RHEUMATOID ARTHRITIS OF THE CERVICAL SPINE IN THE ADULT

BY

J. SHARP, D. W. PURSER, AND J. S. LAWRENCE

From the Departments of Rheumatism Research and Orthopaedic Surgery and the Empire Rheumatism Council Field Unit, University of Manchester

Garrod (1890), who first differentiated rheumatoid arthritis as a clinical entity, noted that the cervical spine was affected in 178 of his 500 patients. Sharp (1957) found that the cervical spine was affected clinically at some stage of the disease in 40 per cent. of the patients attending the Manchester Rheumatism Centre with rheumatoid arthritis; almost all of these were adults and in some cases the cervical involvement was a major source of disability. Involvement of the cervical spine is generally recognized as a common feature of juvenile rheumatoid arthritis (Still, 1897; Coss and Boots, 1946; Potter, Barkin, and Stillman, 1954; Ziff, Contreras, and McEwen, 1956), but little attention has been paid to the changes produced in this region in the adult form of the disease.

The purpose of the present study was to define the radiological changes produced in the cervical spine by rheumatoid arthritis in the adult and to discover whether such changes may occur as the only evidence of rheumatoid arthritis, that is without clinical or radiological signs of the disease elsewhere. We subscribe to the view held by most British and many American authors that rheumatoid arthritis and ankylosing spondylitis are distinct diseases (Golding, 1935; Dunham and Kautz, 1941; Buckley, 1945; Hart, Robinson, Allchin, and Maclagan, 1949; Mowbray, Latner, and Middlemiss, 1949; Ziff, Brown, Badin, and McEwen, 1954). This report is concerned only with cervical involvement in rheumatoid arthritis as such.

Material and Methods

During the years 1953-5 inclusive, in-patients in the Rheumatism Centre of the Manchester Royal Infirmary had a routine series of radiographs including a lateral view of the cervical spine. Only those of patients between the ages of 55 and 64 years were used for this study (16 were males and 28 females). These were compared with films of 15 males and 28 females in this age group taken from the general population of Leigh,

Lancashire. These were selected at random from the series studied by Kellgren and Lawrence (1956).

The films were read by the three authors in consultation and all the abnormalities observed were tabulated. Scores of from 0 to 4 were used to indicate the severity of each abnormal feature:

- 0=absent
- 1=doubtful
- 2=minimal
- 3=moderate
- 4=severe

The sample of films from the general population was found to contain a proportion from individuals with rheumatoid arthritis. The subsequent analysis was, therefore, made first on the total sample, then with the rheumatoid subjects excluded.

Some features of the rheumatoid patients are indicated in Table I. All patients were classified according to the diagnostic criteria for rheumatoid arthritis proposed by

TABLE I
DATA ON RHEUMATOID PATIENTS SELECTED FOR THIS STUDY

Sex	Male	Female	Total	
Total Number of Patients	16	28	44	
American Rheumatism Association Classification	Definite	15	28	43
	Probable	1	0	0
Duration of Symptoms (yrs)	Average	4.3	9.3	7.5
	Range	4/12-16	1-36	4/12-36
Subcutaneous Nodules Present	6	11	17	
Erythrocyte Sedimentation Rate (Westergren) (mm./hr)	Average	67	59	62
	Range	22-140	23-119	22-140
Sheep Cell Agglutination Test	Total Tested	15	26	41
	No. Positive (at least one reading of 1/32 or higher titre)	14	24	38

the American Rheumatism Association (Ropes, Bennett, Cobb, Jacob, and Jessar, 1956). All except one fell into the definite category. All had a raised erythrocyte sedimentation rate and the majority were suffering from very active disease, probably of more than average severity, in view of the selection factors operative in bringing patients to a special centre. The sheep cell agglutination test was performed by the method of Ball (1950), and we are grateful to Dr. Ball for carrying out the tests used in this study. The result was positive in 92 per cent. of the patients tested.

