A large tuberculosis abscess causing spinal cord compression of the cervico-thoracic region in a young child

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Abstract

Introduction Despite numerous descriptive publications, the guidelines for treatment of cervical spinal tuberculosis (TB) are not very clear. The authors report a case of a young girl with cervico-thoracic spinal TB extending from C5 to T3 vertebrae presenting with weakness of the right hand and unsteady gait.

Case report An 11-year-old female who is an immigrant to the UK from Afghanistan, presented to our clinic with a 10-day history of difficulty in walking with an unsteady gait and 3-month history of progressive weakness in both her arms, the right side more affected than the left. Her immunisation history was unclear. Examination of the arms showed bilateral thenar and hypothenar wasting, more so on the right than the left. An MRI scan revealed a large para-spinal abscess extending from C3/4 to T4/5 with a significant anterior epidural cord compression from C5/6 to

T2/3. Therapeutic/diagnostic aspiration was performed under ultrasound guidance and the aspirate was sent for microbiology. She was started empirically on multidrug anti-tubercular treatment and steroids. Although Ziehl–Neelsen stain was negative for acid-fast bacilli, microbiological confirmation of TB was obtained by positive TB culture sensitive to all first-line anti-TB drugs. She made a dramatic improvement within 3 weeks of anti-tubercular treatment. A follow-up MRI scan at 8 months showed complete resolution of the abscess. At 2 years of follow-up, she was a healthy looking child, back to her school with no residual clinical signs/symptoms of the disease.

Conclusion Our case of cervico-thoracic tuberculous abscess in a young child suggests that even with incomplete neurological deficit caused by epidural cord compression, ultrasound (or CT)-guided aspiration and anti-tubercular medication provide acceptable results at 2 years of follow-up.

Keywords Tuberculous spondylitis · Cervical spine · Tuberculous cervical abscess

Case presentation

An 11-year-old female child referred to our institution with a 10-day history of difficulty in walking with an unsteady gait and 3-month history of progressive weakness in both her arms, the right side more affected than the left. She was afebrile, alert and comfortable. Inspection showed, she had a marked wasting of thenar and hypothenar eminences with normal intrinsic muscles in both hands. Neurological examination revealed decreased sensation over her thumb with 3/5 power in C6, C7 and T1 myotomes (Frankel grade D). She had brisk deep-tendon reflexes in both her upper and

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lower limbs with a positive ankle clonus bilaterally (more than five beats). Plantar reflex was upgoing and perianal sensation was intact with continent bladder. Hoffman's test was negative but Romberg's test was positive.

Her immunisation history was unclear, but she had significant past history of contact with TB through her mother. Her blood results showed ESR of 39, CRP 33 mg/dl, vitamin D levels of <12 ng/ml, normal calcium and low serum phosphate of 1.19 mmol/L.

MRI scan showed a large abscess in the cervico-thoracic prevertebral region extending from C3/C4 to T4/T5, with a large anterior epidural cord compression from C5/6 down to T2/3. There was involvement of vertebral bodies from C5 to T3.

Diagnostic imaging section

See Figs. 1, 2, 3.

Historical review of the TB: epidemiology, diagnosis, pathology and differential diagnosis

Tuberculosis has been around for many centuries and signs of the disease stretch as far back as the mummies from ancient Egypt [1]. The most objective evidence dates back to 1000 AD [2]. Tuberculosis of spine though uncommon in

Fig. 1 MRI cervical spine: T2-weighted image at initial presentation showing a large anterior epidural cord compression from C5/6 down to T2/3 and minimum kyphosis at C7–T1 with loss of disc space height

Fig. 2 MRI cervical spine: T2-weighted image at 8-month follow-up showing complete resolution of abscess

