Bone and joint tuberculosis

CASES IN BLACKBURN BETWEEN 1988 AND 2005

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We report 79 cases of bone and joint tuberculosis between 1988 and 2005, eight of which were in the Caucasian population and 71 in the non-white population.

The diagnosis was made in the majority (73.4%) by positive bacteriology and/or histology. The mean age at the time of diagnosis was higher in the Caucasian group at 51.5 years (28 to 66) than in the South Asian group at 36.85 years (12 to 93). Only one patient had previous BCG immunisation.

The spine was the site most commonly affected (44.3%). Surgical stabilisation and/or decompression was performed in 23% of these cases because of cord compression on imaging or the presence of neurological signs.

A six-month course of chemotherapy comprising of an initial two months of rifampicin, isoniazide, pyrazinamide and sometimes ethambutol followed by four months treatment with rifampicin and isoniazide, was successful in all cases without proven drug resistance.

The prevalence of all forms of tuberculosis (TB) is increasing in England and Wales, with numbers rising from 5000 cases in 1987 to 8116 in 2005.¹ In the United Kingdom, there has been an increasing proportion of cases from non-Caucasian ethnic groups. These groups currently comprise 78% of all known cases,¹ rising from 49% in 1988² and 63% in 1998.³ There has also been an increase in the proportion of cases of TB in non-respiratory sites in these ethnic groups.^{4,5}

We report our experience in the treatment of bone and joint TB in 79 cases recorded in our district between 1998 and 2005.

Patients and Methods

A detailed database has been kept on all reported cases of TB in the Blackburn, Hyndburn and the Ribbles Valley District Health Authority (population 269 000) since 1981. We retrospectively reviewed all the cases of bone and joint TB notified between 1988 and 2005. Data on the patients' ethnic origin, age, site(s) of disease and duration of symptoms were collected. The investigations leading to the diagnosis, such as radiographs, histology and bacteriology reports, were studied. Drug therapy, surgical intervention and duration of follow-up were reviewed. The diagnosis in the majority of cases was based mainly on positive bacteriology for TB, either with or without histology, but in the absence of both, other investi-

gations and the patients' response to treatment were used to verify the clinical suspicion.

There were 1072 cases of TB recorded in our database for the years 1988 to 2005, of which 197 (18.4%) were in patients of Caucasian origin and 875 (81.7%) in those of non-white origin. There were 79 cases of bone and joint tuberculosis, eight (10.1%) of which were in Caucasians, 70 (88.6%) in South Asians (40 Indian, 28 Pakistani, 2 Bangladeshi) and one (1.2%) in a Chinese patient. Only four patients (5.7%) from the South Asian group were born in the United Kingdom. The mean age of the patients of South Asian origin was 36.85 years (12 to 93) and that of the Caucasians was 51.5 years (28 to 66). Only one patient had had a prior BCG immunisation.

Results

Systemic symptoms such as fever, night sweats, weight loss and lethargy were present in 31 patients (39%), of whom 29 were South Asian and two Caucasian. There was a range of musculoskeletal symptoms on presentation, including localised pain, swelling, restriction of movement and neurological deficit. The mean duration of symptoms until diagnosis in the South Asian group of patients was 3.37 weeks (ten days to eight weeks) and in Caucasian patients seven weeks (5 to 11).

The spine was the commonly affected site occurring in 35 patients (44%) (Table I). There

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Table I. Sites of infection

Site of infection	Number*
Neck (including c-spine)	3
Shoulder (including scapula)	4
Ribs	5
Thoracolumbar spine	32
Ulna	1
Hip	2
Thigh	1
Tibia	1
Foot	6
Mandible	1
Sternum	3
Elbow and humerus	3
Sacroiliac	1
Hand	7
Knee	5
Ankle	9

* some patients had more than one lesion

were multiple sites of infection, including the meninges, kidneys, oesophagus/gastrointestinal tract and lungs in 19 patients (24%).

All patients underwent radiological evaluation and in 43 cases (54%) there was evidence of bony destruction around the affected site. Further imaging in the form of bone scans (four cases) and CT/MRI scans (15 cases) was performed when necessary to evaluate the extent of bony or soft-tissue involvement.

Of the 71 non-Caucasian patients, 25 (35%) had positive bacteriology and histology, 13 (18%) had positive histology but negative bacteriology, 15 (21%) had positive bacteriology but non-diagnostic histology, and 18 (25%) were treated on clinical suspicion as both histology and bacteriology were negative.

Of the eight Caucasian patients, two had positive bacteriology and histology, two had positive histology only, one had positive bacteriology only, and the rest had negative results for both histology and bacteriology and were treated on clinical grounds. Testing for HIV was not routinely performed, and no case has subsequently been found to be either HIV positive or develop an AIDS-defining illness. No patient was on immunosuppressive drugs at the time of diagnosis.