Comparison of the abnormal features in the two series of films revealed that certain abnormalities were commoner in the rheumatoid patients. Using these features as criteria, 428 cervical radiographs, taken from random

samples of the populations of Leigh and of Cowbridge, in the Vale of Glamorgan, in the age group 55-64 years were read independently by the three observers in an effort to recognize the subjects suffering from rheumatoid arthritis from the radiographic appearances of the cervical spine alone. The films were therefore read without knowledge of the clinical or serological findings, or of the radiological findings elsewhere. Each film was awarded a grading for rheumatoid arthritis of from 0 to 4 as previously defined. Films from the original series of rheumatoid patients, representative of Grades 2, 3 and 4 were selected for use as standards; these are illustrated in Fig. 1.

From the readings of these three observers it was possible to assess interobserver error. For the assess-

Fig. 1.—Standard films used in grading rheumatoid changes.

ment of intra-observer error, a group of 100 films, which included those of all subjects in the population sample with a positive sheep cell test (except one), was re-read independently by one of the observers some months after the original reading and again a third time a week after the second reading.

Results

Readings on Known Rheumatoid and Non-Rheumatoid Subjects

The main differences between the prevalence of abnormal features in the films of the rheumatoid patients and those in films of the general population are set out in Table II (overleaf). Rheumatoid arthritis of the cervical spine was characterized by

changes in the intervertebral disks, vertebral plates, and apophyseal joints, and by vertebral subluxation.

In the rheumatoid patients, narrowing of disk spaces, where present, tended to affect multiple levels. The disks between the second and third and between the third and fourth vertebrae, which were rarely affected in the non-rheumatoid subjects, were quite frequently involved in those with rheumatoid arthritis. Below C4, disk narrowing was common in both groups, rather more so in those without rheumatoid arthritis. Disk narrowing with little or no osteophytosis was a feature of rheumatoid spines, but marked osteophytosis with severe sclerosis of the vertebral plates was more frequent in the non-rheumatoid subjects. In the rheumatoid pat-

Fig. 1.—Standard films used in grading rheumatoid changes.

TABLE II

COMPARISON OF RADIOLOGICAL CHANGES IN THE CERVICAL SPINE IN RHEUMATOID HOSPITAL IN-PATIENTS AND CONTROLS FROM A RANDOM SAMPLE OF THE GENERAL POPULATION, BOTH AGED 55-64 YRS

Characteristics Examined			Rheumatoid Hospital In-Patients	Random General Population Sample		Rheumatoid Hospital In-Patients	Random General Population Sample (Definite Non-R.A.*)	P of Difference R.A./Non-R.A. as Proportion of		
				Total	Definite Non-R.A.*					
			Numbers			Per cent. of Total			Total	Those with Narrow Disks
Disk Narrowing	Number of Disks Affected	None ..	13	7	6	30	17			
		One ..	7	13	12	16	34			
		Two ..	10	11	9	22	26			
		Three or More	14	12	8	32	23			
	Levels Affected	C.2/3 ..	4	1	0	9	0	< .05	< .01	
		C.3/4 ..	9	5	3	20	9			
		C.4/5 ..	15	15	12	34	34			
		C.5/6 ..	26	29	23	59	66			
		C.6/7 ..	18	25	20	41	57			
	Accompanying Osteo- phytosis	Little or None Marked ..	11 20	4 32	3 26	25 45	9 74	< .11	< .05	
Affection of Vertebral Plates	Sclerosis	Minimal ..	10	9	6	22	17	~ .10	~ .19	
		Moderate to Severe ..	6	13	11	14	31			
	Erosion	Minimal to Severe ..	9	6	3	20	9	~ .25	< .14	
Vertebral Subluxation	Total ..	12	6	6	27	17	~ .4	< .01		
	Mild ..	4	6	6	9	17				
	Moderate ..	7	0	0	16	0				
	Severe ..	1	0	0	2	0				
	At Multiple Levels	4	1	1	9	3				
Apophyseal Joint Changes	Prolif- erative	Total Definite At Multiple Levels ..	15	14	13	34	37			
			8	11	11	18	31			
	Destruc- tive	Total Definite At Multiple Levels ..	10	2	2	23	6			< .08
			8	0	0	18	0			
Total Number of Films ..			44	43	35	100	100			

* i.e. after excluding individuals who showed any of the following features: Sheep Cell Agglutination Test Titre of 1/32 or more, Definite Clinical Rheumatoid Arthritis. Definite Radiological Rheumatoid Arthritis of Hands and/or Feet.

ients, however, appearances suggesting erosions of the vertebral plates were more often encountered.

