the lack of parental visiting to children under 5 years old was found to be significantly related to disturbance. It is concluded that in most cases the disturbances resulted from various combinations of factors. If the incidence of disturbance is to be lessened, more attention should be paid to the emotional needs of the children and the part parents can play in treatment.

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SACRO-ILIITIS IN REITER'S DISEASE

BY

J. K. OATES, M.B., M.R.C.P.Ed.

AND

A. C. YOUNG, M.B., D.M.R.D.

From the London Hospital

Involvement of the sacro-iliac joints in Reiter's disease has received little attention in the past. Gounelle and Marche (1941) observed that these joints may be involved, and Marche (1950) devoted a paper to the subject, in which he considered that these joints were commonly affected and estimated that the true figure was probably between 60 and 80% of chronic recurring cases. All his patients were of the post-dysenteric form of Reiter's disease. Harkness (1950) found sacro-iliac involvement in only 5.4% of his series of 126 patients. Romanus (1953) noted that some cases of Reiter's disease were complicated by sacro-iliitis and that when radiological changes were present in these joints they were indistinguishable from those found in ankylosing spondylitis. Ford (1953), when reviewing 20 patients with chronic relapsing forms of Reiter's disease, found that 4 had developed ankylosing spondylitis, and he concluded that this was one of the sequelae of Reiter's disease. Marche (1950) had reached a similar conclusion concerning the post-dysenteric form of the illness.

Radiological abnormalities were present in the sacro-iliac joints of some of Ford's patients, though not all were x-rayed. Stanworth and Sharp (1956) quoted a series of 20 patients with Reiter's disease, of whom almost half had radiographic evidence of sacro-iliitis. Murray, Oates, and Young (1958) and Reynolds and Csonka (1958) in a radiographic study of two series of patients with Reiter's disease found that 39% and 32% respectively had x-ray evidence of sacro-iliac disease. Mason, Murray, Oates, and Young (1959), in a comparative radiographic study of ankylosing spondylitis, rheumatoid arthritis, and Reiter's disease, also stressed the frequent occurrence of sacro-iliitis in the latter condition.

As the sacro-iliac joints are primary synovial joints (Macdonald and Hunt, 1952) there is no reason to expect that they should be exempt from attack in an illness such as Reiter's disease, where arthritis is usually the most prominent feature of the condition. Indeed, it may be that there are reasons, based upon local anatomical relationships, for supposing that these joints may be especially exposed to risk of involvement. Prostatitis is present in a high percentage of cases of Reiter's disease in the acute stage and in virtually all in the chronic relapsing stages (Weinberger, Dienes, and Bauer, 1952; Romanus, 1953; Oates, 1958). The lymphatic drainage of the prostate is to the glands lying in the hollow of the sacrum and in front of the bodies of the lumbar vertebrae (Hamilton, 1956). No direct connexion between these prostatic lymph channels and those of the sacro-iliac joints has been demonstrated, but little work of this nature has been undertaken. That such a connexion exists seems likely in view of the common finding of metastases around the region of the sacro-iliac joints in patients suffering from carcinoma of the prostate.

A further factor that is probably of even greater importance is the venous system described by Batson (1942), which passes from the prostate and seminal vesicles to lie in the lower part of its course, directly over the sacro-iliac joints, with which it almost certainly has connexions. Further support for this theory is given by the work of Romanus (1953), who found a very high incidence of chronic prostatovesiculitis in patients with ankylosing spondylitis, and he considered this genital infection to be the commonest cause of spondylitis.

The diagnosis of sacro-iliac disease is difficult to make, as the joint is not easily accessible to physical examination and the movements permitted at the articular surfaces are very slight. The nerve supply of the joints is derived principally from the first and second sacral nerves, from the superior gluteal nerve (L 4 and 5 and S 1), and there is possibly a contribution direct from the lumbo-sacral trunk. This innervation explains why the pain of sacro-iliac disease is so widely referred.

The symptoms of sacro-iliitis consist chiefly of backache or stiffness, both of which are exceedingly common complaints with a multitude of causes. The pain experienced is a dull ache which is commonly localized in the upper medial quadrant of the buttock and posterior aspect of the upper thigh on the affected side. An associated feeling of stiffness across the buttocks and thighs is also often noted. Physical signs are usually minimal and need to be carefully sought. In subacute cases they are often absent. Local tenderness just below and medial to the posterior superior iliac space is sometimes found in the acute stage, and one or more of the many tests for sacro-iliac disease may be positive. A common feature of Reiter's disease is the occurrence of localized areas of pain and inflammation variously described as "fasciitis," "tendonitis," or "myositis," and these areas are often found in the paraspinal and gluteal muscles. In consequence the presence of sacro-iliac tenderness must be carefully evaluated before interpreting it as evidence of involvement of these joints.

