Progress in Clinical Rheumatology

Edited by
Alan St. J. Dixon

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Preface

IT is possible to define Rheumatology as the study of rheumatoid arthritis and of diseases which resemble it. This is the definition adopted in this book, and it has the advantage of emphasizing the most important problem of rheumatology without at the same time narrowing the field unduly. The definition can be interpreted at a clinical level to include all disorders of joints and at a histological level and immunological level to include disorders of connective tissue such as disseminated lupus and scleroderma. Looked at this way the field is now so wide that it is impossible to do justice to the general surge of progress which has been made in the last 15 years. What has been attempted here is to present to the reader a series of chapters written by those who have themselves contributed original work or ideas. These chapters are up-to-date reviews of the subject chosen or (where this would take too much space) selected aspects of the topic to indicate where progress has been made or ideas are changing. The book is not a textbook and does not pretend to be comprehensive. It is intended for the clinically-minded reader, but includes chapters on essential background knowledge such as the results of surveys of rheumatic diseases in the general population on amyloidosis and on serological tests in rheumatic diseases. In line with the definition of Rheumatology which has been adopted, eight out of the 23 chapters deal mainly with aspects of rheumatoid arthritis and the remainder concern other common or rare rheumatic diseases and their complications.

I am indebted to the Editors and Publishers of the Annals of Rheumatic Diseases for permission to reproduce Figures 1a and b, 2a and b, 12, 13c, 15, 17 and 22 from the paper by Bywaters, Dixon and Scott on "Joint Lesions of Hyperparathyroidism" and to the Editors and Publishers of the British Journal of Radiology for permission to reproduce Figures 1, 2, 3a, b and c, 4a and b, 5, 9, 10, 12a and b, 13a, b and d from the paper by Laws, Lillie and Scott entitled "Arteriographic Appearances in Rheumatoid Arthritis and other Disorders".

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Contents

Chapter 1

Surveys of Rheumatic Complaints in the Population

J. S. LAWRENCE

History. Rheumatoid arthritis. Sheep-cell agglutination test. Disc degeneration. Osteoarthrosis.

HISTORY

EPIDEMIOLOGICAL studies of the rheumatic diseases may be said to date from 1924 when the Ministry of Health published the findings of a survey, based on information from the records of a selected group of general practitioners in England and Wales. This survey threw little light on causation, but gave for the first time some indication of the size of the problem and of the great wastage of man-power caused by rheumatic diseases, a finding which has since been confirmed by similar studies in Scotland by Davidson and Duthie (Scotland Medical Advisory Committee, 1944), by Woolsey (1952) in the United States and by Kalbak (1953) in Denmark.

Meanwhile, confirmation of the importance of the rheumatic diseases as a cause of loss of work has been given by statistics produced by the Ministry of Health on the insured population of England and Wales. According to these statistics based on certificates of incapacity issued under the National Health scheme, some 28 million days are lost from rheumatic disease each year. This may be compared with a loss of 25 million days from bronchitis, 24 million from pulmonary tuberculosis and 23 million days from psychoneurotic disorders.

Some indication of the distribution of this loss amongst the various rheumatic diseases is given by the figures in Table I, which are taken from a random sample of 1,342 persons examined clinically, radiologically and serologically in the town of Leigh in North-West England (Kellgren and Lawrence, 1956; Lawrence and Bennett, 1960). Of 107,268 days lost from school or work since birth 49,469 were attributed to rheumatoid arthritis, which was thus by far the most important cause of loss of work in females. In males, on the other hand, disc degeneration and osteoarthrosis proved more important.

RHEUMATOID ARTHRITIS

In epidemiological studies the prevalence of rheumatoid arthritis is commonly assessed by means of the American Rheumatism Associa-

