

E-ISSN: 2395-1958
P-ISSN: 2706-6630
IJOS 2020; 6(1): 668-671
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www.orthopaper.com
Received: 11-11-2019
Accepted: 15-12-2019

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Tuberculous dactylitis (Spina ventosa) of proximal phalanx in a 10-year-old girl: A case report

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DOI: <https://doi.org/10.22271/ortho.2020.v6.i11.1941>

Abstract

Tubercular dactylitis, defined as Tubercular osteomyelitis of the short tubular bones of the hand and feet is an uncommon condition seen predominantly in children. The condition is characterised by cystic expansion of the bone due to filling up of the medullary canal with granulation tissue and pus and thinning of the overlying cortex, a condition radiologically termed as 'spina ventosa'. We report a case of a 10-year-old girl who presented with a painful, slowly progressive swelling of two months' duration in the index finger of right hand, without any associated history of trauma. The plain radiographs of the hand showed extensive destruction of the proximal phalanx of index finger with thinning of the overlying cortex. Magnetic Resonance Imaging (MRI) showed diffuse enlargement and focal cortical break in the proximal phalanx with thick organised fluid in the medullary canal with a small area of cortical breach. The finger was debrided and the digit stabilised by a K-wire which was removed at three weeks. Biopsy of the debrided material confirmed the clinical diagnosis of Tubercular osteomyelitis. The child was started on anti-tubercular drugs with aggressive mobilisation of the finger at three weeks. At one-year follow-up, the lesion had healed well with functional range of movements of the right index finger.

Keywords: Tuberculosis dactylitis, spina ventosa, tuberculous granuloma

1. Introduction

Tubercular dactylitis is tuberculous infection of metatarsals, metacarpals and phalanges of hands and feet. This disease is uncommonly seen in children over 5 years of age. The hand is involved more commonly than the foot^[1]. This condition is also called as "Spina Ventosa", a term which has been derived based on the radiological features of this condition, that is, cystic expansion of the short tubular bones (Spina = short bones; Ventosa =inflated with air)^[2].

2. Case report

2.1 Clinical features

A 10-year-old girl presented to us with a painful swelling over the index finger of right hand for the past 2 months, which was initially small and was gradually increasing in size. There was no history of any trauma, fever, weight loss, loss of appetite, cough, evening rise of temperature or exposure to pulmonary tuberculosis.



Fig 1: Clinical picture on presentation to hospital showing diffuse swelling over the index finger of right hand.

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There was no family history of tuberculosis or any past history of anti-tubercular treatment. On examination, an oval shaped swelling was noted over proximal and middle phalanx of the index finger of right hand (Figure 1). No skin abnormality was noted over the swelling. There was no local warmth, but tenderness was present over the proximal and middle phalanx of the index finger. The swelling was hard in consistency and fixed to the underlying bone. Movements were painfully restricted at the proximal interphalangeal joint of the index finger. On general physical examination, the right axillary lymph node was palpable and tender.

2.2 Laboratory investigations

The patient's Hb was 12.6 gm%, TLC was 7860/cmm with DLC of 51.1% Neutrophils, 39.5% Lymphocytes, 5.1% Monocytes, 4.1% Eosinophils, 0.2% Basophils and ESR of 15 mm/hr. The HIV, VDRL and blood culture tests were negative.

2.3 Radiological examination

Increased volume of the proximal phalanx of index finger, along with distal lytic lesions and cortical thinning was noted on the right hand radiographs. Diffuse soft tissue swelling was also seen around the distal interphalangeal joint and proximal phalanx. The chest x-ray was normal.

The MRI of right hand showed diffuse enlargement and signal changes in the proximal phalanx of the index finger. Focal cortical break was noted in the volar and dorsal aspect of the distal portion of this bone. Thick organised fluid/ soft tissue was seen coming out of the bone defect, encircling the bone and extending into the proximal interphalangeal joint. Diffuse edema was seen in the surrounding soft tissues (Figure 2). These findings were suggestive of spina ventosa / subacute osteomyelitis.



Fig 2: Radiographs of the right hand showing increased volume of the proximal phalanx of index finger, along with cortical thinning and distal lytic lesions.

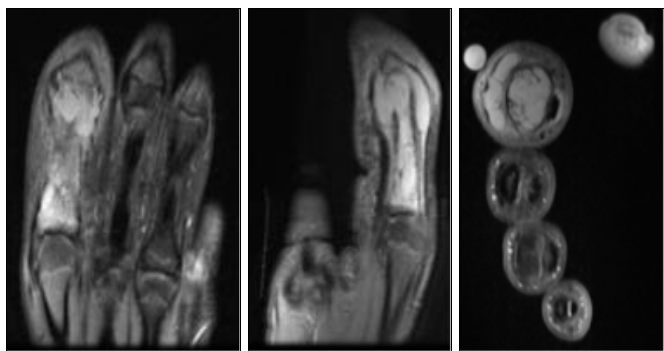


Fig 3: MRI showing signal changes also noted in the proximal phalanx with thick organised fluid seen coming out of the bone defect.

