



## Case Reports &amp; Case Series

## C2 spondylitis TB treatment by only posterior approach

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## ABSTRACT

Tuberculosis infection of the second cervical spine is a very rare case and has an incidence rate of only 1 in 100,000; nevertheless, it could result in grave morbidities. In the present study's case, a 26-year-old woman came to our hospital complaining about stiffness and pain in the neck and other symptoms such as weakness of the left hand and leg as well as positive long tract signs. C-spine MRI revealed a mass with bone destruction around C1–4, which was similar in appearance with the tumor as well as indicated the possibility of atlantoaxial dislocation. Surgery was planned to be conducted in two stages for this patient: (a) first, through the posterior approach by occipito-cervical fusion with laminectomy biopsy and (b) via a transoral approach. However, since the biopsy revealed that tuberculosis caused the lesion, the second stage of the surgery was canceled, and the patient was treated with anti-TB drugs for 9 months. Follow-up evaluation showed significant motoric and sensory improvement in the strength of the left hand and improvement in foot function even though there was still some degree of gait impairment which was tolerable for the patient. To conclude, TB treatment for C2 lesion can also be handled via the posterior approach surgery with good results, especially for cases with atlantoaxial dislocation.

## 1. Introduction

Osteoarticular tuberculosis is a rare extrapulmonary TB that occurs in only about 1–2% of TB cases, but more specifically in those cases involving spinal cord, it occurs in almost half of the cases. The lesion is often located in the vertebral body (anterior spinal tuberculosis; 90–95% of the cases) and the rest involving the posterior vertebral arch (posterior spinal tuberculosis) [1]. The sign and symptoms of the disease vary and highly dependent on the site and the stage of the disease, but it usually manifests complications like back pain, weight loss, neurological abnormalities, fever, and nightsweat [2].

The disease was considered to be dangerous especially because of its subtle progression and devastating complications which range from syringomyelia, permanent neurological deficit, spinal osseous defect, and the most severe one: paraplegia. The occurrence of these complications varies from 23 to 6% [3].

The lesion of spinal TB has a classical form which enables it to be recognized by physicians from plain X-ray. However, higher imaging modalities such as computerized tomography (CT-Scan) and magnetic resonance imaging (MRI) would provide a much more detailed imaging and thus enhance diagnostic accuracy [4]. In terms of diagnosis, however, it is usually hard to obtain enough samples for pathologic examination; therefore, the diagnosis is usually established based on the radiologic finding, physical examination, as well as history-taking [2].

Treatment is usually conducted conservatively in mild-to-moderate cases [5]. However, if there is deterioration in neurological deficit or persisting deficit with spinal cord compression, surgery can be considered. Nevertheless, surgery is not a routine procedure as for spinal TB management [2].

This case report presents a rare case of osteoarticular tuberculosis with spinal involvement located in C2 vertebrae and treated by posterior approach only (posterior decompression).

