



Clinical and radiological presentation of tuberculosis of the elbow

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The diagnosis of tuberculosis of the elbow is often missed in the early stages, so that irreversible osteoarticular destruction may occur. The authors describe their experience with 48 elbows in 47 patients. Most patients were in the first three decades of life. All patients presented with pain, swelling and loss of motion. Sixteen elbows had discharging sinuses. Eight elbows had a palpable supra-trochlear lymph node. Six were completely ankylosed in flexion, at an angle of 73.3° on average ; the other elbows had a mean range of motion from 31.3° to 105.2°. Plain radiographs showed periosteal reaction in 6 elbows without discharging sinus and thus free of superinfection, and para-articular round to oval lytic lesions in 29. According to the radiological classification of Martini, 6 elbows were in stage 1, 13 in stage 2, 20 in stage 3 and 9 in stage 4. All the patients were treated conservatively with antituberculous drugs for a minimum period of 9 months. Twenty-seven elbows were available for follow-up, with a minimum follow-up period of 9 months. The functional results were related to the radiological stage at presentation, not to the duration of symptoms or to the initial loss of range of motion.

Keywords : tuberculosis ; elbow.

INTRODUCTION

Musculoskeletal tuberculosis has been showing a resurgence in the past few years due to the increased number of immuno-compromised individuals, the emergence of drug resistant bacterial strains and the immigration of people from endemic zones (1, 3).

Musculoskeletal tuberculosis accounts for 10% of all extra-pulmonary tuberculosis ; the sites most commonly involved are the spine (51%), the pelvis (12%), the hip and femur (10%), the knee and tibia (10%), and the ribs (7%) (10). Mycobacterial infection of the upper extremities is extremely rare (1, 6), but the elbow is the joint most frequently involved. Tuberculosis of the elbow accounts for 2 to 5% of all skeletal localisations (8). Early diagnosis is often problematic, and delayed treatment results in irreversible osteoarticular destruction. The authors felt that a clear description of this rare localisation would obviate many problems.

MATERIALS AND METHODS

Forty-seven patients (48 elbows) with tuberculosis of the elbow were seen between 1997 and 2004. The diagnosis was confirmed in all the cases by fine needle aspiration cytology (FNAC) from the joint or draining lymph node, or by microscopic examination of tissue obtained from sinus track, synovium, or bone.

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Table I. — Age distribution at presentation

Age (years)	Number of patients	Percent
0-10	9	19.14
11-20	13	27.8
21-30	15	31.91
31-40	7	14.89
41-50	2	4.25
51-60	1	2.12

There were 19 male and 28 female patients. Their ages ranged from 4 to 60 years, but most patients were in their first three decades (table I). Thirty-one right (64.6%) and 17 left (35.4%) elbows were affected. The radiological appearance of the joint was classified according to Martini *et al* (6) : stage 1, localised osteoporosis without bony lesions (6 elbows or 12.5% at presentation) ; stage 2, one or more erosions or bone cavities (13 elbows or 27%) ; stage 3, narrowing of the whole joint without gross destruction (20 elbows or 41.7%) ; and stage 4, gross destruction of bones and joint (9 elbows or 18.8%).

Twenty-seven elbows were available for follow-up, with a minimum follow-up period of 9 months. Five were in stage 1, 7 in stage 2, 11 in stage 3, and 4 in stage 4.

RESULTS

At presentation

All 47 patients complained of pain, swelling and loss of motion. More than 90% had an insidious onset, 3 months to 2.5 years previously. Only 3 patients (6.2%) had an acute history with symptoms since less than 7 days. All patients had muscle wasting (fig 3a). Sixteen elbows (33.3%) had one or more discharging sinuses at initial presentation (fig 3a) : 6 patients on the medial side, and 10 on the lateral or posterior aspect. Ten patients (20.8%) had undergone a drainage procedure in another hospital for a wrong presumptive diagnosis of pyogenic arthritis ; in 4 of these the scar was on the medial side. Six patients had an ankylosis at initial presentation ; the mean angle of flexion deformity in these patients was 73.3° (range : 25 to 90). The mean range of motion in the other patients was

31.3° to 105.2° (range : 10 to 130). Four patients had a nearly full range of motion at initial presentation, however with pain and spasm. Eight patients had a palpable supratrochlear lymph node, while two others had an axillary lymph node. No pathological dislocation was observed. There was no associated posterior interosseous nerve palsy in any patient. Four patients had multifocal osteoarticular tuberculosis.

The erythrocyte sedimentation rate (ESR) ranged from 3 to 132 mm (mean 51.7 mm). Six patients (12.7%) had an ESR of 100 mm or more.

