SPONTANEOUS FRACTURES IN RHEUMATOID ARTHRITIS

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Spontaneous fractures in rheumatoid arthritis are said to be rare (Baer, 1941; Rosenberg, 1958) apart from steroid therapy. This is surprising, since rheumatoid arthritis occurs particularly in women of the age-group when spontaneous fractures might be expected (Albright *et al.*, 1941).

The fractures which occur during steroid therapy have been extensively studied (Boland, 1951; Demartini *et al.*, 1952; Rosenberg, 1958), particularly when this therapy is prolonged (Gascon and Grignon, 1960); but apart from this the subject has received little attention. Den Ouden and Speyer (1959) found little difference between the number of fractures in a group of rheumatoid patients and those in a control group. However, Fineschi (1957) has drawn attention to spontaneous fractures in rheumatoid arthritis and describes many of their features. Spontaneous fractures have also been described in Still's disease (Badley and Ansell, 1960).

This paper reports five cases of rheumatoid arthritis where spontaneous fractures occurred in the absence of any other known cause. All five patients were typical rheumatoid arthritics and fulfil the criteria of definite rheumatoid arthritis laid down by the American Rheumatism Association (Ropes *et al.*, 1957).

Case 1

A woman of 65 had suffered from rheumatoid arthritis for 16 years and had been treated with salicylates, phenylbutazone, and gold. She was admitted to hospital in 1958 because of an exacerbation of her arthritis affecting the shoulders, hands, and lower limbs. She improved with bed rest, analgesics, and physiotherapy. During convalescence while walking she experienced pain in the right ankle, and a radiograph showed a fracture through the right fibula (Fig. 1). This healed with bed rest and strapping.

Investigations.—Hb, 67%. White blood count, 6,400/c.mm., differential count normal. Plasma proteins, 7.5 g./100 ml. (albumin, 5.6 g., globulin 1.9 g.). Rose's test positive. No lupus erythematosus cells in peripheral blood. Sedimentation rate, 60 mm. in one hour. Serum alkaline phosphatase, 12.2 K.A. units. Serum inorganic phosphorus, 3.4 mg./100 ml. Serum calcium, 10 mg./100 ml. Urine normal. She improved and was discharged from hospital.

Five months later, however, she returned with pain in the left ankle; this followed a stumble while walking. On June 16, 1959, radiography showed a crack fracture through the left fibula and a commencing fracture in the left tibia (Fig. 2). She was treated with bed rest, and on July 24 a radiograph showed union of the fibula, while the tibial fracture was more obvious and involved the whole shaft (Fig. 3). Union again occurred after bed rest.

Case 2

A 66-year-old woman with rheumatoid arthritis presented in 1954 with aches and pains in the shoulders and hands for the preceding year. Sedimentation rate was 15 mm. in one hour (Westergren) and had remained between 15 and 25 mm. in one hour. She had been treated at different periods with heat and exercises, salicylates, and phenylbutazone, and had remained ambulant.

In February, 1960, she developed pain in the left hip while walking; the pain radiated to the thigh and there was a slight ache in the right hip. She was admitted to hospital. At first the radiograph was normal, but later this

FIG. 1

FIG. 2

FIG. 3

FIG. 1.—Case 1. Rheumatoid arthritis spontaneous fracture, lower end of fibula, 1958. FIG. 2.—Case 1. Rheumatoid arthritis spontaneous fracture, lower end of left fibula, June, 1959, with lower end of tibia also involved. FIG. 3.—Case 1. Rheumatoid arthritis, July, 1959. Apparent extension of fracture of left tibia.

revealed fracture of the necks of both femurs (Fig. 4). There was no bone rarefaction and the hips showed no evidence of arthritis.

FIG. 4.—Case 2. Rheumatoid arthritis spontaneous fractures, necks of both femurs.

Investigations.—Hb 85%. White blood cells, 7,100/c.mm., with normal differential count. Latex fixation test positive. No lupus erythematosus cells in blood. Serum alkaline phosphatase, 2 K.A. units. Total 24-hour urine volume, 1.3 litres. Urinary inorganic phosphorus, 48 mg./100 ml. Urinary calcium, 230 mg. in one day. The urinary calcium on a calcium-free diet was: first day 374 mg., second day 230 mg., third day 228 mg.

The right femur was treated with internal fixation and a Moore nail; later the left hip was treated by abduction, osteotomy, and internal fixation with a nail and plate.