Vertebral subluxation of more than mild degree was observed *only* in the rheumatoid patients. Minor subluxations were found in both rheumatoid and non-rheumatoid subjects at the disk immediately above a degenerate disk or block vertebra. In the rheumatoid patients, subluxation sometimes occurred without obvious cause, often through a grossly narrowed disk. In the one patient with severe subluxation, this occurred at multiple levels, the most severe being an 8 mm. forward displacement of the atlas on the axis.

Erosion of the apophyseal joints was observed more frequently in films of the rheumatoid patients, but in "blind" reading of films changes in the apophyseal joints were difficult to detect with certainty and were not found to be very helpful diagnostically; as the sole evidence of rheumatoid

arthritis they were even occasionally misleading. The greatest reliance in the diagnosis of rheumatoid arthritis was placed on the presence of narrowing of multiple disk spaces, particularly those between the second and third and third and fourth vertebrae, and subluxation of vertebrae of more than mild degree, particularly if multiple or if occurring through an obviously narrowed disk space. Complete or relative absence of osteophytosis or sclerosis of vertebral plates in relation to narrowed disk spaces was also helpful.

Readings on Films from Population Samples

Observer Agreement.—If the above criteria are to be of value in diagnosis, it must be shown that a good measure of agreement is possible between different observers and between repeated readings of the same observer.

TABLE III

INTEROBSERVER DIFFERENCES IN GRADING RHEUMATOID ARTHRITIS FROM X-RAY READINGS OF THE CERVICAL SPINE

Observer A						Observer B	Observer A						Observer C
	302	94	24	8	428			302	94	24	8	428	
3	—	—	1	2	3		3	—	2	2	3	7	
2	6	18	14	5	43		2	7	12	11	2	32	
1	27	34	7	1	69		1	49	52	7	1	109	
0	269	42	2	—	313		0	246	28	4	2	280	
Grade	0	1	2	3			Grade	0	1	2	3		
$r = +0.66$						$r = +0.58$							

TABLE IV

INTRA-OBSERVER DIFFERENCES IN GRADING RHEUMATOID ARTHRITIS FROM X-RAY READINGS OF THE CERVICAL SPINE

A1						A2	A2						A3
	70	24	4	2	100			65	26	5	4	100	
3	—	2	—	2	4		3	—	—	—	4	4	
2	2	2	1	—	5		2	—	6	4	—	10	
1	9	14	3	—	26		1	1	13	1	—	15	
0	59	6	—	—	65		0	64	7	—	—	71	
Grade	0	1	2	3		Grade	0	1	2	3			
$r = +0.61$						$r = +0.89$							

In Table III Observer A is compared with Observers B and C in readings of the 428 cervical films from the Leigh and Cowbridge surveys. Observer B graded fewer x rays as 3 or 1, and more as 2 or 0 compared with Observer A. Observer C graded more as 1 or 2, and fewer as 0. Nevertheless, the correlation coefficients showed a satisfactory positive correlation, being respectively thirteen times and twelve times the standard error.

In the second readings by Observer A (Table IV), more films were graded 3, 2, and 1, and fewer were graded 0. The correlation coefficient is of the same order as for interobserver comparisons. In the third reading the films graded 3 were identical, but more were graded 2 and 0 and fewer 1. Between the second and third readings there was a very high degree of correlation ($r = +0.89$).

Prevalence of Radiological Signs of Cervical Rheumatoid Arthritis and Comparison with Other Evidence of Rheumatoid Arthritis.—The prevalence of definite radiological changes (Grade 2 to 4) of rheumatoid arthritis (Table V, overleaf) in the cervical spine,

using the average reading of three observers, was 6 per cent. in males and 7 per cent. in females. Though the prevalence was thus similar in the sexes, the severity was greater in females, who alone showed Grade 3 to 4 changes. Doubtful changes were also more frequent in females. In both sexes there was a relationship between the severity of the x-ray changes and the proportion having a positive sheep cell agglutination test. For both sexes together (Fig. 2, overleaf), the proportion of positive sheep cell tests varied from 3 per cent. in those with no x-ray changes to 17 per cent. in those with definite rheumatoid arthritis. This association is highly significant ($P = <0.01$).

