

Myelopathy in Tuberculous Spine Disease

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I. INTRODUCTION

Background

The diagnosis of tuberculous spine disease is quite difficult to be established based on clinical data only, moreover if there is no clinical sign of pulmonary TB or gibbus on the spine. Patients with this disease often show skinny appearance and complaining of cold sweat and chronic cough. Therefore, patients with tuberculous spine disease usually come with radiculopathy and/or myelopathy with an advanced disease features shown in diagnostic neurological appearance (MRI), such as destruction of vertebral body and myelum involvement. Until recently, the decompression and corpectomy with fusion of the spine have become the routine procedures in the management of tuberculous spine disease in the neurosurgery field, besides antituberculous chemotherapy.

Tuberculous spine disease

Involvement of the spine is the second most common manifestation of tuberculosis infection. At least 3% to 5% patients have spine involvement,¹ and this rate was reported to be higher in developing countries.²

Tuberculous spine disease has a high potency of causing disability and mortality, and a late diagnosis even make a higher rate or more severe complications.³ In the early stage of the disease, the clinical appearance (signs and neurological deficits) of the patients are not specific.^{4,5} The main pharmacologic medications for *M. tuberculosis* are rifampicin and isoniazid for 6 months^{6,7} Standard treatment for tuberculosis consists of: rifampicin, isoniazid, ethambutol, and pyrazinamide for two months, followed by rifampicin and isoniazid for four months. Some experts sometimes use oral dexamethasone for treatment of skeletal tuberculosis. Unfortunately, the adherence rate of patients taking the antituberculous chemotherapy is still a concern.⁸

Laboratory profiles and interpretations in skeletal tuberculosis

The routine laboratory examinations for investigating bone involvement are alkaline phosphatase and serum CRP. Leukocyte count is usually normal. Anemia and hypoalbuminemia are usually present in patients with skeletal tuberculosis with malnutrition.

Diagnosis of skeletal tuberculosis

Diagnosis of skeletal tuberculosis is established by obtaining a sample by spine or paravertebral biopsy with assistance of radiological examination or ultrasonography. Diagnosis of extra spinal tuberculosis is made by examining AFB from sputum or pleural fluid.

Epidemiology of TB infection

According to the WHO, tuberculosis is a specific disease that causes the highest mortality in the world.⁹ It is estimated that one-third of the world population, which is about 2 billion people, are infected with tuberculosis. The incidence of tuberculosis in Singapore is about 44 per 100,000 population.¹⁰ In the USA, Australia, and Sweden, the incidence of tuberculosis infection is less than 10 per 100,000 population. In Japan, the incidence of tuberculosis is 33 per 100,000. More than 40% of tuberculosis infection worldwide is located in South East Asia.¹¹ It is estimated that there are three million new cases of tuberculosis infection every year, and around 10.7 million people were infected with tuberculosis and HIV.

The differential diagnosis of tuberculous spine disease in the elderly is metastasis of malignancy from other sites. Histopathology diagnosis is needed to rule out this probability.^{10, 11, 12, 13}

Sites of tuberculosis infection on the spine

The most common sites of tuberculous spine disease are the lower segment of thoracic vertebrae and lumbar vertebrae. Tuberculous spine disease can sometimes be seen at the thoracic and cervical vertebrae, but the presentation is usually more severe.^{14,15,16}

Pathophysiology of tuberculosis spine disease

Less than 50% of patients with tuberculous spine disease had a history of active pulmonary TB.¹⁷ Around 50% cases of musculoskeletal TB has spine involvement. The transition zone of thoracolumbal vertebrae is the most commonly affected site.¹⁸ *M. tuberculosis* usually spread hematogenously to the vertebral body. In most of the cases, the infection occurs at the anterior subchondral of vertebral body adjacent to the intervertebral disc. The posterior element of the spine is very rarely involved in this infection. Dissemination usually occurs below the ligament structure to the vertebrae level and adjacent connecting tissue, which then forms a paravertebral abscess. This abscess can then disseminate by forming a tunnel or duct to unusual sites, such as scrotum, buttocks, or chest area.¹⁹ By classical nature, the disease can disseminate to the iliopsoas muscles. Several vertebral body could

become flat due to bone destruction which then produce a deformity of the spine known as gibbus. Neurological deficits will occur if compression to the spinal cord happens or if there is meningitis.