Metabolic studies carried out by Dr. Stuart Mason disclosed slight senile osteoporosis: plasma proteins were normal in total and differential amounts. On this occasion urinary calcium averaged 263 mg./24 hours, the maximum level being 360 mg. and the minimum 192 mg. Her faecal calcium was increased and she was just in negative balance. A strontium infusion was done to determine her bone dynamics, and there was some increase in her total calcium and in the accretion rate of calcium by bone.

Case 3

This woman, aged 62, had had rheumatoid arthritis for seven years and was attending hospital as an out-patient. At different times she had received phenylbutazone, chloroquine sulphate, gold therapy, short-wave diathermy, and physiotherapy. She was admitted to hospital on November 8, 1959, complaining of pain in the left hip of approximately three weeks' duration which did not follow any definite injury. She was found to have a transcervical fracture of the left femur. Hb, 81%; P.C.V., 39%; E.S.R., 48 mm. in one hour (Westergren).

She was treated by internal fixation with a lag screw and fibula graft, and later had active "non-weight-bearing exercises."

Case 4

This patient, a 69-year-old woman, had had rheumatoid arthritis for 12 years and had been treated with aspirin and phenylbutazone on different occasions. She experienced excruciating pain in the left hip in January, 1960, and on x-ray examination at the London Hospital was found to have a fracture of the neck of the left femur. No history of any preceding fall or trauma of any kind was given. There was no serious exacerbation of her arthritis at that time. She was treated by pinning.

A year later she was admitted to hospital because of exacerbation of the rheumatoid arthritis. The results of investigations were: Hb, 77%; P.C.V., 36%; W.B.C., 6,500/c.mm.; E.S.R., 42 mm. in one hour. No L.E. cells in peripheral blood. Total serum proteins, 7.6 g./100 ml.

(albumin 4.4 g., globulin 3.2 g.) Blood urea, 43 mg./100 ml. Latex fixation slide test positive.

Case 5

This woman, aged 70, has had rheumatoid arthritis for seven years, involving hands, knees, and ankles, but not the hips. On September 21, 1959, she was admitted to hospital because of the onset of severe pain in the right hip which prevented her walking; there was no history of injury. She was found to have an intracapsular adduction fracture of the right femoral neck. She was treated with bed rest and traction, followed by progressive exercises and walking. She progressed slowly: a radiograph still showed displacement of the bone fragments, but she was able to walk with elbow crutches.

Investigations.—Hb, 74%. Latex fixation test positive to a titre of 1/640. Plasma proteins, 7.1 g./100 ml. (albumin 3 g. globulin 4.1 g.). Sedimentation rate, 37 mm. in one hour. Serum calcium, 10 mg./100 ml. Serum phosphorus, 3.4 mg./100 ml. Alkaline phosphatase, 10 K.A. units.

Discussion

These five patients presented with spontaneous fractures in rheumatoid arthritis. In four the neck of the femur was involved and, although the disease had been present for some time, there was no clinical involvement of the hips and no obvious bone rarefaction in this region. In one of these cases the fractures were bilateral. In the fifth case fractures occurred round the ankle on more than one occasion and rarefaction was present.

In Cases 1 and 2 there was evidence that the fractures developed gradually, and in Case 2 the first x-ray film after the onset of symptoms was normal.

This feature has been noted by Fineschi (1957). He referred to them as "dormant" fractures. At first there may be a locally painful stage in which radiography may fail to show an interruption on the bone. Later the formation of callus may make the fracture line obvious but may remain incomplete. He states that the fractures do not undergo displacement and that they heal easily; this was not so in all our cases. In four of them the hip was involved, whereas in Fineschi's cases the metatarsal bones were the most usually affected.

The cause of spontaneous fractures in rheumatoid arthritis remains obscure. There may be no radiological change in bone density in the area of the fracture (Case 2), this feature being noted by Rosenberg (1958) in the case of spontaneous fractures occurring during steroid therapy.

Patients with rheumatoid arthritis have a slight tendency to lose calcium (Ropes *et al.*, 1943), a tendency which is increased by steroid therapy (Sprague and Power, 1950), the latter also having an antianabolic effect on protein metabolism (Clark, 1950). Our patients did not receive any such therapy. However, they were all females in an older age-group when some osteoporosis might be expected, and metabolic studies in one patient showed findings consistent with a mild osteoporosis of senile type, and this may be the most important factor. However, it seems likely that some factor is present in rheumatoid arthritis which causes osteoporosis and that this is aggravated by the age and sex of the patient. Steroid therapy may be an added factor.

Summary

Five cases of rheumatoid arthritis are described in which spontaneous fractures occurred. Although no gross abnormality of calcium metabolism was found, metabolic studies in one case revealed evidence of slight

osteoporosis of senile type; the age and sex of the other patients suggest that these may be important underlying factors.

