SALMONELLA VIRCHOW OSTEOMYELITIS

A CASE REPORT

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A case of salmonella osteomyelitis of the spine complicated by meningitis after needle biopsy is described. The importance of obtaining definitive bacteriological diagnosis in bone infection is emphasised and the changing pattern of salmonella infection discussed.

Salmonella osteomyelitis is very uncommon (0.45% of all osteomyelitis), while osteitis is reported to occur in only 0.8% of cases of typhoid fever (Murphy 1916). Veal and McFetridge in 1934 commented that, when considering the possible organism in osteomyelitis, *Salmonella typhi* infection was not usually overlooked, but the diagnosis of *Salmonella paratyphi* was often missed. There are few reports of bone infection from any of the over 1500 other salmonella species and this may give a false impression of relative incidence in bone infection. We report a case of *Salmonella virchow* osteomyelitis of the lumbar vertebrae.

CASE REPORT

A 12-year-old boy was admitted with a three-week history of increasing back pain. He was afebrile and did not look unwell, but had marked paravertebral spasm and diminution of all lumbar spine movements. His white cell count (WCC) was $7.5 \times 10^9/l$, his erythrocyte sedimentation rate was 40 mm/hr, blood cultures were negative and radiographs of the lumbar spine were normal. It was noted that members of his family had recently visited Spain and suffered mild diarrhoeal illness.

Treatment was started with intravenous flucloxacillin at a dose of 12 g/24 hrs and fucidin 1.5 g/24 hrs, on a presumed diagnosis of *Staphylococcus aureus* osteomyelitis. His condition became worse and he developed a swinging pyrexia. Further investigations including repeated blood cultures, serology for *S. typhi* and *S. paratyphi* A and B (Widal test), *Brucella* and stool culture,

were negative. The possibility of an underlying renal cause was considered but urine microscopy, culture and ultrasound were all normal. A bone scan one week after admission showed increased uptake at the L3-4 level. Tomograms of this area (Fig. 1) then revealed bone destruction in keeping with a pyogenic osteitis.

By then his condition had improved and he was discharged home three weeks after admission, comfortable in a plaster jacket. Oral flucloxacillin (2 g/24 hrs) and fucidin (1.5 g/24 hrs) were continued.

Five weeks later, still on antibiotics the boy was readmitted, being unwell, with recurrence of back pain, and progressive radiographic changes were seen. Because no organism had been identified, percutaneous spinal biopsy was performed under general anaesthesia, using a posterolateral approach under radiographic control. The following day a "coliform" was isolated from this biopsy.

Within 24 hours of the procedure he developed clinical signs of meningitis, with marked neck stiffness, photophobia, a positive Kernig's sign and pyrexia of 39°C. In view of the lumbar osteomyelitis it was felt unwise to perform a lumbar puncture and oral chloramphenicol 3.6 g/24 hrs was started. After another 24 hours the "coliform" was identified as *Salmonella virchow* sensitive to cefotaxime, netilmicin, trimethoprim and cotrimoxazole, but resistant to ampicillin (API 20E system and specific salmonella antisera). Antibiotic treatment was changed to intravenous cefotaxime (12 g/24 hrs) and netilmicin (300 mg/24 hrs) and he was transferred to a neurological unit for cisternal puncture to confirm the diagnosis of meningitis. His cerebro-spinal fluid (CSF) was cloudy with protein 0.86 g/l, glucose 2.6 mmol/l, and his WCC was $2.1 \times 10^9/l$, with 90% polymorphs, results consistent with meningitis. No bacteria were seen on the Gram stain and culture was sterile, as would be expected in a patient already on the appropriate antibiotics.

His condition improved. *S. virchow* was now isolated from his stool cultures and he was nursed in isolation until fit to go home in a plaster jacket. Antibiotics were

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0301-620X/88/3075 \$2.00
J Bone Joint Surg [Br] 1988;70-B:440-2.

Fig. 1

Tomogram of L2, 3 and 4, four weeks after onset.

changed to oral co-trimoxazole (1920 mg/24 hrs) for a further three months. He is now well, pain-free and without significant clinical deformity. Radiographs confirm the healing bone lesion (Fig. 2).

