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TEMPOROMANDIBULAR JOINT IN ADULT RHEUMATOID ARTHRITIS*

A COMPARATIVE EVALUATION OF 100 CASES

BY

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As emphasized by Uotila (1964), medical interest in the stomatognathic system of patients with rheumatoid arthritis has been mainly concerned with the theories of focal infection. In recent years these concepts have become less commonly accepted and the interest accordingly reduced. However, the temporomandibular joints may be considered amongst the more important of the body and a practical clinical consideration of their reaction to systemic disease is an obvious requirement.

The knowledge that rheumatoid arthritis affects the temporomandibular joint has been on record for a number of years, but the reported incidence of manifestations in this joint vary greatly in the literature (Table I). The majority of previous studies have dealt with relatively small numbers of patients.

TABLE I
REPORTED INCIDENCE OF TEMPOROMANDIBULAR JOINT INVOLVEMENT IN RHEUMATOID ARTHRITIS

Author	Date	Incidence per cent.
Ragan	1949	4·7
Markowitz and Gerry	1949	8·7
Hankey	1963	10
Hartfall and Wright	1961	19
Einaudi and Viara	1964	29·3
Mériel, Ruffie, Cadenat, Fournié, and Blanc	1960	31
Uotila	1964	41
Russell and Bayles	1941	51
Blanc	1959	56
Blackwood	1963	70

The present study was designed as a survey of an unselected group of patients with confirmed rheumatoid arthritis to determine the frequency and characteristics of lesions of the temporomandibular joint. Comparison has been made with control groups to evaluate the possible clinical significance of the findings, and with patients complaining of the "temporo-mandibular joint pain-dysfunction syndrome" as previously investigated and described (Franks, 1964).

Method

The hundred unselected patients in this study were attending the day clinic at the Arthur Stanley Institute for Rheumatic Diseases, London, and had been confirmed as cases of rheumatoid arthritis. After an interview to a standard questionaire, the temporomandibular joints and their environment, which includes the oral cavity, were examined by the author. Assessment of the general index of rheumatoid arthritis was undertaken by a rheumatologist (Dr. B. Watkin).

Radiological assessment was made by standard lateral oblique film. Where doubt existed, that is there was positive clinical evidence but negative radiological findings, tomograms were taken of the temporomandibular joints.

When the age-sex distribution of the patients was known—at the termination of the study—three control groups of 100 randomly selected patients were formed matched for age and sex with the rheumatoid group.

Control Group "A"—a hundred selected from 590 non-regular attenders for dental treatment (*i.e.* less than twice a year).

Control Group "B"—a hundred selected from 326 regular dental patients.

Control Group "C"—a hundred selected from 900 patients who attended the author's temporomandibular joint clinic with an acquired abnormality classified as "temporomandibular joint pain-dysfunction syndrome". This is a non-destructive abnormality of function mainly concerned with the masticatory muscles (Franks, 1965).

The data were analysed for degrees of significance using the χ^2 test.

*The substance of this article was reported to the Heberden Society on November 12, 1965.

Results

Age-Sex Distribution

The male : female ratio of the patients examined was just under 1 : 3. The age range of both sexes was comparable (Fig. 1). No patient was under the age of 25 and the majority were over 55.

Temporomandibular Joints

Some history of temporomandibular joint disorder (*i.e.* pain, noise within the joint or movement, altered function of the joint) was discovered in 53 per cent. of the rheumatoid group. No patient could antedate this local complaint before their other joint symptoms. Clinically 40 per cent. of the rheumatoid patients had palpation tenderness of the temporomandibular joints, and 63 per cent. had crepitus in at least one of the moving jaw joints. These results are displayed with the appropriate control figures in Table II.

From Table III it can be seen that patients with a history of temporomandibular joint disorder were more likely to have crepitus and change in the temporomandibular joints. However, the history was of no significance in relation to the radiological findings, which disclosed that 56 per cent. had structural changes of the calcified joint tissues. It was found (Table IV) that, where crepitus was present in the moving joint, there was a highly significant incidence of radiological positives: 43 out of 63, as opposed to 13 out of 37 in which crepitus was absent.