The radiological appearance of the joint was classified according to Martini *et al* (6) : stage 1 : 6 elbows or 12.5% at presentation ; stage 2 : 13 elbows or 27% (fig 1, 3b) ; stage 3 : 20 elbows or 41.7% (fig 2a) ; and stage 4 : 9 elbows or 18.8%. Round to oval lytic para-articular lesions were noted in 29 of 48 elbows. More than one lesion in a single bone, or lesions in adjacent bones were also found. The proximal ulna was the site most frequently affected (23 elbows), followed by the distal humerus (17 elbows) and the proximal radius (8 elbows) (fig 1, 2a). Periosteal reaction was observed in 6 patients (fig 1, 2a, 2b) without discharging sinus : the bones affected were the humerus (5 elbows), the ulna (3 elbows), and the radius (one case). Periosteal reaction was also observed in 8 patients who had a discharging sinus and/or a previous abscess drainage. In the latter cases the periosteal reaction could be attributed to superadded pyogenic infection.

The diagnosis was confirmed cytologically or histopathologically in all cases. Fine needle aspiration for cytological examination was performed on a supratrochlear lymph node in 7 patients, an axillary lymph node in 2 patients, and on the elbow joint in 17 patients. Ziehl-Neelsen staining for acid-fast bacilli was performed on pus evacuated from an abscess in 3 patients. Specimens for microscopic examination were obtained by means of biopsy or curettage of a sinus track in 14 patients, and by means of core biopsy, more specifically from the ulna, in a single patient. In the remaining 3 patients material was obtained from a concomitant chest wall abscess, a paraspinal abscess and a cervical lymph node.



Fig. 1. — Plain radiograph (AP) of a 16-year-old male with Martini stage 2 involvement, showing a large lytic lesion and periosteal reaction (arrow) in the distal humerus.

Multidrug antituberculous chemotherapy was started in all patients, for a minimum of 9 months. The patients were splinted for at least 3 weeks, until subsidence of pain and spasm allowed active range of motion exercises within pain limits. Surgical debridement was not used.

At follow-up

Only 27 out of 48 elbows (56.2%) were available for follow-up at 9 months. The high attrition rate was attributable to two reasons: many patients switched to a government sponsored anti-tuberculosis project near their residence rather than coming to the hospital, and many patients moved to other areas. Only the results obtained in these 27 elbows will be described.

The 27 elbows were respectively in stage 1 (5 elbows); stage 2 (7 elbows); stage 3 (11 elbows) and stage 4 (4 elbows). In the five stage 1 elbows, the pre-treatment range of motion was on average 20° to 106° (range: 10 to 120). All these



Fig. 2a. — Plain radiographs (AP/lateral view) of a 45-year-old female with Martini stage 3 involvement, showing lytic lesions in the proximal radius and ulna and in the distal humerus. There is faint periosteal reaction in the distal humerus (arrow).



Fig. 2b. — Plain radiographs (AP/lateral view) of the same patient, showing development of bony ankylosis on therapy. There is periosteal reaction over the distal humerus (arrow).

patients had a full range of motion at follow-up. One out of seven stage 2 elbows had a pre-treatment ankylosis which did not resolve. In the other 6, the mean pre-treatment range of motion was 26° to 100° (range: 10 to 120); at follow-up 3 of these had a full range of motion, while the remaining 3 had a mean range of motion of 13° to 113°. Five



Fig. 3a. — Clinical photograph of a 27-year-old female with a discharging sinus (arrow). Muscle wasting is appreciable in the forearm.



Fig. 3b. — Radiographs (AP/lateral view) of the same stage 2 patient showing lytic lesions in distal humerus, olecranon and radial head (arrow).

out of 11 elbows in stage 3 had pre-treatment ankylosis, which remained unchanged (fig 2b). The other 6 elbows had a mean pre-treatment arc of motion of 44° to 101° (range : 30 to 120) ; at follow-up the mean arc of motion had improved to 30° to 115° (range : 20 to 130). One out of 4 patients in stage 4 had a pre-treatment ankylosis which persisted at follow-up. In the other 3 patients the mean pre-treatment range of motion was 51° to 70° (range : 30 to 95) ; it improved to 30° to 98° (range : 0 to 100).

All the discharging sinuses healed in 3-6 months.

DISCUSSION

Tuberculosis of the elbow, like pyogenic arthritis, is characteristically a mono-articular disease, although multifocal osteoarticular tuberculosis does occur. The onset is usually insidious (3, 4, 8). Pain is the most common symptom. In the authors' series, pain was the symptom that brought the patient to the hospital. The pain was accompanied by swelling, progressive loss of function, and/or deformity. Due to the insidious nature of symptoms, many of the patients initially went to local bone setters rather than to the hospital. Only 3 out of 47 patients (6.2%) had symptoms of less than 7 days duration.

In the active stage of the disease, the elbow joint was held in flexion. Rarely the involved elbow was

held in extension because of gravity (8). The initial loss of range of motion had no relationship with eventual outcome (2) ; the authors believe that it was due to muscle spasm in addition to synovial / osteoarticular involvement. A significant range of motion returned once the muscle spasm subsided after reduction of the disease activity under the influence of immobilisation and antituberculous therapy.