A clinical diagnosis of rheumatoid arthritis had been made in 41 of the 428 persons in this series (Table VI, overleaf); the prevalence of clinical rheumatoid arthritis varied from 9 per cent. in those with no x-ray changes in the cervical spine to 14 per cent. in those with definite changes. The association, however, could not be regarded as significant ($P = 0.6$). Division of the cases of clinical rheumatoid arthritis into those with and those without a

TABLE V

COMPARISON OF SHEEP CELL AGGLUTINATION TEST WITH CERVICAL X-RAY CHANGES (AVERAGE READINGS OF THREE OBSERVERS)

Sheep Cell Agglutination Test Titre	Grading of Rheumatoid Arthritis												Total No.
	Males (159)				Females (269)				Both Sexes (428)				
	0	1	2	3-4	0	1	2	3-4	0	1	2	3-4	
0	73	14	5	—	131	45	9	1	204	59	14	1	278
1-4	27	14	3	—	28	7	2	—	55	21	5	—	81
1-8	9	2	—	—	14	6	2	—	23	8	2	—	33
1-16	3	—	1	—	6	3	1	—	9	3	2	—	14
1-32	1	1	—	—	2	3	1	1	3	4	1	1	9
1-64	2	—	—	—	2	—	1	—	4	—	1	—	5
1-128	—	—	1	—	—	1	—	1	—	1	1	1	3
1-256	1	1	—	—	1	1	—	—	2	2	—	—	4
1-512	1	—	—	—	—	—	—	—	1	—	—	—	1
Total No.	117	32	10	—	184	66	16	3	301	98	26	3	428
Positive SCAT Per cent.	4	6	10	—	3	8	21	—	3	7	17	—

Fig. 2.—Relationship of rheumatoid x-ray changes in the cervical spine to sheep cell agglutination test.

TABLE VI

COMPARISON OF CLINICAL RHEUMATOID ARTHRITIS AND CERVICAL X-RAY CHANGES (AVERAGE OF READINGS OF THREE OBSERVERS)

Clinical R.A. Gradings	Gradings of Cervical Changes				
	Total No.	0	1	2	3-4
0	356	253	78	23	-
1	31	21	10	-	-
2	29	19	9	1	-
3	4	3	1	-	-
4	8	5	0	2	-
Total No.	428	301	98	26	3
Percentage Grades 2-4	-	9	10	14	-
Morning Stiffness	No.	123	84	31	7
	Per cent.	28	32	28	1
Past Polyarthritis Only	44	42	2	0	0

positive sheep cell test also failed to disclose any significant association (Table VII, opposite). Morning stiffness similarly showed no association with x-ray changes and none of the patients who had only a history of a previous attack of polyarthritis had x-ray evidence of rheumatoid arthritis in the cervical spine.

The hands and feet of all the 428 persons in this series were x-rayed during the original survey. Radiological evidence of rheumatoid arthritis in one or both of these sites had been discovered in 33 (8 per cent.) (Table VIII; Fig. 3, opposite); x-ray changes were three times as frequent in the hands and feet of those with Grade 2 to 4 changes in the cervical spine as in those with Grade 0 to 1 changes. This association is significant ($P=0.02$ to 0.01). The correlation coefficient using all gradings is low

TABLE VII

THE RELATIONSHIP OF CERVICAL RHEUMATOID ARTHRITIS TO CLINICAL RHEUMATOID ARTHRITIS IN PERSONS WITH POSITIVE AND NEGATIVE SHEEP CELL TESTS

Clinical RA Grading	Cervical RA Grading				
	0	1	2	3	Total No.
Positive SCAT	0	6	3	2	12
	1	—	1	—	1
	2	1	2	—	3
	3	—	1	—	1
	4	3	—	1	5
Total No.	10	7	3	2	22
Negative SCAT	0	247	75	21	344
	1	21	9	—	30
	2	18	7	1	26
	3	3	—	—	3
	4	2	—	1	3
Total No.	291	91	23	1	406
Per cent. with Clinical RA Grades 2-4 with Negative SCAT	8	8	8		
Grand Total	301	98	26	3	428