TABLE I

DURATION OF INCAPACITY IN DAYS

	Disc degeneration	*Osteo-arthrosis*	*Rheumatoid arthritis*	*Rheumatic fever*	*Disc prolapse*	*Spondylitis*	*Other rheumatism*	*Undetermined*	*Total*
Males									
Total days	10,304	10,283	8,855	2,037	1,449	5,278	6,636	2,800	47,642
Change of work	4	2	2	1	1	0	2	3	15
Totally incapacitated	4	2	2	0	0	1	2	2	13
Females									
Total days	2,310	5,747	40,614	959	175	0	6,846	2,975	59,626
Change of work	1	0	3	0	0	0	0	1	5
Totally incapacitated	0	1	7	0	0	0	2	1	11
Both Sexes									
Total days	12,614	16,030	49,469	2,996	1,624	5,278	13,482	5,775	107,268
Change of work	5	2	5	1	1	0	2	4	20
Totally incapacitated	4	3	9	0	0	1	4	3	24

tion Criteria (Ropes *et al.*, 1959). In temperate climates the combined prevalence of "definite" and "probable" disease according to these criteria is of the order of 2% in males and 7% in females (Lawrence, 1963a). In addition, 8% of males and 7% of females show some of the characteristic radiological changes without at the time presenting any clinical evidence. Some of these give a history of one or more self-

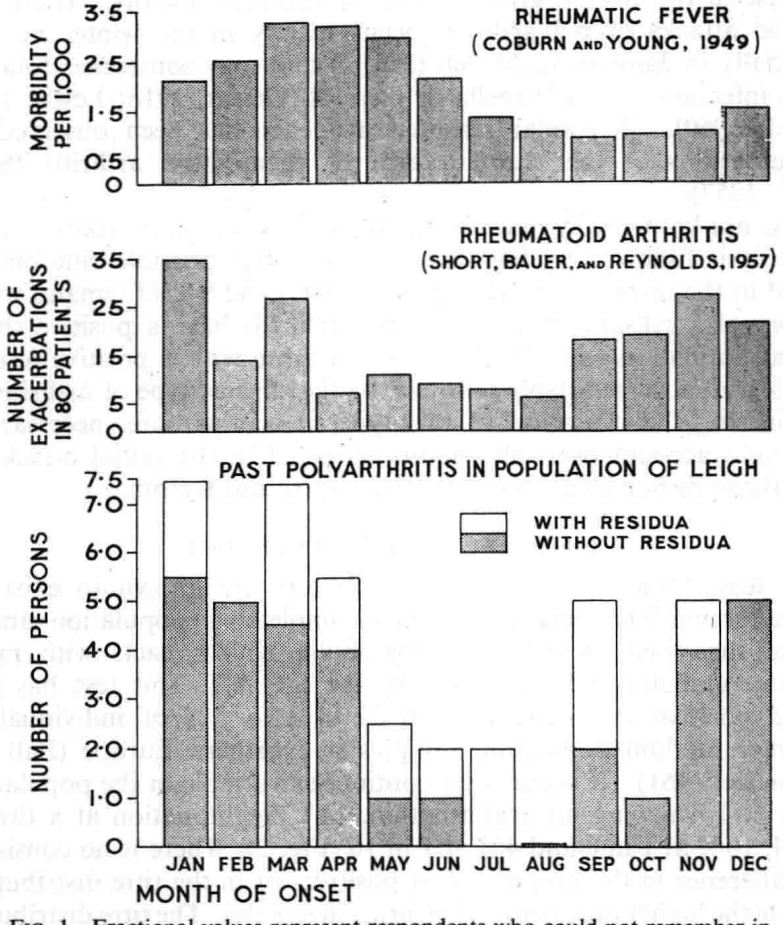

FIG. 1. Fractional values represent respondents who could not remember in which of two months their attack started.

limited attacks of polyarthritis in the past but in others no history of joint symptoms is obtained (Lawrence, 1961). In a third group a history of past polyarthritis is obtained but no clinical or radiological evidence is found. Some of these have evidence of rheumatic heart disease and could properly be classed as rheumatic fever but the majority present no such evidence. Altogether some 5% of males and 7% of females give a past history of polyarthritis and there are indications

that at least half of these should be classed with the rheumatoid group (Lawrence and Bennett, 1960). Thus a gradient can be recognized in the disease, varying from the subclinical group with only radiological evidence, through the group with a transient history of polyarthritis, to those with the continuously active form of the disease.

The transient or benign form of polyarthritis is of particular interest because of the clues it gives to possible causative factors. These self-limited attacks of polyarthritis occur mainly in the winter months, especially in January to March (Fig. 1) and may sometimes follow a virus infection such as rubella or measles (Geiger, 1918; Lewis, 1954; Lloyd, 1960). A similar seasonal incidence has been observed for exacerbations of the chronic form of rheumatoid arthritis (Short *et al.*, 1957).

