

The Arthritis of Ulcerative Colitis*

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Brit. med. J., 1965, 2, 670-675

It has long been recognized that the course of ulcerative colitis may be punctuated by bouts of arthritis (Bergen, 1930; McKittrick and Miller, 1935; Campbell, 1938; Cullinan, 1938; Gallart-Monés and Gallart-Esquerdo, 1956; Brooke, 1956; Wright and Kenwood, 1956; Kendal, 1958). Although arthritis is one of the most common systemic complications of ulcerative colitis outside the intestinal tract, until recently little attention was paid to it since Bergen's original report and its brief characterization by Hench in 1935. Some authorities (Short, Bauer, and Reynolds, 1957; Rotstein, Entel, and Zeviner, 1963) find no evidence for a separate type of arthritis accompanying ulcerative colitis, and regard the occurrence of arthritic symptoms as "a coincident, although perhaps related, rheumatoid arthritis." Thus colitic arthritis is not mentioned as such in the *Standard Nomenclature of Diseases and Operations* (National Conference of Medical Nomenclature, 1952), which was based on the American Rheumatism Association's official listing of joint diseases (Hench *et al.*, 1941). We have previously drawn attention to the widely different estimates of the frequency of the complication, from 0 to 22%, and have suggested that much of the confusion has arisen from a failure to distinguish coincidental rheumatic complaints, especially rheumatoid arthritis, from a form of arthritis peculiar to ulcerative colitis (Wright and Watkinson, 1959).

Since 1958 there has been increased interest in the syndrome and mounting evidence to support the view that some patients with ulcerative colitis have a distinct type of arthritis differing from rheumatoid arthritis clinically, radiologically, and serologically (Bywaters and Ansell, 1958; Wright and Watkinson, 1959; Fernandez-Herlihy, 1959; Ford and Vallis, 1959; McEwen, Lingg, Kirsner, and Spencer, 1962). Attention has also been focused upon the relation of ankylosing spondylitis to ulcerative colitis (Steinberg and Storey, 1957; Acheson, 1960; Zvaifler and Martel, 1960; McEwen *et al.*, 1962; McBride, King, Baikie, Crean, and Sircus, 1963). In a previous study (Wright and Watkinson, 1959) we described the results of a combined forward-planned review of 108 unselected patients with ulcerative colitis where patients were assessed simultaneously by a gastroenterologist and a rheumatologist. This study has been extended, and the present paper describes the finding in 269 patients with ulcerative colitis, with particular reference to the incidence and type of associated arthritis. An assessment of the frequency of sacro-iliac joint disease in our colitic population formed the basis of another study which is referred to elsewhere.

Materials and Methods

During 1955-62 269 unselected patients attending the combined medical and surgical follow-up colitis clinic at the General Infirmary at Leeds were interviewed and examined on the same day by both of us. These patients formed a substantial part of a series of colitic subjects in whom the natural history of colitis has been studied (Watts, de Dombal, Watkinson, and Goligher,

1965). One of us (G. W.) concerned himself with assessment of the clinical type, extent, and course of the patient's colitis, while the other (V. W.) examined all patients with regard to the occurrence and nature of rheumatic complaints. By clinical inquiry, barium-enema examination, and sigmoidoscopic examination the clinical type of colitis and its extent were discovered.

The Rose-Waaler differential agglutination of sensitized sheep cells (S.C.A.T.) was done on the serum of all patients with rheumatic complaints; the technique of Greenbury (1957) was used. Haemoglobin and sedimentation rates were often performed. Radiographs were taken of the sacro-iliac joints and lumbar spine in each patient, and of all other joints involved clinically.

Clinical and Anatomical Features of Colitic Population Studied

Age and Sex Incidence

Of the 269 colitic patients studied 117 were men and 152 women, the female predominance mirroring other series (Bywaters and Ansell, 1958; Fernandez-Herlihy, 1959). Their ages ranged from 9 to 82, the majority being 25 to 44. The age at onset of the colitis is given in Fig. 1. It will be seen that the disease usually developed in early adult life, though a sizable proportion developed later; pre- and post-menopausal women were particularly affected. The mean age at onset in men was 36.1 years, range 5 to 78, and in women 34.5 years, range 2 to 73.

