BRUCELLOSIS OF THE SPINE

A REPORT OF 3 CASES

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Three cases of spinal osteomyelitis due to brucellosis are reported, all in women. Radiological confirmation was delayed for at least three months after the first clinical manifestation, while in one patient a bone scan was positive at an early stage. In two of the three cases the diagnosis was delayed because of insufficient awareness of the disease.

Spinal osteomyelitis caused by *Brucella* is indistinguishable radiologically from that caused by other micro-organisms and needle aspiration or exploration is frequently performed to establish the correct diagnosis. Increased awareness of brucellosis and the carrying out of appropriate blood cultures and serological tests may make these procedures unnecessary.

Brucellosis has become rather uncommon. In the USA the annual incidence is reported as 0.07 to 0.1 per 100 000 (Mandell, Douglas and Bennett 1979; Renner 1979). It is not so rare in some Mediterranean countries, but relatively rare in Israel (Aller 1975; *Epidemiological Bulletin* 1979). Spinal osteomyelitis due to *Brucella* is extremely rare (Glasgow 1976). In a recent review of 318 cases of pyogenic osteomyelitis of the spine with a large variety of pathogenic organisms, Sapico and Montgomerie (1979) did not even mention brucellosis as a possible cause. Especially in countries where brucellosis is endemic, it should be considered in the differential diagnosis of every destructive spinal lesion. Out of 38 proven cases of brucellosis diagnosed between 1955 and 1977 at the Chaim Sheba Medical Center, three patients had spinal osteomyelitis and are reported here. The diagnosis of brucellosis may be delayed or even entirely missed without a high level of suspicion, particularly as its clinical picture may be varied and non-specific.

CASE HISTORIES

Case 1. A 60-year-old housewife was admitted with fever, weakness and loss of appetite of three weeks duration. Physical examination was normal except for a fever of 38 to 39 degrees Celsius. Blood cultures and serological tests, including those for *Brucella*, were negative. The patient was treated for a suspected urinary tract infection with Bactrim for 10 days. The fever subsided and the patient was discharged. She was readmitted with fever and mild anaemia four months later. The fever subsided spontaneously within two days, but the patient started to complain of backache. A bone scan with technetium-99m methylene diphosphonate (^{99m}Tc-MDP) showed increased activity in the regions of the sixth and seventh cervical vertebrae and the ninth and tenth

thoracic vertebrae (Fig. 1). Radiographs showed mild flattening of the bodies of the ninth and tenth thoracic vertebrae (Fig. 2) but no changes in the cervical region. No specific treatment was given and the patient was discharged. Four months later, 10 months after the start of the febrile illness and five months after the start of the backache, she was readmitted with increased back pain. Physical examination was negative except for low-grade fever (up to 37.5 degrees Celsius), but the erythrocyte sedimentation rate was very high. The bone scan was repeated and showed an increased activity in the bodies of the sixth and seventh cervical vertebrae and also of the ninth and tenth thoracic vertebrae. (Fig. 3). The radiographs now showed a paravertebral mass at the ninth and tenth thoracic level (Fig. 4), partial destruction of these two vertebral bodies and loss of the intervening disc space compatible

Fig. 1

Fig. 2

Case 1. Figure 1—Initial bone scan with ^{99m}Tc-MDP. Posterior view of cervical and thoracic regions showing increased uptake at C6-7 (upper arrow) and T9-10 (lower arrow). Figure 2—Lateral radiograph of the spine showing mild flattening of the vertebral bodies of T9 and T10.

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Fig. 3

Fig. 4

Fig. 5

Fig. 6

Fig. 7

Fig. 8

Figure 3—Second bone scan with ^{99m}Tc -MDP: showing the posterior head, neck and thoracic regions with similar findings to those in the first bone scan. Figure 4—Penetrated film of the mediastinum showing a paraspinal mass at the T9–T10 level. Figure 5—Lateral tomogram showing the paraspinal mass and partial destruction of the bodies of T9 and T10. Figures 6 to 8—Follow-up films showing progressive destruction in the bodies of C4, C5 and C6 over a period of six months.

with an infectious process (Fig. 5). The radiographs of the cervical spine, which had been normal four months previously although the scan had been positive, now showed partial destruction (Figs 6 to 8). The radiographs of the chest were repeatedly normal and a whole-body gallium scan revealed increased activity in the left paravertebral space and in the bodies of the affected thoracic vertebrae.

Blood cultures became positive for *Brucella melitensis* at this time and a serum *Brucella* antibody titre, which had also been initially negative, was now positive 1:1280. The patient's condition improved after treatment with tetracycline and streptomycin, with her backache subsiding and the sedimentation rate returning to normal. Follow-up radiographs showed progressive sclerosis of the lesions and disappearance of the paravertebral mass (Fig. 9).

