Rheumatoid involvement of the lumbar spine

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SUMMARY  On stereoscopic examination of the lumbar spines of 6 patients with rheumatoid arthritis and spinal disease we found typical rheumatoid erosions in the apophyseal joints. 2 also had severe asymmetrical disc destruction with associated involvement of the vertebral bodies and scoliosis. In one of these patients who developed Staphylococcus aureus septicaemia, infection was localized in this part of the lumbar spine.

In contrast with the neck, involvement of the lumbar spine in rheumatoid arthritis has received little attention. Lawrence et al. (1964) found an increased incidence of subluxation and disc narrowing without vertebral osteophytosis, apophyseal destruction, and osteoporosis in rheumatoid patients compared with control subjects, and, using these as criteria, thought that rheumatoid changes were present in the lumbar spines of 5% of males and 3% of females in random population studies. Although there was some correlation between their lumbar rheumatoid grades and erosive changes elsewhere, the association between clinical polyarthritis and lumbar changes was less convincing. They had difficulty in detecting erosions in apophyseal joints and sometimes found it impossible to differentiate them from early osteophytic fringes.

The apophyseal joints have always presented problems in radiological examination as their oblique angulation makes assessment by standard antero-posterior and lateral radiographs difficult. The technique of stereoscopic radiographic examination of the lumbar spine allows a unique view of the apophyseal joints in three dimensions with a clarity not obtainable with conventional radiographs. In this method a pair of radiographs are taken with the x-ray tube shifted a fixed distance in the axial direction between exposures. The films are examined in the Zeiss stereoplotter as described by Jacoby et al. (1976) and the apophyseal joints are clearly seen. We report 6 patients with rheumatoid involvement of the lumbar spine.

Case reports

CASE 1
A 43-year-old female with a 16-year history of nodular, erosive seropositive rheumatoid arthritis affecting the feet, ankles, knees, hands, wrists, elbows, and cervical spine. She had been on steroids for 8 years with doses ranging up to 12.5 mg prednisolone per day. She had shown a good response to penicillamine therapy initially but this was withdrawn because of leucopenia. Thereafter she was maintained on azathioprine 50 mg three times daily, prednisolone 2.5 mg/day, and a variety of non-steroidal anti-inflammatory drugs, and the disease remained under reasonable control for 2½ years. Subsequently she relapsed with an acute flare of synovitis affecting multiple joints and developed acute low back pain. There was no radiation into the lower limbs. Examination showed tenderness over the lower lumbar spine with limitation of all spinal movements.

Treatment consisted of rest to the spine and peripheral joints, and increased dosage of anti-inflammatory drugs and of azathioprine to 200 mg/day. On this regimen the peripheral synovitis and back pain settled and has remained under reasonable control.

The standard anteroposterior and lateral radiographs showed gross narrowing of the L5/S1 disc space with a vacuum phenomenon. There was minimal evidence of anterior osteophyte formation at D12-L1, L2-3, and L5-S1. On stereoscopic examination at L4-5 the right apophyseal joint showed definite erosions consistent with rheumatoid disease which were illustrated by coned views of that area (Fig. 1). The left joint at that level was narrowed and subluxed with the inferior facet of L4
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over-riding downwards on the superior facet of L5. The L5-S1 apophyseal joints on both sides were similarly narrowed and subluxed, but there were also sclerotic changes at the joint surfaces.

CASE 2
A 47-year-old female with a 17-year history of extensive, active seropositive rheumatoid arthritis affecting multiple joints with many deformities. She had had several admissions to hospital and was treated with nonsteroidal anti-inflammatory drugs and prednisolone 7.5 mg/day. She was admitted in September 1975 with active arthritis, particularly affecting both hands and wrists, shoulders, knees, and with severe low back pain and stiffness. There was tenderness over the lumbosacral region and all movements of the lumbar spine were limited. Treatment consisted of rest, adjustment of the anti-inflammatory regimen, and the addition of penicillamine. All symptoms gradually improved and in particular back pain ceased to be a problem.

Conventional lumbar spine radiographs showed some narrowing at the L5-S1 disc space but without

Fig. 1 (a, b) Case 1. Coned view showing erosion (arrowed) of right L4/5 apophyseal joint.
osteophyte formation. There was a small osteophyte at the upper border of the 4th lumbar vertebra on the left. Stereoscopic examination showed erosions of the L4-5 apophyseal joints on both sides. At the L5-S1 level the apophyseal joint spaces were narrowed.