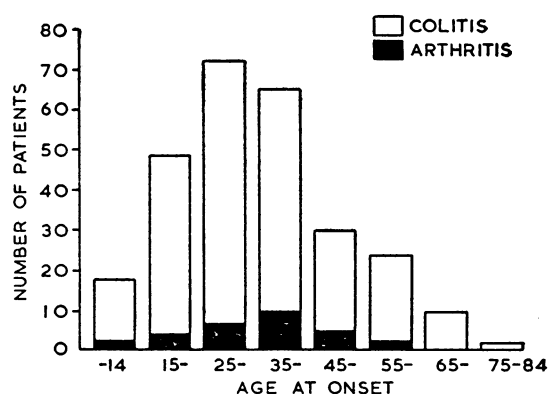


FIG. 1.—Age at onset of arthritis and colitic symptoms in 269 patients with ulcerative colitis.

Clinical Course

A modification of the classification employed by Bockus *et al.* (1956) was used to describe the clinical patterns of colitis encountered.

1. *Chronic intermittent course* in which bouts of diarrhoea, bloody stools, and systemic disturbances alternated between periods of more normal bowel action and good general health. This course occurred in 45% of our 269 patients, in 52 men and 74 women.

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2. *Chronic continuous course* in which bowel action was always loose, blood-stained stools were frequent, and general health was poor. Exacerbations occurred with increased diarrhoea, colonic complications, and systemic disturbance. This course occurred in 16% of our 269 patients, of whom 21 were women and 25 were men.

3. *Proctocolitis* in which periodic attacks of diarrhoea occurred, the stools containing mucus and blood; pyrexia and toxæmia did not occur, but anaemia developed. Constipation often occurred between bouts of diarrhoea, the disease being confined to the rectum and pelvic colon. This type of disease was present in 28% of our patients, of whom 29 were men and 46 were women.

4. *Acute fulminating colitis* in which a serious illness of rapid onset had developed accompanied by profuse diarrhoea with blood-stained purulent stools, and by fever, anaemia, and systemic reactions. There were 22 patients of this type, comprising 8%. Unlike other clinical types of colitis more men were affected than women: 15 (13%) were men and 7 (5%) were women. In a disease manifesting such a prolonged and protean course as ulcerative colitis clinical subdivisions are difficult and somewhat artificial, one type readily progressing into another. Thus chronic disease will have acute fulminating episodes, while proctocolitis has been observed to spread proximally and manifest a chronic continuous course. Over the eight-year period of observation, during which this study has been undertaken, in 11 patients the clinical course altered so that they fitted into a different subdivision. In five men and three women the colitis changed to a chronic intermittent course, in two women the course became of a chronic continuous nature, and in one woman the picture of a segmental colitis developed. In addition, prolonged observations revealed that two patients who had been thought to have ulcerative colitis in our original study of 108 patients (Wright and Watkinson, 1959) were found to have Crohn's disease, involving the colon as well as the small bowel. One of these patients is particularly interesting in that she had three episodes of inflammatory polyarthritis affecting the knees, ankles, and on one occasion the proximal interphalangeal joint of a finger. The arthritis was identical with colitic arthritis. It was accompanied on two occasions by erythema nodosum and once by ulceration of the buccal mucosa. Total colectomy and ileostomy was performed, at which time the diagnosis was substantiated, and since then she has had no further systemic complications.

Duration of Colitic Symptoms

The duration of symptoms revealed that ulcerative colitis had been present for periods of a few weeks to over 20 years, three-quarters having had symptoms for more than five years. Approximately 6% of them had symptoms for over 20 years, cases of prolonged duration being mainly confined to the chronic intermittent course of the disease (11 patients).

At the time of assessment the colitis was judged inactive, or controlled by medical or surgical treatment in two-thirds of our patients. Of the patients with active disease nine were still suffering from their initial attacks and in 39 relapse of long-standing colitis had occurred.

Anatomical Extent of Colitis

We attempted to assess the anatomical extent of the disease by study of barium-enema examinations, which were available in all but two patients, being well aware of the limitations of the method. Thirty-four patients had undergone surgery, permitting precise anatomical localization in resected specimens. In 104 patients the entire colon and rectum was judged to be affected, in 93 involvement was distal to the splenic flexure, and in 61 only rectal involvement occurred. Ten patients with segmental colitis (Watkinson, Thompson, and Goligher, 1960) were also included. Thus involvement of the entire colon occurred in 39%, an incidence similar to that recorded in our previous series (41%) and similar to the incidence in 125 patients of Bockus *et al.* (1956), who found involvement of the entire colon in 49%. Rectal involvement alone, however,

occurred more often in Leeds (23%) than in the Philadelphia series (9%).