Present Study

Seventy-eight patients (76 men and 2 women) who had suffered an attack or attacks of Reiter's disease were studied. The diagnosis of Reiter's disease was made by the association of arthritis involving one or more joints

with urethritis and sometimes conjunctivitis or iritis. The first two conditions were present in all cases, and 46 patients had suffered more than one attack. Some of these patients had had their earliest attacks as long ago as 20 years. In the female patients genital infection was present in the form of chronic cervicitis with erosion.

As the frequency of sacro-iliac joint involvement has been appreciated only relatively recently, special examination for the presence of clinical evidence of sacro-iliac arthritis has been carried out in only the most recently observed cases. As these form a fairly small proportion of the group it was decided to ascertain from the clinical histories of each patient whether backache had been present during an attack. It was felt that this would probably give some minimum indication of sacro-iliitis, as, in general, only where backache was a reasonably prominent symptom would it be recorded. The sacro-iliac joints of each patient were x-rayed and note was taken whether they had suffered an attack or attacks of iritis. In addition all patients who developed attacks of iritis after the arthritis had subsided were carefully examined for the presence of chronic prostatitis.

Radiology

An antero-posterior view of the joints was generally used, but if a definite opinion could not be given a postero-anterior view was also taken as stressed by Grainger (1957) in the examination of cases of ankylosing spondylitis. The postero-anterior view was not always helpful in the present series, and this may have been due to the relative infrequency of joint widening and the rather smaller erosions found in this condition. In some cases films of different dates were available.

Interpretation and Results

The films were assessed as follows: "normal," "doubtful," "one side definitely abnormal," and "both sides definitely abnormal." Abnormalities were categorized "mild," "moderate," or "severe." The joints were regarded as normal if the double cortical "tram-line" of the anterior part of the synovial joint could be seen entirely. This is the more laterally placed of the double white lines seen on the film. Multiplicity of the cortical lines was regarded as a normal variation caused by the different tangential projections of the joint surface. The absence of the cortical white lines was regarded as "normal" only if the patient's age suggested that it might not have formed (Grainger, 1957) and, in addition, if an even edge of the bone could be seen in its place. Where the cortex was absent completely or partially and yet neither erosions nor sclerosis could be definitely seen, the film was regarded as "doubtful." If definite erosion and sclerosis were seen on one side of the joint the joint was regarded as being "mildly abnormal"; if both sides of the joint were affected without ankylosis, "moderately abnormal"; and if ankylosis was present, "severely abnormal" (Table I).

If the patients showing doubtful evidence of radiographic abnormality were ignored the remainder

could be divided into two groups; one with radiographic evidence of sacro-iliitis, the other with radiographically normal joints. It was clear that these groups also differed in other ways (see Table II). When the average disease

TABLE II

	Definite X-ray Evidence of Sacro-iliitis	Doubtful Evidence of Sacro-iliitis	No X-ray Evidence of Sacro-iliitis
No. of patients	35	9	34
No. with complaint of backache	16 (45.6%)	3 (33%)	5 (14.7%)
No. with iritis	12 (34.2%)	1 (11.1%)	3 (8.8%)
Average disease duration	13 years	8.4 years	4.8 years

duration was calculated by averaging the totals of the time from the first attack of Reiter's disease to the time of study it was found to be 13 years in the group with abnormal sacro-iliac joints, but only 4.8 years in the other group. Of the first group, 16 (45.7%) complained of backache at some stage of their illness compared with 5 (14.7%) of those without evidence of sacro-iliitis. Of those with sacro-iliitis, 12 (34%) developed iritis compared with only 3 (8.8%) in the other group. These 12 patients experienced 66 attacks of iritis as against a total of 8 attacks suffered by the three patients with normal sacro-iliac joints. The attacks of iritis were recurrent in nine of the patients with sacro-iliitis and were usually the only manifestation of the disease.

Discussion

As nearly half of the patients showed clear radiographic evidence of sacro-iliitis it is reasonable to suppose that there was often clinical involvement of the joints during the acute stage of the disease but that the diagnosis was not made at the time owing to failure to appreciate the significance of what is a very common symptom. Further evidence for this belief is perhaps provided by the different incidence of complaint of backache in the two groups (Table II). Changes in the joints were found most often in those with recurrent or chronic forms of Reiter's disease. This suggests that such changes develop slowly. However, in several patients erosive lesions have been observed to develop in the course of a few weeks' time. Such rapid progression is well recognized in some cases of rheumatoid arthritis and pyogenic arthritis, but is probably uncommon in Reiter's disease.

It seems likely that, at least in some of the patients showing doubtful radiographic changes, these were examples of very early lesions which had not progressed sufficiently for them to be recognized with any certainty. All the patients with sacro-iliitis who were examined had genital infection in the form of chronic prostatitis, and it is interesting to compare these results with the findings of Romanus (1952) and Mason *et al.* (1959) in ankylosing spondylitis and with the spinal changes described by Thomas (1955) in rheumatic fever following recurrent throat infections. The evidence for concluding that a "focal infection" is responsible for these changes is strong but by no means conclusive. The exact way in which a localized chronic infection could produce such changes is not understood, but of the many factors involved, such as vascular congestion, local lymphadenopathy, the spread of toxins, and metabolic products, little is really known.