**CASE 3**

A 61-year-old female with an 11-year history of erosive, seropositive rheumatoid arthritis which particularly affected her knees and wrists. Previous therapy included hydroxycholoroquine, indomethacin, excision of granulation tissues from the right wrist, and yttrium 90 injection to the right knee. For 2 years she had increasing pain particularly affecting the dorsolumbar spine where there was definite kyphosis (Fig. 2) and extreme limitation of movement.

Conventional lumbar spine radiographs (Fig. 3a, b) showed generalized loss of bone density with a lumbar scoliosis and kyphosis with its apex at L1-2.
There were no collapsed vertebrae, but disc space narrowing at all levels. At the L3-4 disc space on the left there were well marked destructive changes with surrounding sclerosis most marked on the upper border of L4, but present to a lesser degree on the lower border of L3. At the L4-5 disc space there were similar but lesser changes on the right side. Osteophytes were seen at all levels but were most marked around the vertebral body at L3-4 on the left and at L4-5 on the right, that is in the concavities of the scoliosis.

Examination of the stereoscopic radiographs also showed well marked excavations of the L1-2 apophyseal joint on the right consistent with rheumatoid erosions. At the L2-3, L3-4, L4-5, and L5-S1 levels on both sides the apophyseal joints were narrowed and grossly subluxed.

CASE 4
A 68-year-old female with a 30-year history of extensive seropositive rheumatoid arthritis had received steroids for 7 years. There were multiple joint contractures with active disease in the right hip and both knees. Although she had no specific complaints about her back, all lumbar spine movements were grossly reduced.

Lumbar spine radiographs showed generalized loss of bone density. There was narrowing of the
L4-5 and L5-S1 disc spaces with small osteophytes around the vertebral bodies at L4-5. In addition the stereoscopic radiographs showed erosions of the right L4-5 and L5-S1 apophyseal joints. On the left side at these levels the joints showed narrowing, subluxation, and sclerosis.

CASE 5
A 65-year-old female, who had had pulmonary tuberculosis 40 years previously, presented with a 12-year history of extensive nodular seropositive rheumatoid arthritis the onset of which coincided with severe lumbar pain for which she was admitted to hospital for bed rest. She had intermittent recurrences of back pain thereafter, sometimes coinciding with synovitis elsewhere. More recently the pain radiated into the anterior aspect of both thighs and to the medial malleolus on the right. She had been on steroids for about 8 years but gold therapy was then substituted.

Chest x-ray showed apical calcification typical of old inactive tuberculosis. Plain lumbar spine radiographs (Fig. 4) showed the spine to be generally osteoporotic with disc narrowing at all levels and a vacuum phenomenon at L4-5. There was mild scoliosis concave to the left at L3-4 with a compensatory concavity to the right at L4-5. There was associated disc space narrowing and destructive change of the bodies of the vertebrae with surrounding sclerosis and some osteophyte formation at L3-4 on the left and L4-5 on the right.

Stereoscopic radiographs showed erosions at the apophyseal joints on both sides at L2-3, on the right at L3-4, and on the left at L4-5 which were not evident on conventional examination. Both L5-S1 apophyseal joints were narrowed and sclerotic.

About 1 year after these clinical and radiographic assessments she was admitted because of malaise, weight loss, hepatosplenomegaly, acute relapse of the peripheral arthritis, and confusion. Radiographs of the spine were unchanged. *Staphylococcus aureus* was isolated from the blood and was sensitive to all

Fig. 4  Case 5. Anteroposterior radiograph showing asymmetrical destructive changes in the intervertebral discs and vertebral bodies.
antibiotics. She was treated initially with intravenous flucloxacillin and sodium fusidate and subsequently oral benzyl penicillin with rapid improvement, and blood cultures became sterile. After 4 weeks the antibiotics were discontinued. 3 days later she relapsed with pyrexia, acute pain in the midlumbar region, and marked weakness and loss of sensation in the legs. Blood cultures again showed *Staph. aureus* sensitive to all antibiotics. Radiographs of the spine (Fig. 5) showed further narrowing of the L3/4 disc space with increased destruction of the lower border of L3 and the upper border of L4 with marked osteoporosis. The most likely diagnosis was a staphylococcal abscess in the spine with septicaemia, although a tuberculous abscess could not be excluded. She was initially treated with flucloxacillin, rifampicin, and isoniazid with rapid improvement, loss of back pain, and return of normal power and sensation in the legs. The antitubercular therapy was stopped subsequently and she continued on penicillin. Needly biopsy of the L3/4 disc yielded no useful diagnostic material. Subsequent excision biopsy of the L3-4 disc and related bone surfaces with fusion of the L3 and L4 vertebrae was performed. She made

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Fig. 5 Case 5. Anteroposterior radiographs one year later showing progression of the lesion after staphylococcal septicaemia.
an uneventful recovery apart from a small pulmonary embolus on the tenth postoperative day, and will continue on oral penicillin indefinitely.