TABLE VIII

THE RELATIONSHIP OF X-RAY CHANGES OF RHEUMATOID ARTHRITIS IN THE CERVICAL SPINE AND IN HANDS AND/OR FEET

Radiological R.A. of Hands and/or Feet Grading	Cervical RA Grading				
	0	1	2	3-4	Total No.
Positive SCAT	0	4	4	—	8
	1	2	3	—	6
	2	1	—	2	3
	3	1	—	—	1
	4	2	—	1	4
Total No.	10	7	3	2	22
Negative SCAT	0	176	50	12	238
	1	98	35	9	143
	2	15	6	1	22
	3	1	—	—	1
	4	1	—	1	2
Total No.	291	91	23	1	406
Per cent. with Grade 2-4 RA Hands and/or Feet	6	7	8		6
Grand Total	301	98	26	3	428
Per cent. with Grade 2-4 RA Hands and/or Feet	7	6	21		8

Fig. 3.—Relationship of radiological changes of rheumatoid arthritis in the cervical spine to those in the hands and feet.

($r=+0.12$), but with a standard error of 0.05 is significant. The association was virtually confined to those with positive sheep cell tests.

As a composite assessment of clinical, radiological and serological evidence of rheumatoid arthritis, the American Rheumatism Association's classification (Ropes and others, 1956) has been used (Table IX). In this classification, which is based on a points system, one point is given for radiological evidence of rheumatoid arthritis which must include at least osteoporosis in the region of the affected joint. In applying the A.R.A. classification for the present purposes, radiographic changes in the cervical spine have been excluded. This is in conformity with current clinical practice, since a radiograph of the cervical spine is not normally included in the routine investigation of a patient suspected of having rheumatoid arthritis. Using these criteria, a diagnosis of definite rheumatoid arthritis was made in fourteen (3 per cent.) of the 428 persons in this series. A further 10 per cent. had probable and 14 per cent. possible rheumatoid arthritis. There was only a poor association between the disease as defined in this classification and the changes we have assessed in the cervical spine.

TABLE IX

COMPARISON OF AMERICAN RHEUMATISM ASSOCIATION CLASSIFICATION WITH CERVICAL X-RAY CHANGES

A.R.A. Classification	Grading of Cervical Changes				
	Total No.	0	1	2	3-4
Definite	14	9	3	1	1
Probable	44	30	12	2	—
Possible	60	39	15	5	1
None	307	220	68	18	1
Not Stated	3	3	—	—	—
Total No.	428	301	98	28	3
Possible—Definite as Per cent.		26	31	34	

It is thus apparent that, in the type of case predominating in these population samples, both the sheep cell test and radiological changes in the hands and feet correlated to a significant degree with the cervical changes. Clinical rheumatoid arthritis on the other hand showed no close association. There was, however, a definite correlation ($P=<0.01$) between clinical rheumatoid arthritis and the sheep cell test (Table X) and between the sheep cell test and radiological evidence of rheumatoid arthritis in the hands and feet ($P=<0.01$, Table XI).

TABLE X
COMPARISON OF CLINICAL RHEUMATOID ARTHRITIS WITH SHEEP CELL AGGLUTINATION TEST

SCAT Titre	Total No.	Grading of Clinical R.A.				
		0	1	2	3	4
0	278	238	19	17	1	3
1/4	81	68	4	7	2	—
1/8	33	26	6	1	—	—
1/16	14	12	1	1	—	—
1/32	9	6	1	2	—	—
1/64	5	4	—	—	—	1
1/128	3	1	—	—	—	2
1/256	4	1	—	1	1	1
1/512	1	—	—	—	—	1
Total ..	428	356	31	29	4	8
Positive	No.	22	1	3	1	5
	Per cent.		3	10	50	