Supratrochlear and/or axillary lymph nodes were found in 10 out of 48 patients (20.8%). Tuli (8) reported enlarged lymph nodes in nearly one third of his patients. Patel (7) found enlarged supratrochlear lymph nodes in nearly all his patients.

One third of the elbows (33.3%) had one or more discharging sinuses. The incidence of sinus formation in the available literature is 10 to 30% (1, 9). Dix-Peek *et al* (2) reported 0% incidence of sinuses in children (1-11 years). However, in the current series, three children in the first decade had a sinus. Not all sinuses communicate with the joint. As a general rule, the cold abscesses and the subsequent sinuses, originating from the *joint*, are situated on the lateral, posterolateral or posterior aspect of the joint. On the other hand, cold abscesses and sinuses, originating from the *supratrochlear lymph node*, are situated on the medial aspect. In the majority of the cases in this series (10/16), the sinuses were situated on the lateral or posterior aspect, suggesting that they originated from the joint. On the other hand, in 4 out of 10 patients,

who had undergone a drainage procedure elsewhere, the scar was on the medial side, suggesting that they originated from the supratrochlear lymph node.

From a radiographical view-point, tuberculous arthritis is normally characterised by periarticular osteoporosis, peripherally located osseous erosions and gradual narrowing of the cartilage space (Phemister triad) (3, 4, 10). However, according to Haygood and Williamson (5), there is no single pathognomonic finding that allows making the diagnosis of skeletal tuberculosis. The radiological findings are non-specific in the early stages and the initial lesions can be easily missed. Joint effusion with soft tissue oedema may be one of the earliest signs of tuberculous arthritis (5). Periarticular osteoporosis is a common manifestation of tuberculous arthritis and may be more common in the weight-bearing joints of the lower extremities than in the upper extremities. But the detection of periarticular osteoporosis on plain radiographs is subjective (5). Para-articular round or oval lytic lesions with poorly defined margins are common findings in extremity tuberculosis. Haygood and Williamson (5) found an incidence of 53.3% in children; the authors noted an incidence of 60.4%. The commonest site is the proximal ulna (8). Periosteal new bone formation is a relatively uncommon manifestation of skeletal tuberculosis (5, 8). In our series only 6 of 48 elbows (12.5%) had periosteal reaction which could be solely ascribed to tuberculosis. Haygood and Williamson (5) reported an incidence of 24.4% in their series consisting of children, but made no differentiation between closed tuberculous pathology or secondary bacterial infection. Sixty percent of our patients were in stage 3 or 4 at the time of initial presentation. Also Martini *et al* (6), in a study from Algeria, reported 81.2% of their cases to be in stage 3 or 4. On the other hand, in South Africa 90% were in stage 1 or 2 at presentation (2). Dix-Peek *et al* (2) believe that differences in immune response, attributable to local or regional influences and genetic and environmental factors, may be the reason for this paradox.

The diagnosis of tuberculosis of the elbow is generally delayed because the lesion is relatively uncommon and there is a lack of awareness among clinicians, especially in non-endemic areas. Early

diagnosis and treatment are possible through a combination of good history taking, clinical and radiological examination and a high degree of clinical suspicion (10). Usually, due to the late presentation and/or delay in diagnosis, significant osteoarticular damage is already present (8, 10).

The differential diagnosis in patients with elbow involvement should include pyogenic arthritis, gout, pigmented villonodular synovitis, haemophilic arthropathy, rheumatoid arthritis, synovial osteochondromatosis and neoplasm (3).

The authors believe that the mainstay of treatment is uninterrupted multidrug antituberculous chemotherapy, splinting, and active mobilisation once pain and spasm subside. Surgical synovectomy, curettage of periarticular erosions and joint debridement are not always necessary. Conservative treatment leads to satisfactory results in a large majority of cases, with retention of a good range of motion (8).

Martini *et al* (6) also stressed that synovectomy is always incomplete, and that it is useless if the articular surface is already involved, while chemotherapy alone will achieve a biological synovial clearance. Chen *et al* (1) advocated debridement and synovectomy. However, in their stage 1 and 2 patients the mean preoperative range of motion (ROM) was 142° and the postoperative ROM was only 140°. In their stage 3 and 4 patients the preoperative mean ROM of 61° fell to 32° postoperatively. The patients who were operated upon had difficulty in regaining movement, and aggressive physiotherapy was needed for 6 months or more. The mean range of motion improved from 42° to 96° only when debridement was followed by continuous passive motion (1).

This study highlights the clinical and radiological manifestations of tuberculosis of the elbow. It will help the clinician to consider this entity in the differential diagnosis of a swollen elbow.

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