The onset of sudden pain in rheumatoid arthritis may lead one to suspect such a fracture, although initially the radiograph may be normal, as the fractures often seem to develop slowly. Some features of these fractures are discussed.

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STAPHYLOCOCCAL SEPTICAEMIA WITH PYOARTHROSIS IN RHEUMATOID ARTHRITIS

REPORT OF THREE FATAL CASES

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Although occasional instances of staphylococcal septicaemia occurring in patients with rheumatoid arthritis had been described earlier, Kellgren *et al.* (1958) were the first to emphasize the importance of this complication. They described 12 cases of rheumatoid arthritis in which severe bacterial infection of connective-tissue structures occurred. In nine cases this was predominantly a suppurative arthritis—often polyarticular and resembling an exacerbation of the established rheumatoid arthritis. The infecting organisms were coliform in two cases and staphylococci in 10. The latter were resistant to penicillin in all but two cases. Despite this detailed study staphylococcal septicaemia with pyoarthrosis still lacks sufficiently wide recognition as a dangerous complication of rheumatoid arthritis, and the current editions of standard textbooks do not refer to it (Hollander, 1960; Copeman, 1955). For this reason it seemed appropriate to present the clinical and pathological features of three cases of rheumatoid arthritis in which fatal staphylococcal infection with pyoarthrosis occurred.

Case 1

A man aged 68 had suffered from rheumatoid arthritis (sheep-cell agglutination test (S.C.A.T.) 8 to 128) for 20 years with chronic ulcers on the legs and feet. Past therapy included sodium aurothiomalate and prednisolone 10 mg. daily, the latter from February, 1959.

He was admitted to Stoke Mandeville Hospital on February 29, 1960, with a productive cough and breathlessness for several weeks. He was in poor general health with remittent fever (up to 40° C.), a haemoglobin of 3 g./100 ml., marked rheumatoid changes, particularly in the elbows, hands, wrists, knees, and ankles, and unhealed ulcers on the left leg. Severe anaemia with an undiagnosed fever in a patient with rheumatoid arthritis was diagnosed.

Treatment was initially with transfusions and penicillin, and later with tetracyclines, streptomycin, and erythromycin in turn. Prednisolone was omitted on admission but was restarted on March 10, and then steroids were continued, at times in increased dosage, until death.

On March 19 he suddenly developed a parotid abscess with a temperature of 40° C. The leucocyte count was 27,000, with neutrophilia, and culture of sputum grew *Staphylococcus aureus* sensitive to chloramphenicol and resistant to penicillin, streptomycin, tetracyclines, "evramycin," and oleandomycin. Chloramphenicol was started with a reduction in fever and general improvement.

On April 24 he became disorientated and pyrexial, with moist sounds in the lung bases. Culture of sputum continued to grow *Staph. aureus*. Chloramphenicol was continued, and evramycin and tetracyclines were also given. Initially his general condition improved but later it deteriorated. The knees became more swollen, and fluctuant swellings appeared over the sacrum and on the dorsum of the left hand on May 6. He died on May 12, 73 days after admission to hospital.

Post-mortem Findings.—The body was that of a tall lean elderly man. There were many small areas of partially necrotic skin over the sacrum and buttocks with one small area of ulceration. Internally there were two large chronic basal empyemata filled with thick pus. The lungs showed only severe oedema and congestion. The heart showed left ventricular hypertrophy but no other gross or microscopical changes. The liver showed severe centrilobular congestion and necrosis. The spleen was a little enlarged with a pale soft cut surface showing a large area of old infarction. Histology revealed areas of recent infarction and numerous pyaemic abscesses containing large clumps of Gram-positive cocci. The kidneys were slightly reduced in size with granular scarred external surfaces. The renal parenchyma was pale with blurring of the cortico-medullary margins and irregular loss of the cortical tissue. Histology showed mild chronic pyelonephritis and a few pyaemic abscesses in the medulla. In the skeletal system the disk space between the second and third lumbar vertebrae was completely destroyed, being replaced by a cavity containing thick pus communicating with a large irregular paravertebral abscess under the left psoas muscle. On being opened both knee-joints showed severe rheumatoid arthritis, the left joint cavity containing purulent fluid. Histology revealed an acute purulent exudate superimposed upon the changes of subacute rheumatoid arthritis. Cultures taken at necropsy from the left empyema, left knee-joint, paravertebral abscess, and sacral ulcer all grew profuse *Staph. aureus* showing the same antibiotic sensitivities as the organism grown from the sputum.