TABLE XI
COMPARISON OF RADIOLOGICAL RHEUMATOID ARTHRITIS HANDS AND/OR FEET WITH SHEEP CELL AGGLUTINATION TEST

SCAT Titre	Total No.	Grading of Radiological R.A. Hands and/or Feet				
		0	1	2	3	4
0	278	170	89	16	1	2
1/4	81	47	30	4	—	—
1/8	33	14	18	1	—	—
1/16	14	7	6	1	—	—
1/32	9	4	3	2	—	—
1/64	5	1	2	1	1	—
1/128	3	1	—	—	—	2
1/256	4	2	1	—	—	1
1/512	1	—	—	—	—	1
Total ..	428	246	149	25	2	6
Positive	No.	22	8	6	3	4
	Per cent.		3	4	12	63
		24				

The interrelationship between the sheep cell test, and radiological changes Grades 1 to 4 in the hands and/or feet and in the cervical spine is shown in Fig. 4 and in Table XII (opposite); the relationship after excluding Grade 1 is also shown in the Table. In each case there is seen to be a progressive increase in the proportion having a positive sheep cell test from those without x-ray changes to those in whom both the hands and feet and the cervical spine were involved. When doubtful changes were included, a higher proportion of positive tests was found when the radiological changes were present only in the cervical spine than when they were confined to the hands and/or feet; when doubtful changes were excluded, the reverse applied. An interesting finding was that four out of six with definite radiological

Fig. 4.—Relationship of radiological changes of rheumatoid arthritis in the cervical spine and peripheral joints to the sheep cell agglutination test.

evidence of rheumatoid arthritis at both sites gave a positive test. The correlation coefficient for the association of the sheep cell titre with radiological changes in the hands and feet is $r = +0.25$, in the cervical spine $r = +0.16$, and in both sites $r = +0.27$.

Discussion

It is apparent from the data presented that certain radiographic changes in the intervertebral disks, vertebral bodies, and apophyseal joints in the cervical spine are frequently associated with a positive sheep cell agglutination test. The characteristic disk changes (narrowing of the disk spaces

TABLE XII

COMPARISON OF RADIOLOGICAL RHEUMATOID ARTHRITIS GRADING OF HANDS AND/OR FEET AND CERVICAL SPINE FILMS WITH SHEEP CELL AGGLUTINATION TEST RESULTS

X-ray Reading Grades		Total No.	SCAT Positive	
			No.	Percentage of Total
1-4	Hands and/or Feet without Cervical Spine	121	6	5
	Cervical Spine without Hands and/or Feet ..	66	4	6
	Both	61	8	13
	Neither	180	4	2
	Grand Total	428	22	5
2-4	Hands and/or Feet without Cervical Spine	27	4	15
	Cervical Spine without Hands and/or Feet ..	23	1	4
	Both	6	4	67
	Neither	372	13	3
	Grand Total	428	22	5

with relatively little osteophytosis of the vertebral bodies, erosion of the vertebral plates, and vertebral subluxation) were observed most frequently in the upper cervical region in the age group studied. It may be that similar changes in the lower cervical region were less frequently recognized because of the high prevalence of degenerative changes in this region in this age group. Narrowing of cervical disk spaces has been previously observed in patients whose rheumatoid arthritis began in childhood (Coss and Boots, 1946; Potter and others, 1954; Ziff and others, 1956). Gibson (1957) described two examples of destruction of cervical intervertebral disks by vascular granulation tissue arising from the underlying marrow spaces of the vertebral body in the adult form of the disease; he stated that the histological findings in the affected disks were broadly similar to those of the diarthrodial joints modified by anatomical differences between the sites.

In one of Gibson's cases, subluxation had occurred through the destroyed disk between the fourth and fifth vertebrae with resultant pressure on the spinal cord. Subluxation, usually at the atlanto-axial level, has been reported in juvenile rheumatoid arthritis (Coss and Boots, 1946; Potter and others, 1954; Werne, 1957) and atlanto-axial subluxation is seen not infrequently in severe rheumatoid arthritis in the adult (Purser and Sharp, 1958). Kersley (1956) described several examples, but otherwise subluxation lower in the cervical region does not appear to have been previously recognized as a feature of adult rheumatoid arthritis. Bony fusion of cervical apophyseal joints is a relatively common late finding in juvenile rheumatoid arthritis (Coss and Boots, 1946; Potter and others, 1954; Ziff and others, 1956) and

is occasionally encountered in patients in whom disease began in adult life (Sharp, 1957). Histological changes in spinal apophyseal joints similar to those in other diarthrodial joints affected by the disease have been observed in adult rheumatoid arthritics, but little abnormality may be discernible even in *post mortem* radiographs of isolated apophyseal joints which are the site of severe histological changes (Sharp, 1955). The difficulty encountered in identifying apophyseal joint changes in this study is therefore not surprising.

