

Short Research Communication

Tuberculous Spondylitis of the Craniovertebral Junction

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Abstract

Craniovertebral junction tuberculosis is rare, accounting for 0.3 to 1% of all tuberculous spondylitis cases. MR imaging is the modality of choice to detect bone involvement, abscess formation and subligamentous spreading of the pus, to differentiate from other lesions affecting the craniovertebral junction, and to determine the efficacy of treatment. Given the fact that surgical treatment of patients with craniovertebral junction tuberculosis has been associated with a high mortality rate ranging up to 10% and recurrence rate ranging up to 20%, conservative is the standard of treatment for most patients.

This article presents a patient with craniovertebral junction *Mycobacterium tuberculosis* infection diagnosed with CT-guided biopsy. A halo vest was applied and antituberculous treatment with rifampicin, isoniazid and ethambutol was initiated. At 6-month follow-up, the patient was asymptomatic; CT of the cervical spine showed healing of the bony lesions. The halo vest was removed and physical therapy was recommended. Antituberculous treatment was continued for a total of 18 months, without any evidence of infection recurrence

Key words: Tuberculous Spondylitis; Craniovertebral Junction.

Introduction

In the modern era, the incidence of tuberculous spondylodiscitis has risen because of the increase of the susceptible population such as the elderly, immunosuppressed or compromised and intravenous drug users, and the low access to health care systems of patients in low social and economic status such as third party migrants, prisoners and long hospitalized [1-6]. The incidence of *Mycobacterium tuberculosis* spondylodiscitis in developed countries ranges from 9% to 46% [7-11]. Involvement of the craniovertebral junction is exceptional, accounting for 0.3 to 1% of all tuberculous spondylitis cases [1]. This can be a life-threatening condition due to mass effect or resultant instability [12]. However, its treatment is controversial [3,10-14]. In an attempt to enhance literature, this article presents the case of a patient with craniovertebral junction tuberculosis; diagnosis and management are discussed.

Case report

A 24-year-old male Asian migrant was admitted with neck pain, weakness and hypoesthesia in upper and lower limbs. His symptoms started approximately 1 month before, but deteriorated and became constant for the last week before presentation. No other information was available regarding his past medical history. Radiography of the cervical spine showed proximal migration of the odontoid process. A CT showed posterior and superior translocation of the odontoid process, osteolysis of the right side of the anterior arch of the atlas, the axis and right occipital condyle, and dislocation of the right atlantoaxial joint (**Figure 1A**). MR imaging showed proximal migration of the odontoid process causing spinal cord compression, and a soft tissue mass extending anteriorly from the anterior arch of the atlas to the

pharyngeal space (**Figure 1B**). CT-guided biopsy and cultures revealed *Mycobacterium tuberculosis* infection. A halo vest was applied and antituberculous treatment with rifampicin, isoniazid and ethambutol was initiated. Patient's recovery was uneventful; he was discharged from the hospital with per os antituberculous treatment and instructions for close surveillance. At 6-month follow-up, the patient was asymptomatic; CT of the cervical spine showed healing of the bony lesions. The halo vest was removed and physical therapy was commenced. Antituberculous treatment was continued for a total of 18 months, without any evidence of infection recurrence.

Discussion

Craniovertebral junction tuberculosis is usually due to spread from a nearby retropharyngeal abscess, and only rarely begins in the bone itself [1]. Radiography is usually not helpful in the initial stages of disease, as vertebral changes usually need 2 to 6 months to become apparent. MR imaging is the modality of choice to detect bone involvement, abscess formation and subligamentous spreading of the pus, to differentiate from other lesions affecting the craniovertebral junction such as metastasis, rheumatoid arthritis, brucellosis, sarcoidosis, fungal infection and lymphoma, as well as to determine the efficacy of treatment [1]. Combined CT scan and MR imaging may be the most useful method available for evaluating the region of the neck [11]. Three stages of craniovertebral junction tuberculosis have been described [1]: stage 1 is characterized by minimal bone destruction without disruption of the

atlantoaxial joint; stage 2 is characterized by atlantoaxial subluxation and proximal translocation of the odontoid process; and, stage 3 is characterized by extensive bone involvement with destruction of the odontoid process and the anterior arch of the atlas, resulting in atlantoaxial dislocation.