## 2. Case report

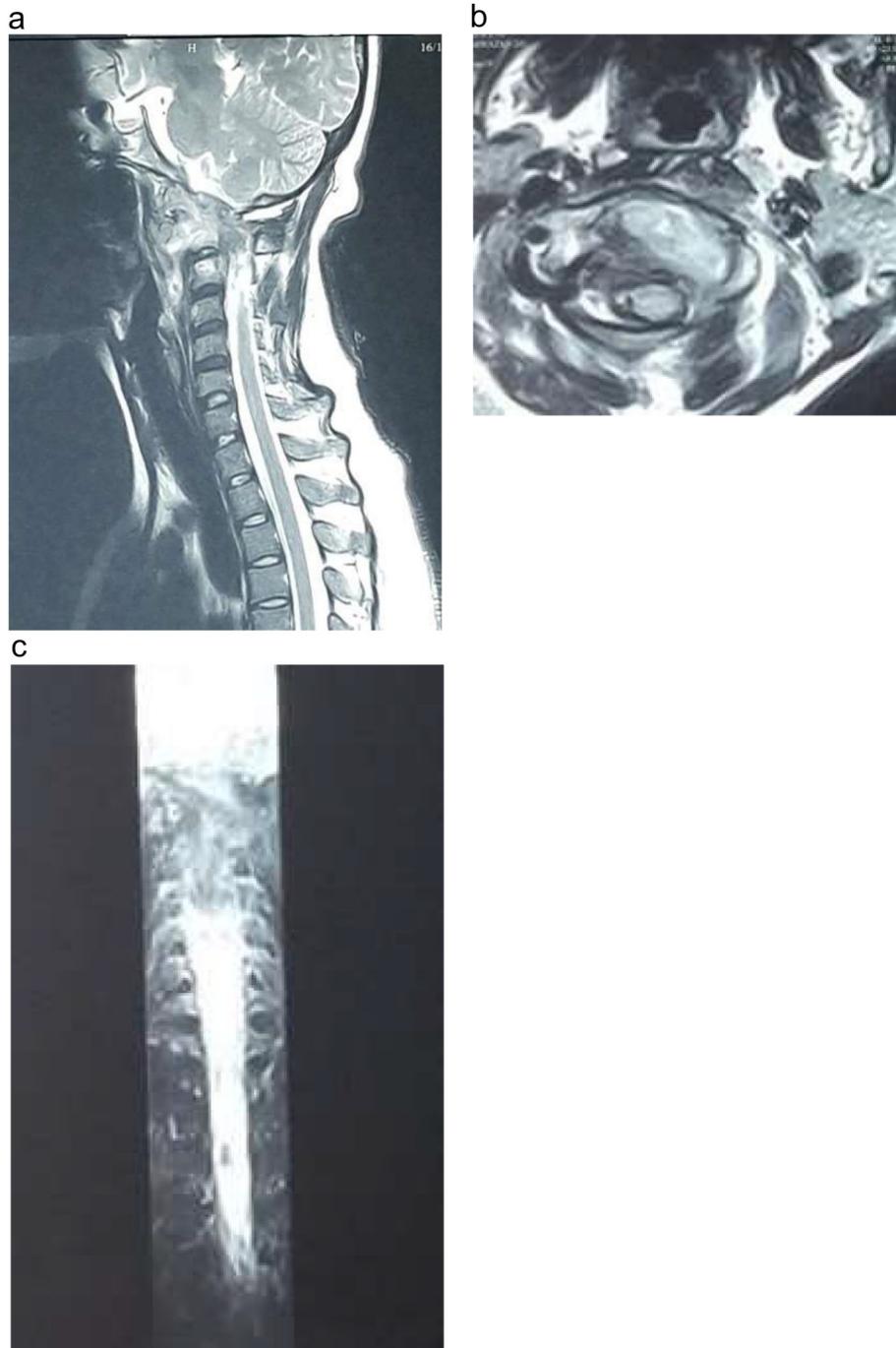
A 26-year-old woman came for consultation to the neurological surgery clinic of our hospital presenting with a history of stiffness and pain in the neck which increased in intensity with neck movements. We learned from her that complaints started at least a year before admission and the severity of complaints has been increasing since then. She also complained about weakness and numbness of the left hand and leg. The positive long-tract sign was found on physical examination. The neurological examination found left-sided paralysis with motor power 4 of 5 on MMT test and hypoesthesia of left arm and legs with a unilateral increase in deep reflexes. Sputum examination found a negative result, and no suspicious lesion of lung TB was found on chest X-ray. MRI imaging revealed destruction of discus and bodies of C1–2 vertebrae, which are mostly on the left side, causing acute angulations at C1–2

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**Fig. 1.** a. Sagittal MRI T2WI of the cervical spine revealed bony destructions and dislocation of C1–2. b. Axial MRI T2WI of the cervical spine revealed paravertebral mass on the left C2 body that fulfilled the spinal canal, which resulted in cord compression. c. MR Myelogram showed CSF blockage from C1–3 levels.

level (Fig. 1a). There are also bone and spinal cord edema on C1–3 as well as cerebrospinal fluid blockage and a paravertebral abscess on the C1–4 level (Fig. 1b and c). Because the patient had no history and family history of lung TB, she was diagnosed with chordoma of C1–2 with C1–2 TB spondylitis as a differential diagnosis. The patient was planned to undergo posterior decompression biopsy with occipito-cervical fusion. The second stage was planned for trans-oral approach surgery.