The relation of the anatomical extent of the colitis to the clinical course of the disease is summarized in Table I. As might be expected a chronic course was most often associated with involvement of the entire colon, being seen in 95 of the 103 patients so affected, an almost identical figure to that of Bockus *et al.* (1956), who observed it in 93% of their 61 patients with extensive colon involvement. In a small proportion the entire colon was involved by acute fulminating disease in both series. The majority of patients with proctocolitis showed only rectal involvement but in 15 instances the disease had spread proximally to involve sigmoid and descending colon. The more long-standing the disease the more extensive was the involvement of the colon. This is clearly shown in Table II, from which it can be seen that in disease of less than two years' duration the entire colon was involved in 22%, that where the colitis had been present for 2 to 10 years the entire colon was involved in 41%, and that in disease of over 10 years' duration the entire colon was involved in 60%.

TABLE I.—Anatomical Extent of Colitis Related to Clinical Picture

Clinical Type	Entire Colon	Distal Colon	Rectum Only	Segmental	Total
Chronic continuous	31	11	—	2	44
Chronic intermittent	64	53	1	8	126
Proctocolitis	—	15	60	—	75
Acute fulminating	8	14	—	—	22
Total	103	93	61	10	267*

* Excludes two patients with chronic continuous colitis in whom extent of disease was unknown.

TABLE II.—Anatomical Extent of Colitis Related to Duration of the Disease

Extent	0-6 Months	6 Months-2 Years	2-4 Years	5-10 Years	10+ Years	Total
Entire colon	4	15	20	31	33	103
Distal colon	8	30	16	25	14	93
Segmental	—	1	2	4	3	10
Rectum only	8	22	11	15	5	61
Total	20	68	49	75	55	267*

* Excludes two patients in whom extent of colitis was not determined.

Clinical Course in Relation to Sigmoidoscopic Findings

Sigmoidoscopy was undertaken frequently, usually by an independent observer (Professor J. C. Goligher). In common with other workers (Bone, Ruffin, Baylin, and Cassel, 1950; Flood, Lepore, Hiatt, and Karush, 1956; Texter, 1957) it was found that the sigmoidoscopic findings usually paralleled the clinical course of the disorder rather than the duration of the disease, that mucosal changes were more common than ulceration, and that polyposis (10%) was found on endoscopic examination.

Local and Systemic Complications of Colitis

Local complications of the disorder in 206 patients with chronic involvement included perianal disease in 26 (13%), polyposal hyperplasia of the colonic mucosa in 26 (13%), and massive rectal haemorrhage in 7 (4%). Recto-vaginal fistula was present in two patients. Free perforation occurred in two patients and chronic or rectal stricture developed in six. Diverticulitis was present in seven patients. Colonic complications occurred equally commonly in patients with chronic continuous and chronic intermittent colitis.

Systemic complications were not uncommonly observed in the 269 patients examined. Recurrent ulcers of the mouth developed in 15.8%, uveitis in 8.9%, skin lesions (either ulceration, pyoderma, or erythema nodosum) in 4.5%, and true colitic arthritis in 11.5%.

Clinical Features of Associated Rheumatic Disease

Coincident Rheumatic Disease

Each patient was questioned about the presence of rheumatic complaints, their nature and duration, joints affected in each attack, the duration of symptoms, and the relation of associated colitic symptoms. It was found that 45% of patients admitted to rheumatic complaints. Specific inquiry was made about the presence of low back pain, which was present in 30% of patients, but these figures have not been included in the assessment of the incidence of rheumatic complaints, since it is possible that in some instances the symptom may have been related directly to the colitis. The significance of the symptom in relation to sacro-iliitis is discussed elsewhere (Wright and Watkinson, 1965).

Many of the complaints could be identified as recognizable coincident rheumatic disease. Thus 33 patients had osteoarthritis which was producing symptoms, 5 gave a history of rheumatic fever, and 16 gave a classical history consistent with lumbar disk protrusion. One patient had gout; this case has been described (Wright and Watkinson, 1959). Three patients had psoriasis, and one of these had psoriatic arthritis of a type clinically indistinguishable from rheumatoid arthritis but characterized by a negative S.C.A.T. (Wright, 1959). Four women had rheumatoid arthritis, their findings being summarized in Table III. There was no relation between bowel and joint symptoms in these four patients.