There are conflicting reports regarding the optimal treatment of patients with craniovertebral junction tuberculosis [2-5,12-14]. Conservative treatment remains the standard of care for most patients, even in cases of advanced involvement of bone or soft tissues at this spinal level [3,11,13]; using improved imaging and appropriate antibiotics, the morbidity and mortality of these patients has fallen from 25% to 56% 15 years before, to <5% in the present era [2-6,11,13]. Selected cases with extensive bone destruction should be considered for surgical treatment [11]. Surgery should also be reserved for cases where diagnosis is in doubt and there is an initial severe or progressive neurologic deficit with or without respiratory distress, in presence of documented mechanical compression and/or dynamic instability following conservative treatment [3]. Moreover, surgical treatment is indicated after failed conservative treatment, in patients with spinal instability, and in those with deteriorating neurological status [6]. Some authors proposed immediate surgical intervention, with a single or 2-stage anterior or transoral decompression and posterior spine stabilization [2,3]; early surgical intervention provides for tissue sampling for precise diagnosis, spinal decompression and early mobilization [3].



Figure 1. (A) Axial computed tomography (CT) scan of the upper cervical spine shows posterior/lateral translocation of the odontoid process (black arrow head), osteolysis of the right side of the anterior arch of the atlas, axis and right occipital condyle, and dislocation of the right atlantoaxial joint (black arrows). (B) Sagittal T2-weighted magnetic resonance (MR) imaging of the cervical spine shows proximal migration of the odontoid process causing spinal cord compression (white arrow head), and a soft tissue mass extending anteriorly from the anterior arch of the atlas to the pharyngeal space (white arrows).

Gupta et al. reported excellent results with rigid immobilization and prolonged antituberculous treatment (18 months) in all their patients, regardless of their clinical and radiological findings [5]; they observed healing of bony lesions and restoration of alignment even in the more advanced cases. In contrast, given the fact that surgical treatment of patients with craniovertebral junction tuberculosis has been associated with a high mortality rate ranging up to 10%, and recurrence rate ranging up to 20%, most authors currently propose more conservative treatment protocols, depending on patients' disability and/or neurological deterioration, and response to conservative treatment [3-5]. Behari et al. [4] and Teegala et al. [14] proposed treatment protocols based on disability grading; patients with minor deficits should be considered candidates for conservative treatment, whereas those with major deficits should be treated surgically; few (8%) patients initially treated conservatively may eventually require delayed surgery for reducible atlantoaxial dissociation [14]. Qureshi et al. [12] recommended that all patients with craniovertebral joint tuberculosis associated with instability and neurological compromise, who fail to respond to 4-6 weeks of antituberculous chemotherapy and skull traction should be offered occipitocervical fusion, with or without posterior decompression; anterior surgery will be needed only in those few cases that do not improve neurologically after occipitocervical fusion [12]. In either conservative or surgical treatment, prolonged antituberculous treatment (up to 18 months) is necessary, as short term antituberculous treatment (up to 6 months) has been associated with poor outcome [1-5].

In conclusion, craniovertebral junction tuberculosis is rare. MR imaging is the modality of choice to detect bone involvement, to differentiate from other lesions that affect the craniovertebral junction, and to evaluate the efficacy of treatment. Conservative treatment remains the treatment of choice. Early diagnosis and careful selection of patients who need surgery is essential. The goals of surgery are to obtain adequate tissue for diagnosis, remove diseased tissue, decompress neural structures and ensure spinal stability.

Competing Interests

The authors have declared that no competing interest exists.

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