TABLE III
HISTORY OF TEMPOROMANDIBULAR JOINT DISORDER RELATED TO JOINT CHANGES IN 100 RHEUMATOID PATIENTS

History of Temporomandibular Joint Disorder	Present	Absent	Total
	53	47	100
Crepitus	38	25	63
Radiological Change	31	25	56

TABLE IV
CREPITUS IN THE JOINT RELATED TO RADIOLOGICAL EVIDENCE OF CHANGE

Crepitus		No. of Cases	Radiological Change in Joint
Present		63	43
Absent	History of Joint Disorder	15 } 37	4 } 13
	No History of Joint Disorder	22	9
Total Rheumatoid Patients		100	56

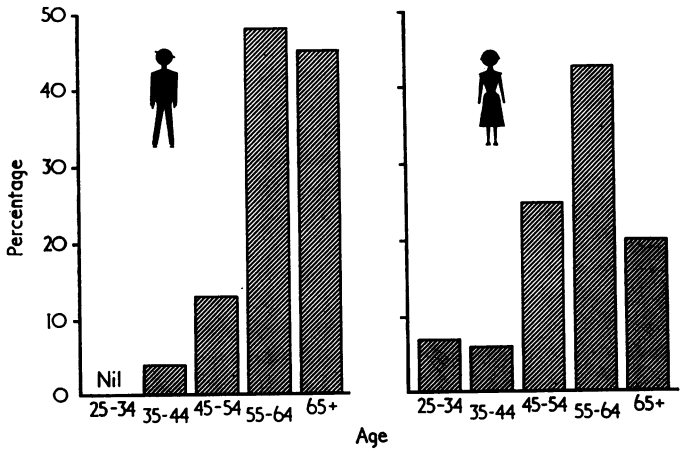

Fig. 1.—Histogram of age range of 100 patients with rheumatoid arthritis.

TABLE II
SIGNS AND SYMPTOMS OF TEMPOROMANDIBULAR JOINT DISORDER IN PATIENTS WITH RHEUMATOID ARTHRITIS AND THREE CONTROL GROUPS

Group	100 Patients with Rheumatoid Arthritis	Control Groups (100 each)		
		A	B	C
History of Temporomandibular Joint Disorder	53	24	19	100
Tenderness of Temporomandibular Joint (Palpation)	40	0	0	11
Crepitus in moving Temporomandibular Joint	63	0	0	4

Some evidence of temporomandibular joint disturbance, clinical or radiographic, was present in 86 per cent. of the rheumatoid patients.

Oral Health

This was almost uniformly poor, 86 per cent. being dentally unfit.

Only six of the patients attended for regular dental treatment, so that as a group they are directly comparable, in terms of dental health, with Control series A.

However only 51 per cent. of the rheumatoid patients had some natural teeth, and this causes hesitation in comparisons with the control groups in which the proportion was much higher. Particularly is this so if we attempt to consider the possible changes in temporomandibular joint function brought about by partial loss of natural teeth.

However, if one takes this group of 51 per cent. with natural teeth and examines those within it who have temporomandibular joints affected by rheumatism, one finds ninety per cent. with unreplaced missing teeth with an average of eight missing and that this is not significantly different from the control series A (Table V).

Further, if we consider unbalanced tooth loss—between the two sides of the mouth, the χ^2 test again shows no significant difference between the rheumatoid group and Control A. In addition, 57 per cent. of those with natural teeth (*i.e.* 25 of the 44 rheumatoid patients) had some radiological change, compared with 55 per cent. of those with full dentures (*i.e.* 23 of the 42 rheumatoid patients with full dentures)—no significant difference. In view of these findings, it was thought justified—in this investigation—to consider the patients with natural and artificial teeth together.

Previous studies of temporomandibular joint disorders at the Institute of Dental Surgery have indicated (Franks, 1967) the apparent aetiological importance of certain functional habits—particularly that associated with unilateral chewing. The importance of this factor appears to be underlined yet again in the disorder under current investigation (Table VI). Here the incidence of the habit amongst the rheumatoid patients with temporomandibular involvement shows a significant relationship.

TABLE VI
CHEWING HABIT RELATED TO INCIDENCE OF RHEUMATOID ARTHRITIS IN TEMPOROMANDIBULAR JOINT

Group	Rheumatoid Arthritis of Temporomandibular Joint	Controls		
		A	B	C
Unilateral Chewing Habit (per cent.)	69	50	43	82

Radiological Findings

Changes appear to occur first in the anterior margin of the condyle (Fig. 2). Progressively the

Fig. 2.—Right temporomandibular joint in closed position. Tomogram showing early rheumatoid change. The radiolucent area is seen in the anterior part of the condyle.