TABLE III.—Summary of Features in Four Patients with Colitis and Coincidental Rheumatoid Arthritis

Case No.	Colitis				Arthritis				
	Age at Onset	Course	Duration (Yrs.)	Extent	Age at Onset	Duration (Yrs.)	Extent	Nodules	S.C.A.T. Titre
35	48	c.c.	7	Entire	46	9	Mild	+	1/64
75	73	a.l.	2/12	Distal	53	20	Severe	+	1/1,024
103	46	c.i.	9	„	22	33	Mod.	+	1/256
176	55	p.c.	10	Rectal	34	31	Severe	-	1/256

c.c. = chronic continuous; a.l. = acute limiting; c.i. = chronic intermittent; p.c. = proctocolitis.

Nine patients (four men and five women) had a typical clinical picture of ankylosing spondylitis with pain in the back, flattening of the lumbar lordosis, limitation of movement of the spine, and radiological changes of sclerosis, erosion, and ankylosis of the sacro-iliac joints. Four patients had calcification of the paravertebral ligaments. A further six patients (three men and three women), on review of the clinical findings after examination of the radiographs, showed features consistent with ankylosing spondylitis. However, the overall radiological incidence of sacro-iliitis detected in a prospective survey was much higher, definite changes being present in 18% of those routinely radiographed. The significance of these findings is discussed elsewhere (Wright and Watkinson, 1965).

There seems good reason, therefore, to believe that in all these cases, except ankylosing spondylitis, recognizable types of rheumatic disease had developed coincidentally in patients with ulcerative colitis.

Characteristics of Specifically Associated Colitic Arthritis

In 31 patients, 11.5% of the colitic population studied, a type of arthritis developed which seemed to be specific and to be related to the associated colitis. We have designated this "colitic arthritis." This arthritis developed in 13 men and 18 women, comprising 11.1% of the men and 11.8% of the women affected by colitis. The age at onset of arthritic symptoms is given in Fig. 1, where it can be seen that symptoms could develop at any age, but were most common at 25 to 44.

Clinical Features of Initial Attack of Arthritis

The arthritis began acutely in 23 patients. The involvement was monoarticular in 20 patients at the onset. The joints of the lower limb were more commonly involved than those of the upper, the onset being in the lower limbs in 24 patients. Involvement was asymmetrical in the majority (20 of the 31 patients). The knees were the joints most commonly involved at the onset of the arthritis, followed by the ankles in order of frequency. The distribution of joints affected initially is shown in Fig. 2. It will be observed that the larger joints were the most common sites of initial involvement, particularly the knee and the ankle, rather than the joints of the upper limbs. Affected joints were always painful, usually swollen with painful limitation of movement, and occasionally accompanied by erythema of the overlying skin. The duration of the initial attack was similar to that seen in subsequent episodes, and in the majority of patients it subsided within six weeks.

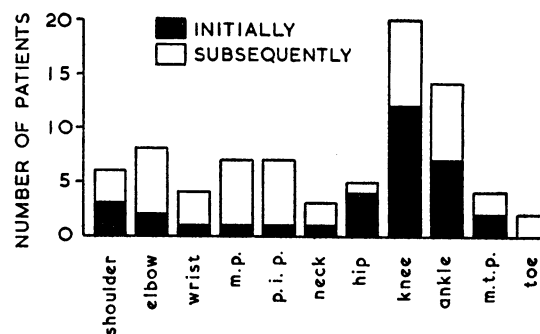


Fig. 2.—Joints involved in 31 patients with colitic arthritis during the first and subsequent attacks.

Subsequent Course of Arthritis

Seventy-one attacks of arthritis were studied in the 31 patients initially affected. Asymmetrical involvement of joints was noted during both the initial and subsequent attacks, and in 28 patients the arthritis always had this character. These attacks subsided within six weeks in most of the patients, persisting in less than a third for more than this period, and only in two lasting longer than 13 weeks. The same predilection for joints of the lower limbs observed during initial attacks was noted in subsequent attacks, so that in 28 patients joints of the lower limbs were involved, while in 17 joints of the upper limbs were involved at some stage of the disease.