The diagnosis in the in-patients, from whose films the criteria for the radiological signs of rheumatoid arthritis of the cervical spine were derived, was largely based on the clinical findings and radiological changes in the peripheral joints, so that the failure of these cervical changes to correlate with rheumatoid arthritis as diagnosed on clinical grounds in the sample of the general population was unexpected. The correlation of the changes with a positive sheep cell test in the population sample is perhaps not surprising, as 92 per cent. of the rheumatoid in-patients tested (86 per cent. of the group as a whole) gave positive results in the test. The relationship of the cervical changes and of those in the hands and feet to the sheep cell test which was found in the population sample is of interest. It appears that each may contribute to a positive test and that if both are involved the test is more likely to be positive.

Patients with a polyarthritis of rheumatoid type may be divided by the sheep cell test into two groups: "sero-positive" and "sero-negative". This study provides no evidence of any association between the cervical changes described and sero-negative polyarthritis. The findings suggest that, in sero-positive rheumatoid arthritis of sufficient severity for the patient to be admitted to a special centre, both the peripheral joints and the cervical spine are frequently affected, but that in the general population the disease may be encountered in a form in which the spine is mainly or exclusively involved. The number of cases in this series is too small to permit of a detailed study of the symptoms associated with the spinal changes, but preliminary studies have shown that pains in the neck and shoulder region are more frequent in persons having these changes than in the general population. The clinical diagnosis of rheumatoid arthritis, as at present determined, is largely dependent on the recognition of peripheral joint changes, so that in a patient presenting with such symptoms a diagnosis of rheumatoid arthritis may not be considered. It is of course possible that the dorsal or lumbar spine may be similarly affected and give rise to chest or

back pain, but it is unlikely that many patients with this form of sero-positive rheumatoid arthritis are referred to this centre, where the majority of patients with complaints referable to the spine are seen in a special spondylitis clinic. A sheep cell test is done routinely on these patients and only 6.2 per cent. of a series of 584 patients tested gave a positive result.

It is hoped shortly to study a larger sample of the general population which will include all age groups over the age of 15 years. From this it should be possible to ascertain whether the changes observed in the upper cervical region in the age group investigated in the present study are detectable elsewhere in the cervical spine in younger subjects. It is also hoped to form a more definite impression of the clinical features of this spinal form of the disease, and to obtain an estimate of its prevalence in the population as a whole.

Summary

A series of lateral radiographs of the cervical spine from 44 hospital patients, aged 55-64, suffering from rheumatoid arthritis have been compared with a series from persons of the same age and sex distribution selected at random from the general population.

The films from rheumatoid subjects showed more narrowing of the upper cervical disks. This disk narrowing was more often associated with erosion of the vertebral plates and less often with sclerosis or osteophyte formation, and in the apophyseal joints there were more destructive changes. The films from non-rheumatoid subjects showed more proliferative changes. In rheumatoid subjects, vertebral subluxations were more frequent and more severe at all levels of the cervical spine.

Using these criteria, a series of 428 cervical radiographs from random samples of the population have been graded for the changes of cervical rheumatoid arthritis. Definite evidence of rheumatoid arthritis was found in the films of 6 per cent. of the males and 7 per cent. of the females. There was a relationship between the radiological grading for rheumatoid arthritis in the cervical spine and a positive sheep cell agglutination test.

There was little or no correlation between these radiological gradings for cervical rheumatoid arthritis and either morning stiffness or a clinical diagnosis of rheumatoid arthritis, or with a diagnosis of rheumatoid arthritis made in accordance with the criteria of the American Rheumatism Association. There was, however, an association between radiological signs of rheumatoid arthritis in the cervical spine and similar signs in the hands and feet.