TABLE V
DENTITION IN 86 PATIENTS WITH RHEUMATOID ARTHRITIS OF THE TEMPOROMANDIBULAR JOINT AND CONTROL GROUPS

Group		Rheumatoid Arthritis of Temporomandibular Joint	Controls		
			A	B	C
Dentition	Per cent. with some natural teeth	51	80	84	92
	Per cent. with unreplaced missing teeth	90	88	69	76
	Average number of missing teeth (per person)	8	9	7	7
	Per cent. with tooth loss unbalanced between two sides of mouth	73	66	52	86

destruction causes the condyle to resemble the "sharpened pencil deformity" of the phalanges (Fig. 3) (Simon, 1965). Uotila (1964) suggested its likeness to "the mouth-piece of the flute". In the most severe manifestation the condyle is completely obliterated (Fig. 4), but function may still remain satisfactory; the patient illustrated in Fig. 4 could open his mouth 44 mm. (the normal average) and had in fact no history, no crepitus, no symptoms.

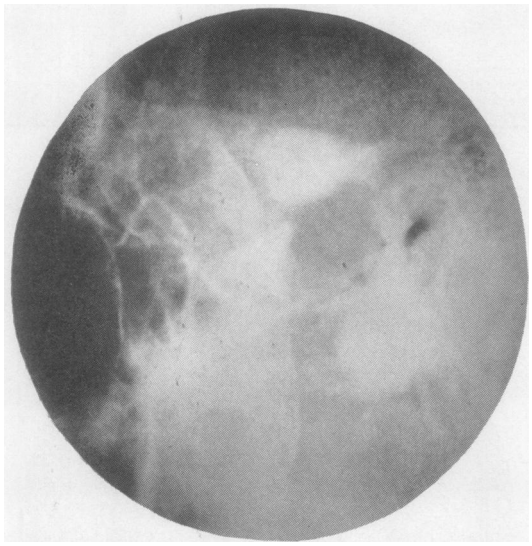

Fig. 3.—Right temporomandibular joint in open position. Standard radiograph showing results of progressive destruction of condyle head, leading to an appearance similar to "the mouth-piece of a flute."

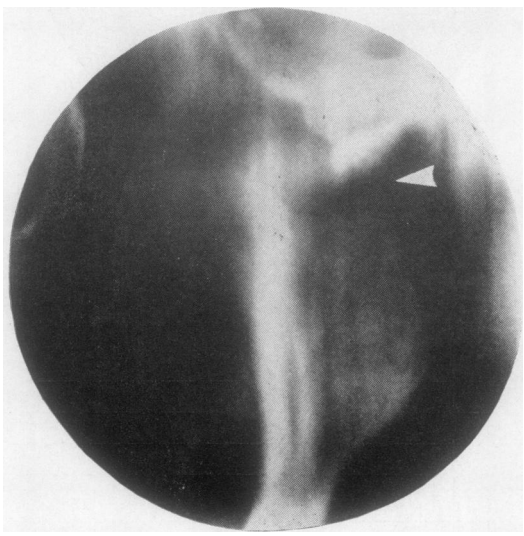

Fig. 4.—Right temporomandibular joint in closed position. Tomogram showing severe destruction of condyle and condylar neck in rheumatoid arthritis. The condyle is completely obliterated.

General Rheumatoid Status

In each of the rheumatoid patients, the number of joints involved in the arthritic process was listed by Dr. Watkin. Small and large joints were collated separately (Table VII). 38 per cent. of the group with between four and seven small joints affected and 53 per cent. of those with over eight small joints affected had involvement of the temporomandibular joints, but the incidence is not significant. The number of large joints involved, however, is significant; as the number increases so does the incidence of temporomandibular trouble.

TABLE VII
RHEUMATOID ARTHRITIS IN TEMPOROMANDIBULAR JOINTS RELATED TO SYSTEMIC JOINT INVOLVEMENT

Systemic Manifestations of Rheumatoid Arthritis (Joints involved)		Rheumatoid Arthritis of Temporomandibular Joint (per cent.)
Small	Up to 3	0
	4—7	38
	Over 8	53
Large	Up to 3	35
	4—7	58
	Over 8	78

Functional incapacity was graded according to Steinbrocker, Traeger, and Batterman (1949). Table VIII shows that the highest incidence of temporomandibular joint disturbance occurs in the more severe cases of rheumatoid arthritis. The association of the progressive percentage increase in affection of the temporomandibular joint with increasing functional incapacity is significant in itself. A significant percentage of the patients examined showed only moderate systemic manifestations of rheumatoid arthritis.