2.4 Intra-operative findings

The child was taken up for the debridement and biopsy of the infective material. Under regional anaesthesia, the entire length of proximal phalanx was exposed by using the dorsal midline approach to the proximal phalanx. Intra-operatively, thickened periosteum was noted over the entire length of the phalanx. Congested, pale blue synovial hypertrophy of the proximal interphalangeal joint was seen. The proximal phalanx head revealed a lytic lesion. Loose cartilage of the proximal phalanx was seen lying in the proximal interphalangeal joint (Figure 3). Shiny white purulent material was noted within the medullary canal of the proximal phalanx and was also seen lying volarly, just posterior to the flexor tendon. This unhealthy material was sent for Tb PCR, Gram and ZN staining and histopathological examination.



Fig 4: Intraoperative photographs showing thickened cortex over the proximal phalanx, congested pale blue synovial hypertrophy of proximal interphalangeal joint and a lytic lesion in the head of proximal phalanx.

2.5 Pathology reports

The Tb PCR report was negative. On Gram staining, many epithelial cells were seen. The ZN staining did not show Acid fast bacilli. The histopathological examination showed many epithelial cell granulomas with Langhans type giant cells with necrosis surrounded by lymphocytes and histiocytes which was diagnostic of tubercular osteomyelitis.

2.6 Treatment

Once the diagnosis of tubercular dactylitis was established, treatment was started with four drugs (Isoniazid, Rifampicin, Pyrazinamide and Ethambutol) for two months, followed by two drugs (Isoniazid and Rifampicin) for seven months. Good response to the treatment was noted. On follow-up, there was substantial reduction in the size of the swelling and restoration of the finger movements within 3-4 months (Figure 7).



Fig 5: Immediate post-operative X-ray following debridement of the proximal phalanx along with stabilization of the proximal interphalangeal joint with K-wire.



Fig 6: X-Ray taken at 4 months' follow-up showing healing of the proximal phalanx lesions.



Fig 7: Clinical picture at 4 months' follow-up showing substantial reduction in the swelling of index finger and restoration of finger movements.

3. Discussion

Skeletal tuberculosis occurs in 1.5% children who have untreated initial pulmonary tuberculosis. It spreads via lympho-haematogenous route to the skeletal system during the initial infection. 85% of the children inflicted with tubercular dactylitis are younger than 6 years of age. The incidence of tb dactylitis in children has been reported to be 0.65%-6.9%. The most common bones to be afflicted by this condition in the hand are the middle and index finger proximal phalanx. On radiographs, periosteal reaction and sequestra are not common but can be seen. Sclerosis may be present in long standing cases^[3]. In children, the short tubular bones of hands and feet have a lavish blood supply provided by a large nutrient artery which enters the bone almost in the middle. This leads to first inoculation of infection being lodged in the centre of the marrow cavity and the interior of the short tubular bone is gradually converted into a tuberculosis granuloma. This results into a spindle shaped expansion of the bone (spina ventosa) with the nutrient artery of the involved bone getting occluded and the destruction of the internal lamellae (or formation of sequestra). In the natural course, this disease heals with shortening of the involved bone and deformity of the neighbouring joint^[1].

It is difficult to demonstrate or culture acid-fast mycobacteria from the lesions of tubercular dactylitis, as these are paucibacillary lesions. However, the gold standard for the diagnosis of skeletal tuberculosis is culture of *Mycobacterium tuberculosis* from the bone tissue^[4].

Pulmonary tubercular involvement is not common in case of tuberculosis dactylitis^[5]. Only 1/3rd of the patients with skeletal tuberculosis are diagnosed with concomitant active pulmonary tuberculosis^[6].

Management is essentially done by anti-tubercular drugs, rest to the part in functional position and early mobilization of the involved parts or joints^[1]. Current recommendations for the treatment of this condition include a two months initial phase

of Isoniazid, Rifampicin, Ethambutol and Pyrazinamide followed by a six to twelve months regimen of Isoniazid and Rifampicin^[5]. However, few studies argue that six months of anti-tubercular treatment is appropriate for tuberculosis dactylitis as it is of paucibacillary nature^[7]. Surgery is limited in curetting the bone cavities to promote early healing in cystic tuberculosis^[8]. If a metacarpo-phalangeal, metatarsophalangeal or interphalangeal joint is ankylosed in awkward position, excision arthroplasty or corrective osteotomy is indicated. If a finger has ankylosed at more than one joint, or is grossly deformed, scarred and interfering with normal hand functioning, amputation of the finger or the corresponding ray may be advised^[1, 3].

There is potential for preservation of good hand function when the diagnosis is made early as *Mycobacterium tuberculosis* does not produce proteolytic enzymes that can destroy the cartilage^[9]. Even in an endemic country like India where tuberculosis is common, this diagnosis is missed or often delayed, particularly due to usual absence of stigmata of pulmonary tuberculosis resulting in potentially fatal consequences^[10]. There are various conditions that can mimic tuberculosis dactylitis, like benign and malignant tumours, endocrinopathies, metabolic disorders, sickle cell dactylitis, non-infectious granulomatous disease, fungal and pyogenic osteomyelitis, Brodie's abscess, syphilitic dactylitis, brucellosis and actinomycosis^[11, 12]. Thus, one should be vigilant while dealing with the pathology of short tubular bones of feet and hands^[10]. Any delay in diagnosis and treatment of tuberculosis dactylitis is likely to decrease the chances of good functional outcome^[13].

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