total
MRI ADDR	No	287	49	336
	Yes	142	6	148
	Total	429	55	484
		MRI AR		
		No	Yes	Total
MRI ADD	No	281	13	294
	Yes	148	42	190
	Total	429	55	484

*Negative correlation between AR and ADDR existed; the pathologies were rarely associated in the same joint. Positive correlation between AR and ADD in MRI existed (not statistically significant in clinical exams). When AR was diagnosed, ADD was often associated. The opposite was not true.

The MR imaging recognized 40 TMJs as having both ADD and AR, while the clinical examination had predicted only 17 joints with those conditions. Ten articulations matched in both exams.

Asymptomatic TMJs

In this study, there were more clinically "asymptomatic" joints (123) than MR "normal" joints (92). Only 51 clinical NOR joints (42%) were confirmed by MRI (true positives). The MR exam yielded 34 ADDR joints (28%), 25 ADD joints (20%), 12 SD joints (10%), and three AR joints (2%). The χ^2 test on the contingencies table of the clinical NOR and the MRI NOR findings showed a high correlation (see Table 1; Yates' corrected $\chi^2 = 54.38$; $P < .001$).

The distribution of unilateral disorders was not different from the bilateral pathologies. The TMJs contralateral to clinically normal TMJs showed 36 cases of ADDR (25%), 56 cases of ADD (38%), 19 cases of SD (13%), 18 cases of AR (13%), and 17 cases of NOR (10%) when observed in MRI (Table 3). Of the entire study, there were 17 patients (7%) with bilaterally normal TMJs in MRI.

If clinical and MR matching diagnoses were considered, two subgroups of 28 unilaterally involved joints and 207 joints involved in bilateral disorders were observed. The Komolgorov-Smirnov test—used to establish a decision rule about the validity of a hypothetical identity between two statistical data distributions—demonstrated that there was no statistically significant difference in the distribution of the unilateral and bilateral disorders.

Statistical Correlation Between AR and the Other Groups

The independence ratios were calculated for AR and the other disorders. No correlation was shown with SD. A negative correlation was found in MR and in clinical examinations between ADDR and AR ($P = .001$ and $P = .002$, respectively). A positive correlation was observed with ADD in MR only. Arthrosis was linked with ADD in 76% of the cases, but the opposite was not true. In addition, ADD was associated with AR in only 22% of the cases (Table 4).

Discussion

In a comparative study such as the present one, there are always some methodologic drawbacks. The conditions for the clinical and the MR examination are not identical: there was a lapse of time between the two exams; the patient position was different; a special device to maintain mandibular positions was needed; and more psychologic stress was put on the patient in the MRI environment than in that of the clinical examination.

The definition of the control group remains a problem. The 123 asymptomatic TMJs of our study could not be used as a control group. Because of the greater amount of false-positive data (58%), this group does not reflect a population free of TMJ derangement as compared with other

studies.[8-10] The computation of the sensitivity and the specificity of the clinical exam was inapplicable because of the lack of a true control group.

Most studies chose the MR diagnosis as the master reference, assuming that MR images were more reliable than clinical exams in documenting TMJ conditions. Comparing the results from MRI to that of the clinical examination produces different information. For example, using MRI, we found 25 ADD cases that had been totally asymptomatic at the clinical exam. This statistical analysis method balanced both sets of data without prejudging the value of one examination technique over the other.

Early studies confirmed the accuracy of MR images in comparison with anatomic cryosectioning. Magnetic resonance imaging was 95% accurate in the assessment of the disc position and disc form, and 93% accurate in the assessment of osseous changes.[11] The stuck disc condition has been noted in an MR study on 106 TMD patients.[12] Still, stuck disc has been observed in arthroscopic explorations,[13] but it has not been established in an anatomic study.

In our study there was agreement between the clinical diagnosis and the MR findings in 287 joints (59%). In other studies using arthrographic and/or MR images, the percentage of joint conditions that were predicted correctly was 59%[14] and 43%,[15] respectively. Neither study considered the stuck disc category, which would have minimized the percentage of good clinical predictions.

In the literature, the clinical diagnosis of ADDR was correlated to the imaging diagnosis of ADDR at 84% to 90%,[14] 66%,[16] and 37%.[15] We had 57% of the clinical predictions validated by MR and 64% of the MR findings validated in the clinical examination. The false-positive data of the ADDR group may be due to borderline patients with reciprocal clicking that may oscillate between ADDR and ADD. Patients may fall into the ADD category during 2 or 3 weeks between the clinical and MRI appointments or during MRI exploration with a mouth opener that may force the disc in a locked position. Another hypothesis is that a permanently displaced disc may simulate the clinical symptoms of ADDR, at least in some cases.