The joints involved during the 71 episodes are shown in Fig. 2. It will be seen that the knees and ankles were the joints most frequently affected, in 20 and 14 patients respectively. In seven patients the metacarpophalangeal and proximal interphalangeal joints of the fingers were involved. In eight patients the elbows were affected and in six the shoulders. Recovery and restoration of normal function almost always occurred. Residual objective abnormalities were present in only three patients. One had a 10-degree flexion deformity of an elbow; another had mild flexion deformity of the proximal interphalangeal joint of the left little finger, and a third had limitation of hyperextension of the left wrist.

Relation of Colitis to Arthritis

Although colitic arthritis often recurred in patients with long-standing bowel disease, the initial attack occurred as often in patients with colitis of less than six months' duration as it did in those whose bowel disease had been present for more than 10 years (Fig. 3). In no patient did the arthritis precede the onset of bowel symptoms. One in six of the colitic patients showing a chronic intermittent or chronic continuous course

developed arthritis, the proportion falling to less than 1 in 20 in acute fulminating disease (4.5%) or proctocolitis (4%).

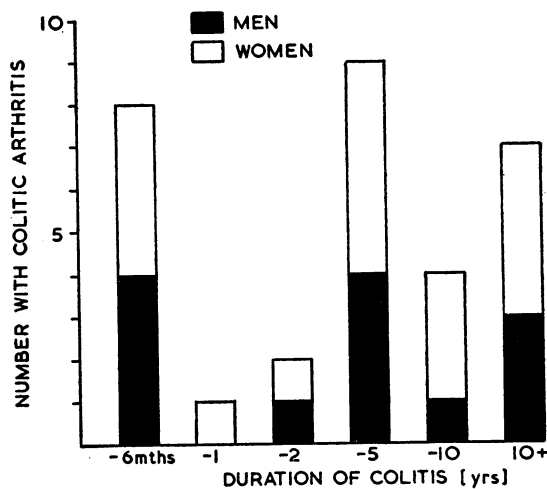


FIG. 3.—Onset of colitic arthritis related to the duration of colitis.

In 14 patients there was an exacerbation of colitic symptoms preceding the onset of the arthritis, which was again observed in 23 patients during subsequent attacks. In all these patients it was noted that there was a synchronous remission of joint symptoms, when colitic symptoms subsided.

Relation of Arthritis to the Extent of Colitis

In women with ulcerative colitis there was a definite correlation between the extent of the colitis and the incidence of colitic arthritis. Thus in 58 women with entire involvement of the colon the incidence of colitic arthritis was 20.6%, in 46 with involvement of the left side of the colon alone the incidence was 8.7%, and in 38 in whom only the rectum was affected the incidence was 2.6%. This correlation was not apparent among the men, however, the respective figures being 6.5%, 17%, and 8.7%. Taking the overall population of 103 patients with entire involvement of the colon 14.4% had colitic arthritis; of 93 with distal involvement 12.9% had colitic arthritis; and of 61 with only the rectum involved 4.9% had colitic arthritis.

Association of Arthritis with Complications of Colitis

The frequency of arthritis related to colonic complications is summarized in Table IV. Colitic arthritis was significantly more common in patients with perianal disease than in those

TABLE IV.—Association of Arthritis with Local Colonic Complications of the Colitis

Local Complication :	Perianal Disease		Pseudopolyposis	
	With	Without	With	Without
No. with arthritis	7 (25.0)	24 (10.0)	7 (26.9)	24 (9.9)
No. with colitis	28	241	26	243
Statistical comparison :	t = 2.72 n = 269 P < 0.01		t = 2.59 n = 269 P < 0.01	

Percentage frequency in parentheses.

without this complication (25% to 10%). It was also significantly more common in those with pseudopolypi (27% to 10%). In those with massive haemorrhage arthritis was more common (43% to 10.7%), but the numbers were too small to achieve significance.

The association between systemic complications of colitis and arthritis is demonstrated in Table V. Of the 41 patients with recurrent ulceration of the buccal mucosa 14 (34.2%) had

colitic arthritis, compared with an incidence of 7.5% in patients without mucosal ulceration. A similar association was seen between colitic arthritis and uveitis—33.3% of patients with uveitis had colitic arthritis, compared with 9.4% of those without uveitis. There was a striking association between the occurrence of skin lesions, such as erythema nodosum, pyoderma gangrenosum, and leg ulceration, and of colitic arthritis. Arthritis occurred in two-thirds of those with skin lesions, compared with an incidence of 9% in those without such changes.