It is not known why in certain individuals a transient attack of polyarthritis is followed by the chronic form but a possible clue may be found in the serum tests. Only 6% of males and 9% of females with a history of a self-limited attack of polyarthritis have a positive sheep-cell agglutination test (S.C.A.T.) but in those with a positive test the attack is almost invariably followed by the chronic type of arthritis. In considering the causation of this type, it is, therefore, necessary to take into account not only factors involved in the initial attack but also those responsible for the presence of serum factors.

SHEEP-CELL AGGLUTINATION TEST

At least three rheumatoid serum factors are known to exist but the factor which has been studied most completely in population samples is the sheep-cell factor, a macroglobulin which reacts with rabbit immune globulin and is assessed by the S.C.A.T. This test has been found positive at a titre of 1 in 32 in 2 to 5% of individuals in different random population samples in Northern Europe (Ball and Lawrence, 1961). It occurs as a continuous variable in the population, some 60% showing no agglutination, 14% agglutination at a titre of 1 in 4, 10% at 1 in 8 and 4% at 1 in 16 (Fig. 2). There is no consistent sex difference in the proportion of positives or in the titre distribution, despite the higher prevalence of arthritis in females. The titre distribution does, however, differ in urban and rural areas, there being more positive tests at all titre levels in the urban populations (Fig. 3). The factors which determine the titre level in the individual are unknown but the urban-rural differences suggest that infection may play a part. This has been confirmed by animal experiments with a variety of bacteria (Lerner *et al.*, 1960; Abruzzo and Christian, 1961). There is, however, evidence that genetic factors may also be important. When the first-degree relatives of persons with various sheep-cell titres taken from a random population sample in Leigh, Lancashire, were tested it was

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found that the proportion of positives in the relatives was greatest when the proband's titre was high, lowest when there was no hæmagglutinin in the proband's serum with a graded relationship between. This suggests a polygenic form of inheritance but does not rule out a purely environmental cause. In only two instances was a positive S.C.A.T. found in both husband and wife in population samples in Leigh and Wensleydale. This is just double the expected rate but is half the rate found in parents, siblings and offspring of sero-positive probands. If this is confirmed in other surveys it would suggest an environmental cause,

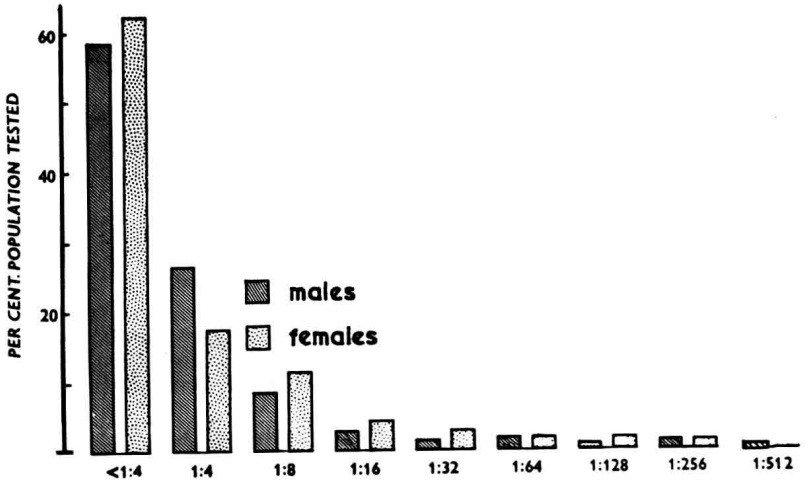

FIG. 2. Distribution of S.C.A.T. titres in differential sheep cell agglutination test found amongst 350 persons in Leigh aged 55–64 years (163 men and 187 women) (Kellgren and Lawrence, 1956).

operative mainly in childhood. Other evidence of an environmental factor is forthcoming from a twin study by Dixon (personal communication). He described a pair of identical twins, one of whom had rheumatoid arthritis with a positive S.C.A.T. but the other was free of arthritis and had a negative S.C.A.T. also. Moreover, in a family survey of patients with Still's disease no positive tests were obtained in relatives of patients with a positive S.C.A.T. (Ansell *et al.*, 1962).