DISCUSSION

The diagnosis of salmonella osteomyelitis, or bone infection due to any other unusual organism, may be difficult until material is obtained for direct histological and bacteriological examination. If radiographic changes are initially absent, a bone scan may help to localise the lesion, though not necessarily with sufficient precision for accurate needle biopsy. In our patient, because of clinical improvement at the time of bone scanning, we did not proceed immediately to biopsy, thus contributing to the delay in diagnosis.

Serological tests for salmonella are of limited value under these circumstances. The Widal test detects only the O and H antigens of *S.typhi* and *S.paratyphi* A and B, and does not exclude the other salmonella species.

Infective complications following careful lumbar vertebral biopsy are uncommon. Fyfe, Henry and Mulholland (1983) reported a series of 100 vertebral

Fig. 2

Radiograph of lumbar spine at the end of treatment.

biopsies performed under local anaesthesia, including 20 for pyogenic infection, with only four minor local infective complications. We feel that in our patient the marked clinical deterioration within 24 hours of the biopsy, combined with the CSF findings, suggests that salmonella meningitis had occurred as a direct result of the spinal biopsy. The rarity of salmonella meningitis outside the neonatal period also makes the possibility of natural direct spread very unlikely.

We therefore postulate that the organism was introduced into the sub-dural space by direct inoculation through a nerve root sleeve. Salmonella meningitis carries a very high mortality rate (Kauffman and St. Hilaire 1979). Our biopsy was performed under general anaesthesia; had local anaesthesia been used pain would have been felt if a nerve root had been needled, and this would have reduced the risk of complications. We know of no other reported case of meningitis following this procedure.

Few cases of salmonella osteomyelitis due to organisms other than *S.typhi* or *S.paratyphi* have been reported. Giaccai and Idriss (1952) found *S.cholerae-suis* in 17 of a series of 27 such infections. They suggested that there may be no preceding history of bowel upset, or else a prolonged latent period. Long bones were most frequently involved and multi-focal infection was more common than with staphylococcal osteomyelitis. The association of salmonella osteomyelitis with sickle cell anaemia and other haemaglobinopathies is well recognised, though not well understood (Engh et al. 1971). The correlation was sufficient for Torregrosa et al. (1960) to advocate looking actively for haemoglobin abnormalities when salmonella is detected in bone. In our case, haemoglobin electrophoresis was normal.

A total of 74 cases of septic arthritis or osteomyelitis due to salmonella species other than *S.typhi* or *S.paratyphi* A and B, were reported to the Communicable Diseases Surveillance Centre of the Public Health Laboratory Service in England and Wales over a nine-year period from 1975 to 1983. The commonest site of bone involvement was the vertebrae. There were 29 different salmonella serotypes with no predominant organism.

Accurate figures for *S.typhi* and *S.paratyphi* osteomyelitis are not available, but there are on average 300 cases of enteric fever per annum (PHLS Communicable Disease Surveillance Centre, unpublished), and 0.8% of these may be expected to develop bone infection (Murphy 1916). Therefore, with the decline in enteric fever in this country and the recognition of many new salmonella serotypes over the past 40 years, it is evident that *S.typhi* and *S.paratyphi* are no longer the predominant salmonellae in bone infection.

S.virchow is being increasingly recognised in this country as potentially invasive, causing typhoidal or septicaemic illness rather than just mild food poisoning (Mani, Brennand and Mandal 1974). A recent report has

demonstrated that *S.virchow* may present as meningism during an outbreak of food poisoning, without CSF changes (Norris 1986).

Chloramphenicol and ampicillin are commonly used in complicated cases of salmonella infection. In this case, a synergistic combination of the bactericidal antibiotics cefotaxime, which can cross the blood brain barrier, and netilmicin was felt to be more appropriate. Co-trimoxazole was used for maintenance oral therapy because of the toxicity of chloramphenicol after prolonged usage.

Conclusions. Unusual organisms may cause spinal osteitis; definitive bacteriological diagnosis is essential for safe management. Infective complications of spinal biopsy are uncommon but may be life threatening. Serotypes other than *S.typhi* and *S.paratyphi* A and B now predominate amongst salmonella species in bone infection.

The authors wish to thank Mr G. Abrami and Mr G. Waddell for their helpful advice.

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

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