Iritis has often been associated with the rheumatic diseases and in particular with ankylosing spondylitis (Sorsby and Gormaz, 1946; Forestier, Jacqueline, and Rotès, 1949; Birkbeck, Buckler, Mason, and Tegner,

TABLE I

	No.
No. of patients examined	78 (100%)
Normal S.I. joints	34 (43.6%)
Doubtful	9 (11.5%)
Abnormal	35 (44.9%)
Abnormality unilateral (mild 5, moderate 1)	6 (17.1%)
bilateral (mild 8, moderate 11, severe 10)	29 (82.9%)

1951). Brodie in 1818 described five cases with Reiter's disease, of which two suffered from recurrent attacks of iritis. Stanworth and Sharp (1956), after a careful study of the whole problem, concluded that iritis was especially associated with Reiter's disease and all forms of spondylitis, but that its association with rheumatoid arthritis was probably coincidental. Csonka (1958) found iritis developed in 21 of a series of 185 patients with Reiter's disease and that 9 of the patients with iritis also had evidence of sacro-iliitis. Ford (1953) and others have described cases of Reiter's disease in which the patients have suffered multiple attacks of iritis after apparent recovery from the arthritis.

Of the 12 patients with iritis in the group showing sacro-iliac disease studied here, no fewer than nine had recurrent attacks. In the majority, most of the episodes of iritis were not associated with arthritis or obvious genito-urinary disorder. Careful examination showed evidence of prostatitis in all. The attacks of iritis persisted over a period of years in many of the patients, and four had to have an iridectomy performed. As iritis is often the sole manifestation of the disease such patients usually seek advice in ophthalmic departments, and the correct diagnosis of Reiter's disease is easily overlooked. A further fact which renders diagnosis difficult is that patients do not like to vouchsafe information relating to past episodes of urethritis, especially if these have been gonococcal.

Much diagnostic difficulty is met with when considering patients with ankylosing spondylitis who present with iritis (Birkbeck *et al.*, 1951). In such patients backache is not often a prominent feature, though restriction of spinal movements is usually present and indeed may be severe. The only differences between these patients and those described here with recurrent iritis is that the latter group all gave a past history of arthritis associated with urethritis and in addition there was little evidence of restriction of spinal movement. Patients with true ankylosing spondylitis sometimes give such a history, and it must be admitted that in a number of cases it is impossible to decide upon an exact diagnosis.

The development of radiographic evidence of sacro-iliitis in a patient suffering from Reiter's disease is of more than academic interest. Such a patient may suffer from recurrent attacks of iritis over a long period of time. He also seems to be more likely to develop recurrent or chronic arthritis, and on occasion the full syndrome of ankylosing spondylitis may be a sequel, though actual spinal involvement does not seem to be common.

Summary and Conclusions

Sacro-iliac disease demonstrable radiographically is common in Reiter's disease. Clinically appreciable involvement of these joints is probably common only during the acute stages of the disease, but the diagnosis may be easily missed. In cases of Reiter's disease special attention should be paid to the presence, site, and distribution of backache.

Sacro-iliac disease in this condition often appears to be associated with recurring attacks of iritis. This iritis is usually the only symptom. The occurrence of frequent attacks of iritis in the male should always lead to inquiry into the presence of a past history of Reiter's disease or its components. Evidence of sacro-iliac disease and genital infection should be carefully sought in such patients.

The difficulty of distinguishing cases of Reiter's disease with sacro-iliitis and associated iritis from some cases of ankylosing spondylitis is discussed.

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LETHAL HAZARDS OF THE LUTEAL PHASE OF THE MENSTRUAL CYCLE

BY

I. L. MacKINNON, M.B., Ch.B.

Department of Anatomy, King's College, London

P. C. B. MacKINNON, M.B., B.S., Ph.D.

Department of Anatomy, Royal Free Hospital School of Medicine, London

AND

A. D. THOMSON, M.A., M.D., M.R.C.P.

Bland-Sutton Institute, Middlesex Hospital, London

MacKinnon and MacKinnon (1956) reported that, in a series of 47 post-mortem examinations on women of reproductive age, death was found to have occurred in 45 cases during the luteal phase of the menstrual cycle. In the last two years 55 post-mortem examinations have been added to the series, and in these also the great majority of deaths occurred during the luteum. The present report is an analysis of the total of 102 post-mortem examinations.

Methods

Uteri were collected from a consecutive series of 131 necropsies on women aged 18-46 years carried out at one London mortuary. The uteri were opened, were fixed in 10% formol-saline, and a portion of the posterior wall was removed for histological examination. Sections (7 μ) were cut at right angles to the uterine cavity, stained with haematoxylin and eosin, and their endometria examined; 29 were discarded as menopausal or diseased. The remaining 102 were