TABLE V.—Relation of Colitic Arthritis to Systemic Complications of the Colitis

Systemic complication:	Skin Lesions		Oral Ulcers		Uveitis	
	With	Without	With	Without	With	Without
No. with arthritis	8 (66.6)	23 (8.9)	14 (34.2)	17 (7.5)	8 (33.3)	23 (9.4)
No. with colitis	12	247	41	228	24	245
Statistical comparison	t = 6.13 n = 269 P < 0.001		t = 4.97 n = 269 P < 0.001		t = 3.51 n = 269 P < 0.001	

Percentage frequency is given in parentheses.

Effect of Surgery

In a more extensive series of patients with ulcerative colitis, including those in the present study, investigated by Watts *et al.* (1965), 151 were treated surgically. Five of these patients had rheumatic symptoms persisting after operation. We examined each of them, and none had a recurrence of colitic arthritis. One patient had aching during hot weather in the left wrist in which hyperextension remained limited after an attack of colitic arthritis eight years previously. Another patient had symptoms from primary generalized osteoarthritis affecting the distal interphalangeal joints of the fingers and the first carpometacarpal joints. Two patients had aching in the muscles with no evidence of inflammatory arthritis.

A fifth patient had colitic arthritis at the age of 14 years while under our care for chronic continuous ulcerative colitis of two years' duration. The arthritis affected both ankles and the right fifth metatarsophalangeal joint. It subsided, but recurred a week later, finally settling after admission to hospital. One year later (1959) she had pain at the bottom of the back, and x-ray examination of the sacro-iliac joints showed early sclerosis and erosion bilaterally. The following year she had iritis, which recurred two months later. This persisted for four months. In 1963 total colectomy and ileostomy were performed. Two weeks after operation iritis recurred, and five months later a further attack occurred. She was treated with prednisolone 12.5 mg. daily for this, but continued to have pain in the back and hips. On examination there was tenderness in the upper lumbar region and over the sacro-iliac joints, and restriction of forward flexion with flattening of the lumbar lordosis. Straight-leg raising was limited to 60 degrees on each side. X-ray examination showed progression of the sacro-iliitis. There was no evidence clinically of a recurrence of colitic arthritis, and the patient was quite emphatic that the present episodes were different from the attacks of colitic arthritis. The pain in the pelvic girdle seemed related to continuing activity of the sacro-iliitis. The recurrence of iritis was interesting in this connexion.

Discussion

Although arthritis was recognized as a complication of ulcerative colitis as long ago as 1895 (White, 1895), it is only in recent years that attempts have been made to characterize it. Retrospective studies with their attendant limitations have been undertaken by Fernandez-Herlihy (1959) and Rotstein *et al.* (1963). Detailed studies of patients with arthritis and ulcerative colitis have been made by Bywaters and Ansell (1958),

Ford and Vallis (1959), and McEwen *et al.* (1962). We have previously published our findings in 108 consecutive unselected patients being treated for colitis, studied in a combined forward-planned review (Wright and Watkinson, 1959): 15.7% were found to have a specific type of arthritis which we designated as "colitic arthritis," the features of which differed strikingly from those in 95 patients with definite rheumatoid arthritis when compared clinically, radiographically, and serologically. Thirty-two attacks occurred in the 17 patients with colitic arthritis, and the features of the syndrome were defined from the study of these attacks. In the present study these observations have been extended by a detailed prospective survey of 269 patients with ulcerative colitis.

Many workers have found difficulty in distinguishing colitic from rheumatoid arthritis (Fischel, 1949; Fletcher, 1951; Short *et al.*, 1957; Texter, 1957), but a recent review concludes that the traditional interpretation of colitic arthritis as a rheumatoid variant is not tenable (Wilske and Decker, 1965). Even among workers who recognize arthritis as an accompaniment of ulcerative colitis there is a tenfold variation in incidence quoted. Thus Hamilton (1957) quoted a figure of 2.2% in 138 patients, while Fischel (1949) quoted a figure of 22% in 85 patients and Bockus *et al.* (1956) quoted a similar incidence in 182 patients. This great variability in incidence may be accounted for in part by the failure to distinguish coincidental rheumatic complaints. In our present study of 269 patients with ulcerative colitis, 45% admitted to some sort of rheumatic symptoms, whereas the incidence of true colitic arthritis was only 11.5%. Another reason for differing incidence reported in the literature may be the type of patient with ulcerative colitis seen at a particular clinic. Our investigation shows clearly that colitic arthritis is commoner among patients whose bowel is more extensively involved by colitis. Thus the frequency of colitic arthritis was nearly three times greater in patients with the entire colon involved than in those with rectal involvement only. Those clinics in which a greater proportion of patients present with more extensive disease are therefore likely to find a higher incidence of colitic arthritis.