In population samples rheumatoid factors, though not uncommon, are only found occasionally in association with rheumatoid arthritis. Of 93 individuals with a positive S.C.A.T. in surveys in Leigh and Wensleydale only 24 (26%) had any clinical or radiological evidence of arthritis. Of 23 persons with a positive bentonite fixation test (BFT) 5 (22%) had clinical or radiological disease. In a random sample in Tecumseh, Michigan, a third of those with a positive latex fixation test (LFT) were in the group with suspected rheumatoid arthritis (Mikkelsen *et al.*, 1962). Where more than one serum factor is present the chance of

finding evidence of arthritis is greater (Aho *et al.*, 1961). If those with no evidence of arthritis are followed up they will, in many instances, be found to develop the disease. Of 20 sero-positive individuals with neither clinical nor radiological evidence who were followed up for five years in Leigh, 8 developed arthritis whereas only 5 of 57 with a negative S.C.A.T. had done so. It would thus appear that the presence of this rheumatoid factor in the serum is associated with a predisposition to develop arthritis. Its absence in an individual who already has arthritis on the other hand goes well with a tendency to recovery. In

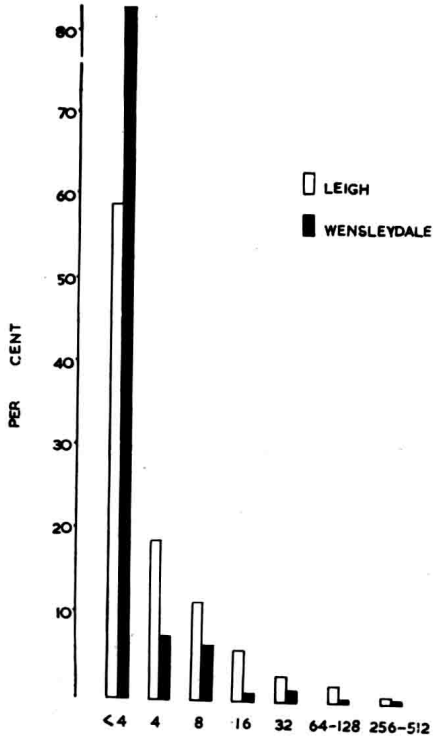

FIG. 3. Titre distribution in Leigh and Wensleydale, all age groups and sexes combined. (Ball and Lawrence, 1961).

eight sero-negative individuals with arthritis seen again after five years in Leigh, the disease was found to have remitted in four. This did not happen to any of those in the sero-positive group and bears out experience with hospital patients (Duthie *et al.*, 1957; Kellgren, 1957). In addition to the familial aggregation of the sheep-cell factor, aggregation of arthritis occurs in families. This appears to be independent of the sheep-cell factor. Moreover, it is not confined to rheumatoid arthritis but occurs also in Still's disease and generalized osteoarthrosis. In both of these diseases aggregation of the sheep-cell factor is lacking. Arthritis differs from the sheep-cell factor moreover in that it is virtually confined to female relatives (Lawrence, 1963b; Ansell *et al.*, 1962;

Kellgren *et al.*, 1963). The evidence that this aggregation of arthritis is genetically determined is perhaps more convincing since the occurrence of arthritis in spouses does not exceed the frequency with which it would be expected to occur by chance. These three factors would appear to be operative in rheumatoid arthritis: (1) an infection which in normal individuals causes only a transient polyarthritis; (2) an inherited tendency to arthritis; (3) an abnormal immune response associated with the formation of anti-λ-globulins.

In both Still's disease and generalized osteoarthrosis there is evidence that more than one gene may be involved. In Still's disease, in addition to peripheral arthritis, spondylitis and sacro-iliitis have been found more commonly than would be expected but only in the male relatives. In relatives of patients with generalized osteoarthrosis not only arthritis but also generalized osteoarthrosis and Heberden's nodes are more commonly found than in the general population. The aggregation of Heberden's nodes, however, occurs only in relatives of probands with nodes and of inflammatory polyarthritis only where the proband has no nodes. It is thus possible to differentiate on genetic grounds two types of generalized osteoarthrosis, the nodal and the non-nodal.