Case 2. A 23-year-old housewife had started to suffer from backache three months before her admission. The pain radiated to the left leg and increased in severity until the patient became bedridden. An intermittent fever of 40 degrees Celsius developed with severe night sweats. The Lasègue sign was positive at 30 to 40 degrees in both legs and the liver was palpable two centimetres below the costal margin. Erythrocyte sedimentation rate was 60 millimetres in the first hour, haemoglobin 10 milligrams per decilitre, leucocyte count 4000 per microlitre with 46 per cent lymphocytes in the differential count. The radiographs of the spine, which had been repeatedly negative for the first three months of her illness, now showed a lytic lesion in the adjacent borders of the second and third lumbar vertebrae. A lumbar puncture was normal; the Mantoux test was negative as were blood cultures. Agglutination test for *Brucella* was negative on admission but rose to 1:160 after one week and progressively to 1:5120 within three weeks. Treatment with

oxytetracycline and streptomycin was started and, after five days, the fever subsided with gradual disappearance of all symptoms and signs. Epidemiological investigation showed that the patient had drunk unpasteurised goat's milk some weeks before her illness.

Case 3. A 32-year-old female clerk suffered from low backache radiating to the chest and the left upper abdomen. The pain progressively increased and after two months the patient was admitted to another hospital with a presumptive diagnosis of an acute abdomen.

Fig. 9

Follow-up film showing dense sclerosis of the involved vertebrae which indicates the healing stage.

Laparotomy was negative and one month later she was referred for further investigations.

Physical examination was within normal limits except for fever of 37.4 degrees Celsius. Radiographs taken three months after the first complaint showed a destructive lesion at the level of the third and fourth lumbar vertebrae. A tuberculin test was positive and because of this finding she was treated with rest and antituberculous drugs for three weeks. Her condition deteriorated and exploration of the vertebral lesions was carried out revealing a small amount of granulomatous tissue at the anterior border of the affected vertebrae. Biopsy was consistent with a non-specific infection with no evidence of tuberculosis. A serum agglutination test for *Brucella* showed a high titre of 1:1280 four months after the start of the illness. Tetracycline and streptomycin were then administered for three weeks with complete recovery.

DISCUSSION

Different reports mention involvement of the skeletal system in 1 to 36 per cent of patients with brucellosis (Spink 1956; Ganado and Graig 1958; Mandell *et al.* 1979). Arthralgia, often quite severe, is usually the first symptom. When the spine is affected, root pains may occur leading to confusing clinical presentations simulating chest or abdominal disease as was seen in our third patient, or a urinary tract infection as in the first patient.

Involvement of the spine in brucellosis was first described by Kulowski and Vinke in 1932. The spine, especially the lumbosacral region, is the part of the musculoskeletal system most commonly affected. The thoracic and cervical spine are less commonly affected (Keenan and Metz 1972; Glasgow 1976). Sometimes the destruction is extensive and may involve different regions at the same time, as in our first patient. The extent of the destruction can be explained partly by the fact that in most cases the diagnosis is not made until the disease is at an advanced stage, thus resulting in a delay in instituting specific treatment.

The finding of *Brucella* organisms on blood culture is diagnostic, but in many cases the test may fail, probably because bacteraemia is intermittent and the bacillus difficult to isolate. The diagnosis may also be confirmed by demonstrating agglutinin antibodies to *Brucella* in the blood, an investigation often overlooked. Bacteriological investigations may also be made on specimens obtained by needle biopsy of the spine.

The radiological signs of spinal osteomyelitis due to

Brucella are non-specific (Keenan and Metz 1972) and may appear as late as three months or more after the onset of the disease (Mandell *et al.* 1979). This was the case in our first two patients. Early changes are mild osteoporosis of contiguous vertebrae, with later erosion of the anterior vertebral plates as in our first patient. When healed, dense sclerosis of the involved vertebrae occurs.

In the differential diagnosis, tuberculosis of the spine, pyogenic osteomyelitis due to other bacteria, herniated disc and metastatic lesions have to be considered. The changes in tuberculosis appear relatively early, osteoporosis is more marked and destruction more severe than in brucellosis. Proliferative changes which appear in the healing stage of brucellosis are not seen in tuberculosis (Glasgow 1976). Paravertebral abscesses are more common in tuberculosis as is vertebral collapse. In a pyogenic infection due to other bacteria the onset is usually more rapid and the disease is more acute with early destruction of bone. A herniated disc does not show the severe bone destruction observed in untreated brucellosis. Metastatic deposits do not usually involve two adjacent vertebral bodies and the intervening disc is usually spared.

Scintigraphy is very helpful in the early detection of bone lesions, and positive changes may often precede radiological findings as in our first patient.

Treatment is mainly conservative and consists of immobilisation and the administration of analgesic and antibiotic drugs. The antibiotic treatment of choice is a combination of tetracycline, two grams daily, and streptomycin, one gram daily, for three weeks. Treatment with tetracycline is continued until evidence of healing becomes apparent in patients who have marked destruction of a vertebra or a paravertebral abscess. The three patients reported here responded well to treatment even though in two of them it was started at a relatively late stage of the disease.

Surgical intervention is indicated only when there is spinal instability, progressive collapse of vertebrae, evidence of pressure on the spinal cord or nerve roots, or when there is no response to prolonged antibiotic treatment.

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