Characteristics of Colitic Arthritis

In a large number of patients, such as the present series, one would expect to find some examples of coincidental rheumatoid arthritis and ulcerative colitis. In this series four such patients were investigated. They fulfilled the diagnostic criteria for definite rheumatoid arthritis laid down by the American Rheumatism Association (Ropes, 1959). Two patients had subcutaneous nodules, which are regarded by many to be pathognomonic of rheumatoid arthritis. Thirty-one patients, however, had an arthritis which was distinct from rheumatoid disease clinically, serologically, and radiographically. Seventy-one episodes of colitic arthritis were studied in these patients, which enabled a definite syndrome to be characterized. Although in our original series women were found to be more often affected with colitic arthritis than men, in the present study the sex incidence was virtually equal, being 11% in each group.

The arthritis most commonly began at ages 25 to 44 years. This is in contrast to rheumatoid arthritis, where the onset is often later, at ages 35 to 64 years. Colitic arthritis usually began as an acute arthritis, affecting a single joint of the lower limb, most commonly the knee and, secondly in order of frequency, the ankle. It then affected other joints, again predominantly in the legs, and involvement was most often asymmetrical. The arthritis usually subsided within six weeks with little or no residual deformity. Subsequent attacks followed a similar pattern. Subcutaneous nodules and tendon-sheath effusions were never observed. Muscle-wasting rarely occurred. Colitic arthritis may closely simulate acute rheumatic fever, and the fact that salicylate therapy is often

beneficial may further strengthen this misconception (Bywaters and Ansell, 1958). Five patients with colitic arthritis did in fact give a history of rheumatic fever, but this had preceded the colitis by many years and seemed unrelated. Small erosions have been reported as residua of colitic arthritis (Bywaters and Ansell, 1958), but we have been unable to detect any such changes in the peripheral joints of our patients radiologically.

Relation of Colitis and Colitic Arthritis

Patients with long-standing colitis were more prone to develop recurrent arthritis, but arthritis began as often before symptoms of colitis had been present for six months as it did later. Colitic arthritis was more frequent in patients with a chronic intermittent or continuous course than in those with acute fulminating disease or with proctocolitis. The frequency of the arthritis varied with the extent of the colitis, being more common when the entire colon was involved. This association was very clearly seen among women with ulcerative colitis, although the correlation was not apparent among men. Colitic arthritis usually manifested itself at a time when bowel symptoms were worse and the bowel and joint symptoms tended to remit simultaneously.

There was a striking association between both local and systemic complications of ulcerative colitis and colitic arthritis. The arthritis was significantly more common in patients with perianal disease and pseudopolypi. Similarly it was significantly more common in colitis with recurrent ulceration of the buccal mucosa, uveitis, and skin lesions.

Exacerbations of arthritis have subsided for long periods, and we were unable to confirm the view of Hamilton (1957) that only surgery would cure the arthritis. In a number of our patients in whom the colitis was quiescent there has been no exacerbation of arthritis for a number of years. Our findings confirm those of Brooke (1954, 1956) that colectomy causes a prolonged remission of arthritic symptoms. In our experience this is almost invariably so. In a wider series of patients with ulcerative colitis treated surgically at the General Infirmary, Leeds (Watts *et al.*, 1965), five complained of rheumatic symptoms which persisted after operation, but in none were these episodes of colitic arthritis. Sacro-iliitis, however, did produce symptoms in one of these patients after surgery, apparently due to continued activity of the disease. It may be that once sacro-iliitis is established, unlike colitic arthritis, the joint manifestations are unaffected by colectomy.

Summary

A total of 269 unselected patients with ulcerative colitis have been investigated by a gastroenterologist and a rheumatologist in a forward-planned review to establish the frequency and nature of rheumatic complaints in this disease, and to correlate arthritic symptoms with those of colitis.

The clinical and anatomical features of the colitic population studied are reported. Forty-five per cent. of patients had rheumatic complaints. Fifteen patients had ankylosing spondylitis; 31 (11.5%) developed a specific type of arthritis designated colitic arthritis.