In performing posterior decompression biopsy, occipito-cervical midline skin incision was performed from external occipital protuberance until C7. Meticulous homeostasis was conducted after placing an automatic retractor; we observed mal-alignment of atlantoaxial joint.

Occipital screws were placed using the twist drill followed by lateral

mass screws placement on C3, C5, and C6 consecutively. Best realignment and stabilization were confirmed after checking and verifying that the occipito-cervical rods and nuts were correctly placed and in a good position. Laminectomy was done on C1–2 levels, biopsy of the mass was carried out, and necrotic tissue was encountered, which appeared pale and poorly vascularized. As we went deeper, the border between the necrotic tissue and the normal spine bone tissue was not distinguished. Further surgical debridement and decompression revealed that the lesion involved the anterior part of the C1–2 as well; there was no infiltration of the dura mater. Complete posterior decompression and correction were achieved in this case.

Post-surgical recovery was considerably good with improvement in



Fig. 2. Postoperative plain X-ray of the spine showed occipital plate fixation and lateral mass screws from C3 to C6 with acceptable atlantoaxial alignment.

motor paralysis and gait disturbance. On discharge, the patient was able to walk although still fairly unstable and had minor difficulty to maintain her walking direction. Over the following six-month period there was complete resolution of all neurological deficits except for the very mild gait disturbance. Postsurgical X-ray imaging showed good realignment and sagittal balance of the occipital and the neck segments (Fig. 2).

Pathology report of the biopsy specimen revealed extensive necrotic foci with inflammatory lymphocytes cells, PMN neutrophils, and histiocytes as well as multinucleated giant cells that form granulomatous structure (Fig. 3). Based on the pathological finding, diagnosis of chronic granulomatous lesion due to tuberculosis was established.

### 3. Discussion

TB spondylitis or spinal TB is a highly debilitating disease that often results in disability (paraplegia or hemiparesis; depending on the location of the lesion) [5]. It is hard to establish an early diagnosis because of the subtleness of the disease in its early stages; the symptoms appear only in the latter stages by which time neurological disability would have already developed [2]. Imaging modalities such as X-ray

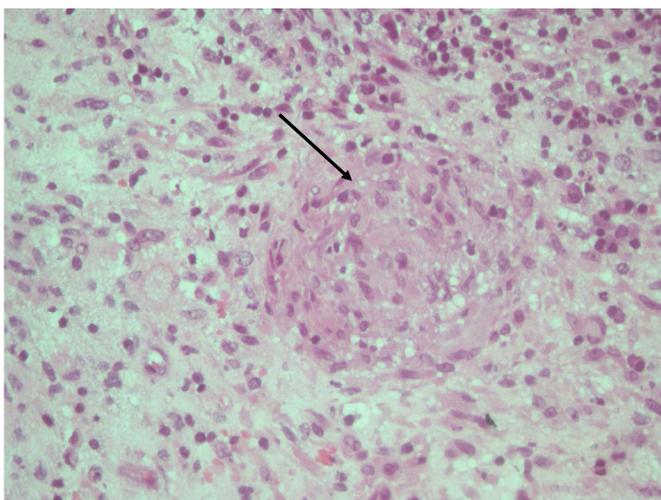


Fig. 3. Microscopic image (H&E) revealed multinucleated giant cell (arrow), which indicates a tubercular focus.

and MRI offer great diagnostic value to identify spinal tuberculosis, but they do not always give a clear view to enable accurate diagnosis. Pathological examination offers very high sensitivity; however, it is usually hard to obtain enough samples for evaluation. Moreover, the lesions often develop in an inaccessible location, which exacerbates the aforementioned reason [4].