DISC DEGENERATION

When routine X-rays are taken of the spine in population samples a high proportion show evidence of wear or osteophyte formation on the margins of the vertebral bodies. This may or may not be accompanied by narrowing of the discs and sclerosis of vertebral plates. These changes, which have been shown by autopsy studies to be associated with disc degeneration, are the commonest abnormality to be found in X-rays of population samples. In the North-West of England they were found in one disc or other in 88% of the population aged 35 and over. In most instances, however, the changes are minimal and limited to one or two discs. Moderate or severe changes were found in one or more discs in 32% of the population in this age group. Lumbar disc degeneration is associated with pain in the low back and legs, but only up to age 50 is there more pain in these sites in males with lumbar disc degeneration than in those without such changes. The association is most striking in the 35–44 age group in which those with moderate or severe changes lose work three times as often from pain in this distribution as those with minimal or no change. The association between cervical disc degeneration and neck-shoulder-brachial pain is most striking up to age 45 and indeed in males it is only in these younger age groups that it can be considered significant. Evidence of nerve root pressure is usually lacking in individuals with disc degeneration encountered in population samples and it would seem that the pain is seldom produced in this way. The disc itself contains no nerve fibres but the spinal

ligaments are well supplied with pain fibres and it must be assumed that symptoms arise from tears in these ligaments as a result of faulty mechanics which result from the narrowed unstable disc.

Both lumbar and lower dorsal disc degeneration are influenced by occupation, X-ray changes appearing at an earlier age in those whose occupation involves much heavy lifting, for example coal miners, dock workers and farmers. Exposure to cold and damp, though associated with more symptoms and greater incapacity, does not correlate with the X-ray changes of disc degeneration (Lawrence, 1955).

OSTEOARTHROSIS

Osteoarthrosis is also found with considerable frequency in X-rays of population samples. In the North-West of England, evidence of osteoarthrosis was found in one joint or other in 50% of the adult population. Changes appear first as a rule in the metatarso-phalangeal joint of the big toes, these joints being affected as early as age 20 years. With increasing age the number of affected joints increases and from age 45 the increase becomes more rapid in females than in males. Characteristic patterns of joint involvement are found in certain occupations, the elbows being much affected in dock workers, the knees and elbows in coal miners and the finger and first carpo-metacarpal joints in textile workers. The condition is symptomless in 75% of cases but, like disc degeneration, it more often causes symptoms in those exposed to cold and damp. This effect is not produced by *warm* moist conditions and appears to depend on the influence of tissue cooling on the pain threshold. A relationship between wet working or living conditions and symptoms has been found only in the degenerative types of rheumatism (Lawrence 1962).

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Chapter 2

The Clinical Features of Rheumatoid Disease

MALCOLM THOMPSON

THE CONCEPT OF RHEUMATOID DISEASE

THE most impressive advances in our clinical knowledge of the rheumatoid process during the past decade have been concerned with the recognition of the concept of "rheumatoid disease". Patients suffering from polyarthritis of the rheumatoid type may exhibit involvement of internal organs and other tissues. Some of these visceral changes, e.g. pericarditis, were first described nearly a hundred years ago in the earliest accounts of the disease (Charcot, 1881), so their belated recognition is an example of clinical "re-search". These internal lesions may be clinically silent, e.g. nodules in spleen or lungs, or, rarely, they may cause signs and symptoms, e.g. rheumatoid nodules in the atrio-ventricular bundle and myocardium. The acceptance of such small and often silent lesions as an integral part of the rheumatoid process has been the outcome of many detailed pathological studies. More surprising has been the failure to recognize until comparatively recently the relationship between rheumatoid polyarthritis and such dramatic presentations as pleural effusion or polyneuritis. Our fuller understanding of these presentations in the clinical picture of rheumatoid arthritis has resulted from studies of large series of cases and the correlation of the clinical features with pathological findings at biopsy and autopsy.

As the rheumatoid process may involve any tissue or organ in the body from the hairs of the scalp (alopecia totalis in Sjögren's syndrome) to the soles of the feet (fistulæ from damaged interphalangeal toe joints), the term rheumatoid disease has been suggested in preference to rheumatoid arthritis (Ellman and Ball, 1948) and has much to commend it. The visceral features may be predominant in the clinical picture in some patients and may occasionally provide inaugural evidence of the disease, the appearance of the arthritis being delayed for months or even years following an incident of pleurisy or parotitis, etc. Indeed, Bagratuni (1956) has postulated that rheumatoid disease may exist in the total absence of joint involvement, so-called anarthritic rheumatoid disease. Nevertheless, it must be stressed that arthritic signs are usually the first, the predominant and often the only evidence of the disease, especially when the course is comparatively mild.

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