All patients were treated with a combination of rifampicin (R), isoniazid (H), pyrazinamide (Z) and sometimes ethambutol (E). The initial treatment for the first two months was either RHZE or RHZ, depending on the risk of primary isoniazid resistance.^{6,7} Between 1988 and 1990, the duration of treatment was nine months (2RHZ/7RH), but from 1991 onwards a six-month duration (2RHZ(E)/4RH) was used. Treatment was modified from the above only if there was a significant reaction or resistance to the drugs. All patients were routinely and randomly tested for rifampicin levels in urine throughout their treatment.

Between 1988 and 1990, nine patients received 2RHZ/7RH, and from 1991 onwards, 58 patients received

Table II. The surgical procedures undergone by the different ethnic groups

	Non-white	Caucasian
Incision and drainage of abscess	20	0
Spinal operation		
Biopsy	2	1
Decompression/stabilisation	8	0
Open/arthroscopic biopsy	27	3
Washout/biopsy of tendon sheath	2	1
Biopsy sinus	2	0
Cervical lymph node biopsy	1	0

either 2RHZE/4RH (42 patients) or 2RHZ/4RH (16 patients). Two patients with associated TB meningitis were given 12 months of 2RHZE/10HR in line with national guidance. A further five patients had their treatment modified for drug intolerance and four (9.3%), for drug resistance, including one case of multidrug-resistant TB. Three patients (7%) were resistant to isoniazid.

In our series, 67 (85%) patients required surgical intervention as well as medical management of TB for diagnostic/therapeutic reasons (Table II). Open or arthroscopic biopsy (histology/bacteriology) was performed in 30 patients (38%); in two cases biopsy of a sinus communicating to bone was required.

Drainage of an abscess was undertaken in 20 cases (25%). Of the 35 patients with spinal involvement, 11 (31%) had surgery, three (8.5%) underwent open biopsy and eight (23%) required spinal decompression and stabilisation. In one case (cervical spine TB) a lymph node biopsy was performed. Tendon sheath washout/biopsy was undertaken in three cases.

No deaths related to the disease or its treatment were reported. All patients were compliant with their treatment on random monthly urine checks and pill counts. After 1990, patients were not routinely followed up, but no recurrences were reported after the completion of treatment by the local service.

Of the 35 patients with spinal involvement, 10 (29%) have persistent back pain, with four having residual neurological deficits despite surgical decompression and stabilisation.

None of the infected joints that underwent an open or arthroscopic washout required further surgical intervention, in the form of joint replacement or arthrodesis, either during treatment or after its completion.

Discussion

Tuberculosis of bone and joints (all sites) comprised 7.3% of all TB cases seen in this district of high TB incidence between 1988 and 2005. Bone and joint TB can present as a diagnostic and treatment challenge. The close multidisciplinary collaboration between the orthopaedic surgeon, thoracic physician and pathology service is seen as the key to achieving the excellent outcomes described.⁸

The incidence of bone and joint TB was found to be higher in those of South Asian origin, but a small number of cases also occur in the Caucasian population. The lack of BCG immunisation should increase the suspicion of bone and joint involvement. As bone and joint TB mimics other infective conditions, such as acute bacterial osteomyelitis and septic arthritis, it is important to take adequate bacteriological and histological samples, to confirm the diagnosis. If there is a clinical suspicion but an absence of definite histological or bacteriological evidence the patient needs to be treated for TB empirically.

Bone and joint TB can affect all age groups. In our series, some patients were young adults aged between 16 and 21 or children. The Caucasian patients were generally older than those of South Asian origin, as in England and Wales as a whole.¹

In most cases, the treatment of spinal TB was non-surgical. Following the introduction of rifampicin and other anti-tuberculous drugs, routine anterior spinal surgery is usually not necessary.⁹⁻¹² However, in the presence of neurological signs of spinal compression seen on the MR scan, spinal decompression and stabilisation are required.

Studies have shown that a six-month course of rifampicin/isoniazid is as effective as a nine-month one for TB.^{13,14} Watts and Lifeso¹⁵ recommended in a review article in 1996 that a 12-month course of drug therapy for bone and joint TB is required as did Govender more recently.¹⁶ No controlled trials of the 2RHZ(E)/4RH regimen for the treatment of bone and joint TB have been carried out, but based on the data of the six-month rifampicin/isoniazid treatment that is now recommended for spinal TB, this regimen can be extended for all bone and joint TB infections.^{6,7,13-15,17}

This study shows excellent clinical outcomes from six-month chemotherapy courses, with no relapses in the 58 cases treated with the 2RHZ(E)/4RH regimens (after 1991), no mortality, and a low morbidity for continuing bone and joint problems.

Although some cases were treated empirically on clinical and radiological grounds, wherever possible, biopsies were obtained, as this confirms the diagnosis and provides drug sensitivity data. In our series, we report a drug resistance rate of 9.3% of the positive cultures, with 7.0% isoniazid resistance and one case of multi-drug-resistant TB, levels that are comparable with the related local and national

data.^{14,15} These cases were treated with the modified regimen as suggested by the national chemotherapy recommendations and National Institute for Health and Clinical Excellence (NICE).^{7,16}

This paper provides further evidence that a six-month chemotherapy regimen (2RH2(E)/4RH) is adequate for spinal and bone and joint TB in cases without proven drug resistance.

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