The use of Cine MRI to detect patients with ADDR seems to be beneficial unless the disc repositioning does not occur during the recording session, which would lead to an ADD MRI, or unless the small amplitude of the repositioning movement remained undetected, which would lead to an NOR MRI.

In the literature, the ADD clinical diagnosis was correlated to the ADD imaging diagnosis at 55% to 61%,[14] 76%,[16] and 36%.[15] We had 73% of the clinical predictions validated by MR and 56% of the MR findings validated in the clinical examination. The good correlation between clinical and MRI findings in the group with ADD demonstrates the reliability of the clinical criteria of our study. Only 7.5% of the clinical ADD group appeared to be normal in MRI; this might have been a clinical misinterpretation of a restricted muscular movement. On the other hand, MRI showed ADD when the clinical exam indicated absences of signs and symptoms in 13% of the cases. This reinforces the opinion that an old ADD may exist without pain or clinical signs and that there is no correlation between the degree of pain intensity and specific meniscal abnormalities.

The category *stuck disc* remains controversial. Stuck disc is typically diagnosed by imaging, and clinical signs are not sufficient to clearly identify this disorder—only 15% of the stuck discs in the MR pool were suspected clinically. The statistical significance threshold of the SD group was only 2%, while the other groups yielded 0.1%. Nevertheless, the recognition of a stuck disc could alter patient care as stated by Rao et al.[12] Its diagnosis clearly specifies the treatment: manual therapy or lavage to break the adhesions between the disc and the fibrous outer layer of the cartilage.

Of the MRI SD group, 19% were clinically NOR, which tends to indicate that a stuck disc is not necessarily a painful or limiting factor for the joint movement. In some cases the increase of rotational and translatory movements of the condyle under the disc can compensate for the absence of movement in the upper compartment.

According to De Laat et al,[8] MRI can be used to disclose the origin of a restricted mouth opening when the clinical exam fails to differentiate between a myogenous limitation and an ADD. Another alternative would be a stuck disc that may restrict the mouth opening together with a muscle restriction.

In the previous literature, the AR clinical diagnosis was correlated to the AR imaging diagnosis at 91% to 100%,[14] and 35%.[15] We had 64% of the clinical predictions validated by MR and 51% of the MR findings validated in the clinical examination. In this group there were highly significant findings, the true positives contributing 81% of the χ^2 value.

Magnetic resonance imaging is not as accurate as the computerized tomography with respect to the analysis of the bony components of the TMJ.

Early degenerative lesions might not be disclosed in MR and patients may present crepitations in the clinical examination. In such instances, the MR images showed more often an ADD.

In MR images, AR and ADD were linked in one way only: the AR diagnosis was more often associated with ADD, but the reverse was not true. This information led us to consider that AR may be a late consequence of ADD at least in 76% of the observed cases. This correlation is not found in the clinical examination because it failed to recognize both pathologies when they concurred. Even though we have no information about the initial date of the disc displacement in the group that had ADD and AR, the mean age difference between this group and the ADD group confirms that a long-term disc displacement may produce degenerative arthrosis. The average age was 27 years for the patients with ADD, 38 years for those who had both ADD and AR, and 51 years for AR patients.

Previous studies of asymptomatic volunteers showed that 25% to 38% of the discs were displaced.[9,10] In our patient population, we obtained 41% of true positives starting with the clinical examination and 56% of true positives starting with MR findings. Therefore, the NOR data does not meet the requirements of a true control group. In a study of patients with TMD evaluated by MR, the authors[17] found that 29% showed normal joints bilaterally. We only recognized 34 normal joints bilaterally (7%) at the MR examination.

The present study reinforces the opinion that bilateral disorders are more frequent than unilateral ones. We obtained a ratio of 3:1, but a previous study[17] mentioned a 105:45 ratio, approximately 2:1. With the two TMJs working as a functional unit, it makes sense that more often than not, the temporomandibular disorder involves both joints. One might have expected that the unilateral derangements would be less advanced than the bilateral ones. Because the category distribution was the same in both instances, this supposition was not supported by the facts.

The clinical false positives of the NOR group yielded 35% of cases with ADD and 45% of cases with ADDR. These results question the convenience of an intensive disc repositioning treatment. A spontaneous evolution without pain, noise, or handicap may be possible.[18] The dramatic image of a disc out of place may be the sign of an acute problem or a remnant of the past.