Colitic arthritis was equally common in the sexes, usually at ages 25 to 44. It was characterized by a recurrent acute synovitis, usually monarticular, asymmetrical, and beginning in a lower limb (commonly in a knee or ankle). The attack was usually of short duration and was unaccompanied by residual deformity or radiological change. Exacerbations of arthritis were usually associated with increased bowel symptoms.

Patients with chronic ulcerative colitis involving the bowel extensively were more likely to develop colitic arthritis. The arthritis developed more often in patients with local or systemic complications of the colitis. Of 151 patients whose colitis had

been treated surgically five had rheumatic complaints persisting after surgery. None were examples of colitic arthritis. In one patient the pains were apparently a result of sacro-iliitis which had developed during the course of the colitis.

We are grateful to Professor J. C. Goligher, who allowed us to question patients under his care, and who performed most of the sigmoidoscopic examinations. Miss M. Price drew the figures.

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Sacro-iliitis and Ulcerative Colitis*

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Brit. med. J., 1965, **2**, 675–680

A relation between ankylosing spondylitis and bowel complaints has been postulated by several authorities. In a number of series of patients with ulcerative colitis an increased incidence of ankylosing spondylitis has been noted (Table I) and in the extensive series of 555 patients from the Lahey Clinic at Boston 28 were found to have ankylosing spondylitis (Fernandez-Herlihy, 1959). Conversely, in a number of series of patients with ankylosing spondylitis the incidence of ulcerative colitis has been variously reported as 1.5% to 3.9% (Table II). Although the frequency of ulcerative colitis in the general population is unknown, this frequency seems higher than its occurrence in hospital admissions, estimated by Spriggs (1934) at 5 in 1,000 and by Melrose (1955) at 10.9 in 10,000. Melrose suggested it occurred less often in northern towns.

Court Brown and Doll (personal communication, 1958) studied a population of 13,352 spondylitics who had received x-ray therapy between 1935 and 1954. They calculated on the basis of certified deaths from colitis between 1950 and 1953 that the expected numbers of deaths from ulcerative colitis in this population would be 0.65. However, at the time of inquiry 13 certified deaths from colitis had occurred—that is, 20 times more than had been previously predicted. They were unable to advance an estimate for the morbidity from the ulcerative colitis in the same period. Such a vast and careful survey must carry considerable weight, and there would seem to be a definite relation between deaths from colitis and spondylitis.

In a previous study of the arthritis of ulcerative colitis we reported three patients who had ankylosing spondylitis among

108 with colitis (Wright and Watkinson, 1959). Bywaters and Ansell (1958) included six patients with sacro-iliac joint involvement in their 37 patients with colitic arthritis, being unable to distinguish radiologically sacro-iliac arthritis in colitic arthritis and in ankylosing spondylitis. In none of the previously reported studies had an attempt been made to investigate the true incidence of arthritis by taking radiographs of all patients with ulcerative colitis, with particular reference to the sacro-iliac joints and lumbar spine, and in none had the frequency of sacro-iliitis in a matched control group of patients unaffected with colitis been studied. We have therefore conducted a prospective study in which 234 patients with ulcerative colitis have been assessed simultaneously by both a gastro-enterologist and

TABLE I.—Incidence of Ankylosing Spondylitis in Ulcerative Colitis (Various Authors)

Place	Date	Total with Colitis	% with Spondylitis	Authors
New York ..	1956	148	1.3	Flood <i>et al.</i>
Vancouver ..	1959	371	1.1	Ford and Vallis
Leeds ..	1959	108	2.8	Wright and Watkinson
Boston ..	1959	555	5.0	Fernandez-Herlihy
Bethesda ..	1960	100	6.0	Zvaifler and Martel
Washington, D.C.	1960	1,175	2.0	Acheson
U.S.A. ..	1962	1,200	1.6	McEwen <i>et al.</i>
New York ..	1963	333	2.7	Rotstein <i>et al.</i>
Glasgow ..	1963	170	2.9	McBride <i>et al.</i>
Leeds ..	1965	234	6.4	Wright and Watkinson

TABLE II.—Incidence of Ulcerative Colitis in Ankylosing Spondylitis (Various Authors)

Place	Date	Total with Spondylitis	% with Colitis	Authors
Stockholm ..	1953	117	2.6	Romanus
London ..	1957	399	1.5	Steinberg and Storey
..	1958	211	1.9	Wilkinson and Bywaters
Edinburgh ..	1963	870	1.8	McBride <i>et al.</i>
Montpellier ..	1964	103	3.9	Serre and Simon

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