Fig. 3 Plain lateral X-ray of cervical spine at 2-year follow-up with a kyphosis of 12° between C7 and T2. There is a spontaneous fusion between C7 and T1

the European population was first described in London by Sir Percivall Pott [3]. Over the last decade, there have been an increasing number of cases of TB reported largely due

to immigration, homelessness and HIV [4–8]. Thus, the treating physician should have increased awareness for the presence of the disease to prevent long-term morbidity. A high index of clinical suspicion and an accurate history of possible TB exposure are essential to the diagnosis of skeletal TB. Although more than 90 % of immunocompetent patients with skeletal TB have positive tuberculin skin testing, a negative test should not exclude the consideration of *M. tuberculosis* in the differential diagnosis of vertebral osteomyelitis [9, 10]. A negative test can occur in patients with active or latent TB who are immunocompromised because of a comorbid condition, on immunosuppressive therapy (e.g. glucocorticoids), or who have other reasons for a diminished cutaneous delayed-type hypersensitivity response to PPD (e.g. malnutrition) or extremes of age [11]. Microscopy and culture of infected material are recommended for the diagnosis of spinal TB [12]. Around 60–75 % of cases show positive Ziehl–Neelsen stain and cultures are positive in 62–76 % of cases in skeletal tuberculosis [12, 13]. Needle aspiration and biopsy, preferably CT-guided, are advocated, and considered both sensitive and specific [13]. This diagnostic approach yielded the diagnosis in our case. Testing of anti-TB drug sensitivity should also be performed, given the increasing prevalence of multidrug-resistant spinal TB [14, 15]. Polymerase chain reaction (PCR) testing is not appropriate for detection of new TB cases in the routine laboratory, but it can be useful for cases where the clinical and bacteriological diagnosis of TB is not conclusive following Ziehl–Neelsen staining and TB culture.

The thoracic and lumbar regions are the most favoured by the bacilli with the incidence of abscess formation in spinal TB being lowest in the cervical spine. Spinal TB has no specific diagnostic characteristics or features on radiologic imaging and usually manifests in two distinct entities: (1) spondylodiscitis (classic), and (2) spondylitis without disc involvement (atypical); involvement of contiguous vertebrae is common [16]. Vertebral compression fractures should also raise suspicion for spinal TB in patients with appropriate risk factors [16].

There are only limited reports with regard to the management of cervical spine TB. Only very few have compared the results of operative and non-operative treatment of TB of the cervical spine in children and adults and the different patterns of healing between the two age groups [17–23]. The diagnostic difficulty arises because most of the patients with TB of the cervical spine do not show the classic constitutional symptoms such as fever, weight loss, and loss of appetite [24]. Instead, they usually present with axial neck pain. Hence, this obscurity in the clinical symptoms can lead to a delayed diagnosis. This delay can have serious immediate sequelae also presenting as mono, hemi, para and tetraplegia. The development of kyphosis is

a well-recognised late complication; the abscess might extend into the retropharyngeal space and the mediastinum resulting in acute respiratory distress syndrome, airway compromise and arterial erosion [25]. Radiological images may initially suggest progression of disease, despite effective treatment, and are not usually helpful in monitoring response to therapy [26].

The differential diagnosis includes rickets, demyelinating disorders, B12 deficiency and space-occupying lesions in brain or spinal cord, pyogenic or fungal spondylitis along with metastatic disease may be suspected. Further, vertebral osteomyelitis caused by *Mycobacteria* other than *M. tuberculosis* and Brucellosis may also mimic Pott's disease [27–29].

Rationale for treatment and evidence-based literature

Several reports on tuberculosis of the cervical spine in children have stated principles of management [16, 18, 19, 22, 30–32] as follows: (1) obtaining a definitive diagnosis through an appropriate biopsy and culture of the specimen, whenever feasible; (2) institution of appropriate medical management with or without surgical treatment; (3) preservation or restoration of normal neurological function and (4) maintenance of the growing spine stability to prevent subsequent secondary osseous and neurological dysfunction. The combination of raised inflammatory markers, plain X-rays, CT and MRI scans, usually support or is helpful for diagnosis in many cases. Accurate histological evaluation and culture is imperative for definitive diagnosis [33]. Despite the lack of clear treatment guidelines on cervical TB complicated by abscess formation and neurological compression of the spinal cord, multidrug anti-tubercular chemotherapy with rest and immobilisation appear to be the mainstay of treatment reported in the literature. This would especially be true in cases without any instability and neurological compromise (radiculopathy or myelopathy).