TABLE VIII
FUNCTIONAL INCAPACITY OF PATIENTS WITH RHEUMATOID ARTHRITIS OF TEMPOROMANDIBULAR JOINTS

Functional Incapacity (Steinbrocker and others, 1949	Rheumatoid Patients Studied (Percentage incidence within whole group)	Patients with Rheumatoid Arthritis of Temporomandibular Joint (Percentage incidence within each "incapacity group")
I	4	33
II	51	41
III	40	60
IV	5	70

Analysis of the age at onset of the rheumatoid condition (Table IX, opposite) and of the erythrocyte sedimentation rate revealed no significant relationship.

TABLE IX
RELATIONSHIP OF AGE AT ONSET OF RHEUMATOID ARTHRITIS AND LESIONS IN THE TEMPOROMANDIBULAR JOINT (PER CENT.)

Age at Onset (yrs)	15-24	25-34	35-44	45-54	55-64	65+
Rheumatoid Arthritis of Temporomandibular Joint	82	71	66	79	33	50

Haemoglobin averages (at least five per patient) showed a significantly higher incidence of temporomandibular joint involvement amongst those with a reduced haemoglobin level (Table X).

TABLE X
HAEMOGLOBIN LEVELS (AVERAGE OF AT LEAST 5 ESTIMATIONS PER PATIENT) RELATED TO RHEUMATOID ARTHRITIS OF TEMPOROMANDIBULAR JOINT

Hb (per cent.)	Rheumatoid Arthritis of Temporomandibular Joint (per cent.)
80 and over	59
under 80	77

Discussion

Clinical Findings

The age-sex distribution of the patients under discussion agrees closely with the average patterns associated with the complaint in the general population (Kellgren, Lawrence, and Aitken-Swan, 1953), so that there is some justification for drawing general conclusions from the results.

Previously published work (Table I) has shown a varying incidence of rheumatoid temporomandibular joints. The study of Blackwood (1963) is of especial importance because it is based on autopsy findings, seven of his cases of rheumatoid arthritis demonstrated temporomandibular joint changes, and although the group is small his results are the most objective.

A question which requires further evaluation is whether the incidence of temporomandibular joint disorder is increasing. A comparable suggestion has been made for the hip joint (Edström, 1961), the explanation being based on an osteoporosis following the use of steroids and the resultant abuse of damaged joints freed from pain.

In dealing with disease of the temporomandibular joint, it is important to be aware of the diagnostic problems associated with it (Franks, 1964) and the almost epidemic nature of non-destructive temporomandibular joint dysfunction (Table III). The control studies disclosed an incidence of 24 and 19 per cent. in the two groups.

Certain differential characteristics of the rheumatoid temporomandibular joint are clearly shown by the results of the study. Tenderness is significantly more frequent over the rheumatoid joint, but in the dysfunction cases the masticatory muscles are more frequently involved.

Crepitus appears to be of considerable significance, when it is present irreversible degenerative change is likely to have taken place, but structural change may occur without crepitus—a result, perhaps, of remodelling of the articular surfaces without cartilage loss and fragmentation.

Table VIII suggests that involvement of the temporomandibular joint by rheumatoid arthritis is not an index of the severity of the systemic manifestations.

Since this paper was presented to the Heberden Society in 1965, rheumatoid arthritis of the temporomandibular joint has been discussed by Marbach and Spiera (1967) in a résumé of two cases which includes general conclusions that cannot be supported. For example, they suggest that in rheumatoid arthritis there is a considerable reduction in the amount of possible condyle movement during mouth opening. Table XI clearly shows that there is only a slight reduction in the amount of opening (as measured between maxillary and mandibular incisors) and mandibular condyle movement which is of little significance.