A cervical form of rheumatoid arthritis without

peripheral joint involvement may account for an important number of apparently false-positive reactions in the sheep cell agglutination test.

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Arthrite rhumatismale cervicale

RÉSUMÉ

On compara une série de radiographies latérales de la colonne cervicale de 44 malades hospitalisés, entre âges de 55 à 64 ans, atteints d'arthrite rhumatismale, à une série similaire de personnes d'âge et de sexe correspondants, choisies au hasard dans la population générale.

Les clichés des rhumatisants accusaient plus de rétrécissement des disques cervicaux supérieurs. Ce rétrécissement du disque était plus souvent associé à l'érosion épiphysaire et moins souvent à la sclérose ou à la formation d'ostéophytes et il y avait plus de lésions destructives dans les articulations apophysaires. Les clichés des sujets non-rhumatisants montraient plus d'altérations prolifératives. Chez les rhumatisants, les subluxations vertébrales étaient plus fréquentes et plus sévères à tous les niveaux du rachis cervical.

En prenant ces résultats pour critère, on gradua une série de 428 radiographies cervicales, pris au hasard parmi la population, du point de vue d'altérations dénotant l'arthrite rhumatismale cervicale. Des preuves définies d'arthrite rhumatismale furent trouvées dans les clichés de 6% des hommes et 7% des femmes. Il y eut un rapport entre le grade radiologique de l'arthrite

cervicale et le résultat positif de la réaction d'agglutination de globules de mouton.

Il y eut peu ou pas de corrélation entre le grade radiologique de l'arthrite rhumatismale cervicale et une rigidité matinale ou un diagnostic clinique d'arthrite rhumatismale ou même un diagnostic clinique d'arthrite rhumatismale basé sur les critères de l'*American Rheumatism Association*. Il y eut, toutefois, une association entre les signes radiologiques d'arthrite rhumatismale au niveau des vertèbres cervicales et des signes similaires dans les mains et les pieds.

La forme cervicale de l'arthrite rhumatismale sans implication des articulations périphériques peut expliquer un grand nombre de réactions positives apparemment fausses d'agglutination de globules de mouton.

Artritis reumatoide cervical

SUMARIO

Se compara una serie de radiografías laterales de la columna cervical de 44 enfermos hospitalizados, entre las edades de 55 y 64 años, afectados de artritis reumatoide, y una serie de clisés similares de personas de edad y sexo correspondientes escogidos al azar en la población general.

Los clisés de los enfermos reumáticos acusaron un mayor estrechamiento de los discos cervicales superiores. Este estrechamiento se vió asociado más a una erosión epifisaria y menos a una esclerosis o a una formación de osteofitos; hubo también más lesiones destructivas en las articulaciones apofisarias. Los clisés de los sujetos non-reumáticos acusaron más alteraciones proliferativas. En los sujetos reumáticos, las subluxaciones vertebrales fueron más frecuentes y más severas en todos los niveles de la columna cervical.

Tomando estos resultados por criterio, se graduó una serie de 428 radiografías cervicales, de sujetos escogidos al azar entre la población, desde el punto de vista de alteraciones indicativas de la artritis reumatoide cervical. Signos definidos de artritis reumatoide fueron encontrados en los clisés de un 6% de los hombres y en un 7% de las mujeres. Hubo una relación entre el grado radiológico de la artritis cervical y el resultado positivo de la reacción de aglutinación de eritrocitos de oveja.¹

La correlación fué poca o ninguna entre el grado radiológico de la artritis reumatoide cervical y la rigidez matinal o el diagnóstico clínico de artritis reumatoide, aunque éste fuera basado sobre los criterios de la *American Rheumatism Association*. Hubo, sin embargo, una asociación entre los signos radiológicos de artritis reumatoide en la columna cervical y signos similares en las manos y los pies.

La forma cervical de la artritis reumatoide sin implicación de las articulaciones periféricas puede explicar un gran número de reacciones positivas aparentemente falsas de aglutinación de eritrocitos de oveja.