Image-guided aspiration of the abscess is often a simple and effective choice to reduce the bacterial load and hasten the effectiveness of the medical regime [30, 34]. Surgical aspiration is essential as the abscess is often contained within the thick prevertebral cervical fascia and there is no sinus formation by the disease process. It can therefore, track down into the path of least resistance—namely, the spinal canal, leading to potential neurological compromise.

Mcclay et al. [35] showed resolution of deep neck abscesses with intravenous antibiotics alone, but in our case there was a radiological evidence of spinal cord compression by the expanding abscess. So with this in mind and together with the family's objection to invasive surgery, we opted for aspiration of the abscess to obtain a

sample and indirectly decompress the spinal cord. This also allowed us to preserve the apophyseal ring cartilage of the vertebral bodies. This in theory decreases the possibility of a late kyphotic deformity allowing continued anterior column reconstitution and growth from the unaffected apophyseal rings [36].

Although there is a general consensus on the medical management of uncomplicated TB of the cervical spine [3, 19–22, 37, 38], treatment protocols become a little uncertain with a case such as ours with a large abscess causing cord compression. Whilst some authors agree on a trial of medical management [30], others advocate surgical options [32]. Although it is agreed that the surgical options through the anterior approach allow direct access to the infected tissues and stabilisation of the spine by bone grafting, anterior exposure of the cervico-thoracic junction presents with specific anatomical challenges, especially with added difficulties to address kyphosis if present [39–41].

Furthermore, anterior radical debridement in children with spinal TB, destroys the anterior growth and limits the capacity for spinal remodelling, which can lead to progressive kyphosis [31, 42]. Thus, additional posterior instrumentation is recommended by some surgeons [11, 17, 39, 42]. This naturally leads to increased morbidity with longer operation time and healing time as well increased surgical trauma. Upadhyay [36] and Schulitz [43] have suggested that debridement without bone grafting could reduce surgical insult to the growing spine and prevent the kyphosis deformity in children with spinal tuberculosis. Others have reported spontaneous fusion in tuberculous lesions [30].

Procedure

All options of management were discussed with the patient and the family. Considering her age and very specific cultural/family fears of invasive surgery, a decision was made to aspirate under sedation with ultrasound guidance. Under aseptic technique and ultrasound screening, a percutaneous approach was made just lateral to the carotid/jugular sheath. The skin was infiltrated with local anaesthesia (5 ml of 1 % lignocaine) and a grey cannula (16 FG size) advanced into the centre of the anterior abscess. The aspiration was largely performed to establish the diagnosis with approximately 40 ml of pus aspirated from the extra-spinal component. The child tolerated the procedure very well and following this, the anterior aspect of the abscess was significantly reduced. No complications were encountered during the procedure and the patient was monitored for any late signs of haematoma or systemic symptoms due to possible micro-spillage of abscess into the systemic circulation during aspiration. Although the aspirate was negative for acid-fast

bacilli, the TB culture showed a positive growth of *Mycobacterium tuberculosis* sensitive to all first-line anti-tubercular drugs. She was started immediately after the aspiration empirically with short course of steroids and multidrug anti-tubercular medication consisting of rifampicin, isoniazid, pyrazinamide, ethambutol with pyridoxine and vitamin D supplementations. She was discharged after 2 weeks and followed up in clinic by the spinal and infection diseases' teams.

Outcome, follow-up

A follow-up MRI scan at 8 months showed complete resolution of the abscess and no further collapse of the vertebral bodies (Fig. 2). At her last follow-up at 2 years, she had improved remarkably (Frankel E) and had no long tract signs. Cervical spine radiographs showed a satisfactory bone healing and 12° C7–T2 kyphosis with spontaneous fusion of C7–T1 (Fig. 3). Our patient will remain under follow-up until the cessation of growth, in particular monitoring for late complications.

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