Histological examination of the excised material showed gross bone destruction, with dense infiltration by polymorphs, lymphocytes, and plasma cells. Gram-stain showed multiple intracellular Gram-positive cocci. There was no histological evidence of tuberculosis and Ziehl-Neelsen stain was negative. There were no specific features of rheumatoid arthritis.

CASE 6

A 49-year-old female with a 15-year history of active nodular seronegative rheumatoid arthritis had been treated with gold, penicillamine, and steroids. She had had intermittent lumbar pain for 10 years which had become much worse over the past 18 months and coincided with increased activity of the arthritis. At the time that the synovitis was brought under control she became free of lumbar symptoms. Conventional radiographs showed only minimal changes with slight narrowing of the L5-S1 disc space and a small anterior osteophyte on the upper border of the body of L3. Stereoscopic examination showed erosion of the right L4-5 apophyseal joint. At the L5-S1 level both apophyseal joints were narrowed and sclerotic.

Discussion

Back pain is a common symptom and precise diagnosis in a patient is often difficult. In rheumatoid patients with back pain the history, physical examination, and conventional radiology are often unhelpful in differentiating inflammatory joint disease from other causes of back pain. Our patients all had extensive, active, erosive rheumatoid arthritis and attacks of back pain often coincided with flares of rheumatoid synovitis elsewhere. Pain occurred mainly in the lumbar spine and in some patients radiated into the legs. There was no clear relationship between pain and physical activity. Conventional radiographs showed changes that might be ascribed to degenerative spondylolisthesis, but stereoscopic views of the apophyseal joints showed features which we have not seen in an extensive study of the spinal radiographs of patients with back pain from other causes. The distinguishing feature was the presence of erosions of the apophyseal joint surfaces which resembled rheumatoid erosions seen in other joints. This was distinct from osteoarthrosis of the apophyseal joints which is characterized by joint-space narrowing, sclerosis, subluxation, and osteophyte formation.

In 2 patients there was scoliosis of the lumbar spine with gross narrowing and subluxation of the intervertebral discs in an asymmetrical manner and destructive erosive changes of the adjacent parts of the vertebral bodies. One patient (Case 5) developed staphylococcal septicemia and subsequently an abscess at the site of this lesion.

Rheumatoid involvement of cervical intervertebral discs is well recognized and it is thought that the lesions originate in the adjacent synovial uncovertebral joints which are not found in the lumbar region. However, rheumatoid granulomas develop at multiple sites in the body, for example as rheumatoid nodules over pressure points and as scleritis in the eye. They have a predilection for moving parts and pressure points, so it is conceivable that a granuloma in the disc could lead to the disc damage and destruction. E. G. L. Bywaters (personal communication) has suggested that a fissure in the aging or degenerating disc could become lined by a form of synovium and so become the site of rheumatoid inflammation. Baggenstoss et al. (1952) reported destruction of an intervertebral disc and the adjacent parts of the lumbar bodies due to a rheumatoid nodule in a patient with typical rheumatoid arthritis.

It is also possible that these vertebral body and intervertebral disc changes are secondary to apophyseal joint involvement. Since rheumatoid disease often leads to joint instability, loss of the stabilizing influence of the lumbar apophyseal joints may allow abnormal movement between the vertebral bodies and so predispose towards the intervertebral disc and body lesions. There may also be a direct extension of the inflammatory process from the apophyseal joints to the discs. Finally, these disc and vertebral body changes may represent a form of neuropathic joint due to analgesic or steroid therapy.

In the patient with septicemia, histological examination of excised material showed evidence of both acute and chronic inflammation, but no specific feature of pre-existing rheumatoid disease. As the radiographic appearances were static for at least a year before the acute episode, and as this was preceded by staphylococcal septicaemia, we feel certain that the earlier radiological changes were not due to chronic sepsis. It is well established that the rheumatoid joint frequently becomes infected during septicemic episodes and it remains likely, but unproven, that this abscess was due to infection localizing in an area of rheumatoid inflammation.

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