TABLE XI
FUNCTION OF TEMPOROMANDIBULAR JOINT IN RHEUMATOID ARTHRITIS
Expressed as Degree of Mandibular Condyle Movement measured by Maximum Inter-incisal Opening

Group		Inter-incisal Opening (mm.)
Patients with Rheumatoid Arthritis of Temporomandibular Joint		38·0
Controls	A	43·5
	B	45·0
	C	32·0

Functional Aspects

Amongst the unique characteristics of the temporomandibular joints is the fact that the joint at each end of the mandible is one half of a functional unit. One joint cannot operate independently and therefore any alteration in the activity of one side will affect the other. Clearly a unilateral chewing habit constitutes an uneven distribution of function between the right and left joints. Previous work (Franks, 1967) has indicated that such a habit is of considerable importance in the aetiology of temporomandibular joint pain–dysfunction. The significant incidence of abnormal jaw function amongst rheumatoid patients is striking.

It would be legitimate to ask which came first, the deranged activity or the joint disease. The results indicate that the patient's awareness of a temporomandibular joint disorder (*i.e.* history) was not significant in relation to the incidence of radiological change. Furthermore it was found that the average joint movement measured as maximal mouth opening without pain in the rheumatoid patients was reduced but not significantly (Table XI). This would suggest that the functional effect of rheumatoid arthritis on the joint was not significant and that the significant incidence of unilateral chewing was not a result of the joint changes but more probably a precursor.

Summary

The examination of 100 patients with rheumatoid arthritis has shown that the temporomandibular joint can become involved at varying stages of the natural history of the disease, and that such signs and symptoms are much more common than previous work has suggested. The more severe the manifestations of the general complaint, the more commonly are the temporomandibular joints involved; however, the involvement of these joints is not itself an index of the severity of the systemic manifestations.

Bywaters (1962) posed a fundamental question, "What determines the localization of rheumatoid arthritis in a joint?", and suggested that movement itself, or perhaps the mild trauma which occurs with movement, may be responsible for the localization of the inflammatory agent. The present study shows that this concept may be applied and extended; the appearance of rheumatoid changes in the temporomandibular joint may be related to an uneven distribution of function between the right and left sides.

I am indebted to the Medical Research Council for their support during the period that the above work was carried out. I should also like to express my thanks to Dr. Oswald Savage, not only for allowing me access to his patients, but for the spirit in which his co-operation was offered. I am also very grateful to Dr. Bernard Watkin for his valuable help and assistance in the systemic assessment of the rheumatoid patients.

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L'articulation temporo-maxillaire chez l'adulte atteint de polyarthrite rheumatoïde

RÉSUMÉ

L'examen de cent malades atteints de polyarthrite rhumatoïde a demontré que l'articulation temporo-maxillaire peut être affectée aux différents stades de la marche normale de la maladie et que ces signes cliniques et ces symptômes sont beaucoup plus communs que les travaux antérieurs avaient suggéré. Plus les manifestations de la maladie en général sont sérieuses plus il est commun de voir les articulations temporo-maxillaires affectées; l'affection de ces articulations n'est pas d'elle-même un indice de la sévérité des manifestations systémiques.

Bywaters (1962) a posé une question fondamentale, 'Que'est-ce qui détermine la localisation de la polyarthrite rhumatoïde dans une articulation?" et a suggéré que le mouvement lui-même, ou peut-être le traumatisme léger qui a lieu pendant le mouvement, pourrait être responsable de la localisation de l'agent inflammatoire. Cette étude démontre que ce concept peut être appliqué et étendu, l'apparition des changements rhumatoïdes dans l'articulation temporo-maxillaire peut se rapporter à une distribution inégale des fonctions entre le côté droit et le côté gauche.

La articulación temporomaxilar en adultos con poliartritis reumatoide

SUMARIO

El examen de 100 pacientes con poliartritis reumatoide ha revelado que la articulación temporomaxilar puede quedar afectada en diferentes etapas del desarrollo normal de la enfermedad, y que tales manifestaciones y síntomas son mucho más comunes que lo que han sugerido trabajos previos. Cuanto más severas las manifestaciones de la enfermedad general, tanto más comunmente afectadas las articulaciones temporomaxilares; no obstante, la complicación de estas articulaciones no es un índice de la severidad de las manifestaciones sistémicas.

Bywaters (1962) planteó una cuestión fundamental: "¿Qué es lo que determina la localización de la poliartritis reumatoide en una articulación?", y sugirió que el propio movimiento o quizá el ligero trauma que ocurre con el movimiento sería tal vez el causante de la localización del agente inflamatorio. Este estudio muestra que el concepto podría ser aplicado y ampliado, y la aparición de cambios reumáticos en la articulación temporomaxilar pudiera ser atribuída a una distribución desigual de las funciones entre los lados derecho e izquierdo.