The nine correlated joints in the SD category constituted a poor clinical score. Either the joint can perform a subnormal function with movements restricted to a unique compartment, or the selected clinical criteria were not reliable and led us to an inaccurate diagnosis. It is a general agreement that the stuck disc condition typically requires an MR diagnosis.

Conclusion

Based on the high occurrence of true-negative matching data, this study showed a highly statistically significant correlation between MR and clinical data for all categories of derangements. Despite this high correlation, the MR and clinical diagnoses matched exactly in only 287 of the 484 joints studied. There was only partial agreement in the remaining 197 joints. The best clinical diagnosis in relation to the MR findings was observed in the degenerative arthrosis category, followed by the asymptomatic (NOR), disc displacement without reduction, stuck disc, and disc displacement with reduction groups, in order.

This study strongly suggests that degenerative arthrosis follows a long-term, permanently displaced disc. There was no statistically significant difference in the distribution of disorders on a unilateral or bilateral basis, and there was not a higher prevalence of disorders in right versus left joints. The clinical examination alone did not correctly indicate all the structural defects of the joint.

References

1. American Academy of Craniomandibular Disorders. Craniomandibular Disorders: Guidelines for Evaluation, Diagnosis, and Management. Chicago: Quintessence, 1993.
2. Brooks SL, Westesson P-L, Temporomandibular joint: Value of coronal MR images. Radiology 1993;188:317–321.
3. Katzberg RW, Westesson P-L, Tallents RH, Anderson R, Kurita K, Manzione J, Tottermans S. Temporomandibular joint: Assessment of rotational and sideways disc displacements. Radiology 1988;169:741–748.
4. Bell KA, Miller KD, Jones JP. Cine magnetic resonance imaging of the temporomandibular joint. J Craniomand Pract 1992;10:313–317.
5. Pharaboz C, Pujol A, Foucart JM. Le ciné I. R. M. dans l'étude de l'A. T. M. Orthod Fr 1993;64:371–387.
6. Katzberg RW. Temporomandibular joint imaging. Radiology 1989;170:297–307.
7. Drace JE Enzmann DR. Defining the normal temporomandibular joint: Closed-, partially open-, and open-mouth MR imaging of asymptomatic subjects. Radiology 1990;177:67–71.
8. De Laat A, Horvath M, Bossuyt M, Fossion E, Baert AL. Myogenous or arthrogenous limitation of mouth opening: Correlations between clinical findings, MRI, and clinical outcome. J Orofacial Pain 1993;7:150–155.

9. Kircos LT, Ortendhal DA, Mark AS, Arakawa M. Magnetic resonance imaging of the TMJ disc in asymptomatic volunteers. J Oral Maxillofac Surg 1987;45: 852–854.
10. Hatala MP, Westesson P-L, Tallents RH, Katzberg RW. TMJ disc displacement in asymptomatic volunteers as detected by MR imaging [abstract 100]. J Dent Res 1991; 70:27.
11. Tasaki MM, Westesson P-L. Temporomandibular joint: Diagnostic accuracy with sagittal and coronal MR imaging. Radiology 1993;186:723–729.
12. Rao VM, Liem MD, Farole A, Razek AA. Elusive "stuck" disk in the temporomandibular joint: Diagnosis with MR imaging. Radiology 1993;189:823–827.
13. Nitzan DW, Dolwick MF, Heft MW. Arthroscopic lavage and lysis of the temporomandibular joint: A change in perspective. J Oral Maxillfac Surg 1990;48:798–801.
14. Anderson GC, Shiffman EL, Schellhas KP, Fricton JR. Clinical vs. arthrographic diagnosis of TMJ internal derangements. J Dent Res 1989;68:826–829.
15. Paesani D, Westesson P-L, Hatala MP, Tallents RH, Brooks SL. Accuracy of clinical diagnosis for TMJ internal derangement and arthrosis. Oral Surg Oral Med Oral Pathol 1992;73:360–363.
16. Roberts CA, Katzberg RW, Tallents RH, Espeland MA, Handelman SL. The clinical predictability of internal derangements of the temporomandibular joint. Oral Surg Oral Med Oral Pathol 1991;71:412–414.
17. Sanchez-Woodworth RE, Tallents RH, Katzberg RW, Guay JA. Bilateral internal derangements of the temporomandibular joint: Evaluation by magnetic resonance imaging. Oral Surg Oral Med Oral Pathol 1988;65:281–285.
18. Roberts CA, Tallents RH, Katzberg RW, Sanchez-Woodworth RE, Espeland MA, Handelman SL. Clinical and arthrographic evaluation of the location of temporomandibular joint pain. Oral Surg Oral Med Oral Pathol 1987;64:6–8.