Regarding the management of spinal TB, the treatment is chosen depending on the degree of paraplegia [6]. For grade 1 and 2 where there are only mild neurological symptoms, chemotherapy is the treatment of choice since there is still no need for decompression. However, for grade 4 paraplegia, operative management is imperative to decompress the spinal cord as soon as possible in order to salvage neurological function as well as fixing the kyphosis. On the other hand, in stage 3 paraplegia, operative management is only considered when the chemotherapy management is deemed to have failed after 6–8 weeks of trial. In this case, the patient had hemiparesis instead of paraplegia. Based on the neurological examination, it seemed that the paraparesis was comparable to stage 3 paraplegia (motor power 4) [7]. However, we justified posterior decompression surgery in order to alleviate spinal cord compression and because patient's symptoms and history did not in any way directly indicate spinal TB. However, after a pathological examination which revealed a TB infection, we canceled the second phase (trans-oral approach) and initiated chemotherapy for tuberculosis treatment.

In terms of surgical management, there are two approaches in managing spinal TB: (a) anterior approach and (b) posterior approach [8]. Currently, the anterior approach was still more popular compared to the posterior approach [9]. However, the posterior approach has been gaining an increasing amount of attention recently partly because it offers better kyphotic angle, significant lower angle loss, and better back pain alleviation despite the risk of a higher amount of blood loss and longer operation time [10,11]. It also has a slightly lower neurologic recovery rate (72.2% vs. 76% in anterior approach), which is partly caused by difficulties with extracting anterior lesion and decompressing the neural element [12]. In this case, we used posterior approach to decompress the spinal cord locally at the C1–2 level and accessed the lesion for biopsy. To achieve stabilization, the occipital screw was used to stabilize the involved vertebrae and for preventing dislocation or subluxation. Second-phase surgery, the trans-oral approach, was aimed to evacuate the lesion. However, because pathologic examination confirmed the diagnosis as spondylitis TB, this method could not be performed. According to guidelines, it is imperative to

administer anti-tuberculosis chemotherapy before carrying out the surgical evacuation of the tubercular lesion.

Spinal instability is a major issue in spinal tuberculosis because of the destruction of the vertebral components [13]. In addition, both surgical approaches also potentially aggravate this issue [13]. Therefore, stabilization methods need to be performed in order to avoid treatment-related morbidities. Stabilization of the spine is usually achieved by using screws to fuse two or more vertebrae followed by traction to maintain spinal alignment.

Spinal tuberculosis has a good prognosis especially if detected and managed early. With the combination of proper anti-tubercular drugs and surgical intervention, about 80% of patients show improvement both symptomatically and neurologically [1]. The lack of accurate diagnostic modalities hampers the effort to establish an early diagnosis of spinal tuberculosis. Currently, the only way to accurately identify tubercular lesion of the spine is by pathological examination [3]. However, it is usually hard to obtain a tissue sample for pathological examination. Imaging modalities offer great help in establishing the diagnosis, but none of them has enough accuracy to be considered as gold standard. The symptoms also pose an issue in spinal tuberculosis. In most of the cases, early stages often do not show any or very minimal symptoms; as a result, the patient is unaware of their disease [2]. As seen in this patient, there was no sign or symptom of pulmonary TB experienced by the patient. In addition, no relevant history was found to direct the suspicion toward spinal TB. Therefore, spinal TB was only regarded as a differential diagnosis with chordoma as a primary working diagnosis. Anti-tubercular chemotherapy program was initiated right after surgery, and patient condition was closely monitored. At the moment of hospital discharge, the patient recovered well, and neurological symptoms were greatly improved. The patient still had gait disturbances and however, they were considered as being tolerable and not much of a hindrance to her mobility. After the six months follow-up period, the patient was found to be free of all neurological signs and had experienced the only minor issue of gait disturbances.

#### 4. Conclusion

This case represents a successful C2 spondylitis TB that was managed by only a posterior approach followed by anti-tubercular

chemotherapy. The patient had demonstrated good recovery with minimal neurological sequelae. However, because of its subtle onset, this disease is considered to be highly debilitating. Prompt history-taking, physical examination, and supporting radiological examination are required to establish the diagnosis and minimize the probability of misdiagnosis.

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