Resumen

Comparación del Diagnóstico Clínico con los Hallazgos de las Imágenes de Resonancia Magnética en 242 Pacientes con Malfuncionamiento Interno de la Articulación Temporomandibular

El propósito de este estudio fue el de comparar el diagnóstico provisional basado en un examen clínico inicial con los hallazgos subsecuentes de las imágenes de resonancia magnética, en pacientes con malfuncionamiento interno de la articulación temporomandibular (ATM). Se efectuaron exámenes clínicos en 242 pacientes (198 mujeres y 44 hombres) quienes presentaban malfuncionamientos internos unilaterales (51%) o bilaterales (49%) de la ATM. Los pacientes se dividieron en las siguientes categorías: *(1)* desplazamiento del disco con reducción, *(2)* desplazamiento del disco sin reducción; *(3)* articulación atalcada; *(4)* artrosis degenerativa con o sin una de las situaciones antes mencionadas; y *(5)* ATM normal del lado contralateral. No se detectó una diferencia estadisticamente significativa en cuanto a la distribución de los desórdenes (unilaterales o bilaterales) o en relación a la prevalencia de los desórdenes en las articulaciones (derechas versus izquierdas). Basados en la alta ocurrencia de información negativa-verdadera que concordó, este estudio demostró la existencia de una correlación altamente significativa entre los hallazgos de la resonancia magnética y los datos clínicos en todas las categorías del malfuncionamiento. A pesar de esta correlación alta, las imágenes de resonancia magnética y los diagnósticos clínicos concordaron exactamente en sólo 287 de las 484 articulaciones estudiadas. Se detectó sólo un acuerdo parcial en las 197 articulaciones remanentes. El mejor diagnóstico clínico en relación a los hallazgos de resonancia magnética fue observado en la categoría de las artrosis, seguido por las categorías de la articulación normal, el desplazamiento del disco con reducción, la articulación atalcada, y el desplazamiento del disco sin reducción, respectivamente. Este estudio indica enfáticamente que la artrosis degenerativa es el resultado de un disco desplazado por largo tiempo. El examen clínico por si solo no indicó correctamente todos los defectos estructurales; por lo tanto, no es suficiente para determinar el estado de la articulación.

Zusammenfassung

Vergleich der klinischen Diagnose mit den Befunden der Kernspintomographie bei 242 Patienten mit "internal derangement" des Kiefergelenkes

Das Ziel Dieser Studie war ein Vergleich zwischen der provisorischen Diagnose aufgrund einer anfänglichen klinischen Untersuchung und darauffolgenden Befunden der Kernspintomographie bei Patienten mit "internal derangement" des Kiefergelenkes. An 242 Patienten (198 Frauen und 44 Männern), die ein einseitiges (51%) oder ein beidseitiges (49%) "internal derangement" des Kiefergelenkes aufwiesen, wurden klinische untersuchungen vorgenommen. Die Patienten wurden in eine der folgenden Kategorien eingeteilt: *(1)* Diskusluxation mit Reduktion, *(2)* Diskusluxation ohne Reduktion, *(3)* blockierter Diskus, *(4)* degenerative Arthrose mit oder ohne einen der vorgenannten Zustände, *(5)* normales Kiefergelenk der kontralateralen Seite. Es lag kein signifikanter Unterschied in der Verteilung unilateral oder bilateral vor, ebensowenig gab es einen der Verteilung unilateral oder bilateral vor, ebensowenig gab es einen Unterschied in der Prävalenz der Störungen auf der linken bzw. der rechten Seite. Basierend auf einer hohen Übereinstimmung richtig-negatriver Daten zeigte diese Studie eine hochsignifikante statistische Korrelation zwichen kernspintomographischen und klinischen Diagnosen für alle untersuchten Kategorien. Trotz dieser hohen Korrelation stimmte die kernspintomographische mit der klinischen Diagnose exakt in nur 287 von 484 untersuchten Gelenken überein. Bei den übrigen 197 Gelenken gab es nur eine partielle Übereinstimmung. In Beziehung zu den kernspintomographischen Befunden wurde in der Kategorie der Arthrose die beste klinische Diagnose gestellt, gefigt von den Kategorien "normales Gelenk," Diskusluxation mit Reduktion, blockierter Diskus, und Diskusluxation ohne Reduktion. Diese Studie unterstützt stark die Annahme, dass degenerative Arthrose ein Resultat langdauernder Diskusverlagerung sci. Die klinische Untersuchung entdeckte night alle strukturellen Defekte Korrekt. Sie genügt also nicht, um allein über den tatsächlichen Zustand eines Gelenkes zu entscheiden.