The role of surgical treatment in tuberculous spine disease

Combination of surgical treatment together with tuberculosis medications offer a more rapid improvement of neurological deficits and better outcome to patients with progressive neurological deficits.^{14,16} Conservative or non-surgical treatment is the treatment of choice only in cases where no neurological deficits were found.^{15,17} Surgical treatment performed in this patient is the anterior approach for debridement and fusion.^{20,21} *M. tuberculosis* seldom form biofilm surrounding the metal implant compared with other pyogenic microorganism,²² so that some surgeons also perform a combination of spine instrumentation, either posterior instrumentation or anterior instrumentation after curettage and bonegraft use.^{24,25} A strong stability could also be obtained by using titanium cage as a reconstruction effort to the vertebral body.²⁶

Presentation of myelopathy cases of tuberculous spine disease

Case I:

A female aged 25 years old came to the clinic, assisted by family member. Patient came with a complaint of weaknesses of the four extremities accompanied by the feeling of numbness since 1 year before admission. At the beginning, the patient felt a heavy feeling on the neck, and also tingling at both upper and lower extremities. Six months prior to admission, the patient felt weaknesses on both upper and lower extremities, and two months prior to admission she cannot move all four extremities. Patient is bedridden, but could still feel the urge for defecation and micturition. Physical examination showed motoric impairment with increasing physiological reflexes and positive Babinsky sign on both sides. There were no autonomic impairment. MRI examination on axial and sagittal cut of cervical vertebrae of T2WI showed destruction of anterior element of C5, with a hyperintense mass compressing the spinal cord. Comparison with MRI with T1 sequence demonstrated a cystic and capsulated mass.



Figure 1. MRI of patient I, the sagittal and axial cut of cervical vertebrae showed destruction of anterior element of C5 compressing the myelum. Comparison of sequence T2 to T1 showed a cystic and encapsulated mass.

The patient underwent anterior cervical corpectomy and debridement. The destructed C5 vertebral body was replaced with bone autograft taken from the right SIAS. The patient was then treated with anti tuberculous chemotherapy for 6 months under the supervision of a pulmonologist.



Figure 2. Design of incision and anterior approach for debridement and sequestrectomy of destructed cervical vertebral body.

Case II:

A 34-year old male came to the clinic with assistance from the family. Patient came with the chief complaint of weakness in lower extremities accompanied with feeling of numbness. This has been experienced since 1 year 6 months before admission. In the beginning, the patient felt pain on the back, which worsened during sleep in supine position. One year before admission, the patient started to suffer from weakness in both legs. Two months prior to admission, the patient could no longer walk and have difficulty in moving both legs. Patient could only perform activities on the bed, but still could feel the urge for defecation and urination. Physical examination showed motoric impairment with increasing physiological reflexes and positive Babinsky sign on both sides. There were no autonomic impairment. MRI examination on sagittal cut of cervical vertebrae showed destruction of anterior element of T10 and T11 protruding to the spinal canal. Axial cut on segment T10 and T11 showed constriction of spinal canal with fractured fragments from T10 and T11 bodies compressing the spinal cord.



Figure 3. MRI sagittal cut of cervical vertebrae, showing destruction of anterior element of T10 and T11 which protruded into the spinal canal. Axial cut on T10 and T11 segment showed constriction of spinal canal due to fracture fragments from T10 and T11 corpuses which had compressed the spinal cord.

The patient underwent thoracic vertebrectomy and debridement. The destructed vertebral body of T10 and T11 was replaced with bone autograft from the patient taken from the rib. Afterward, the patient received anti tuberculous chemotherapy for 6 months under the supervision of a pulmonologist.

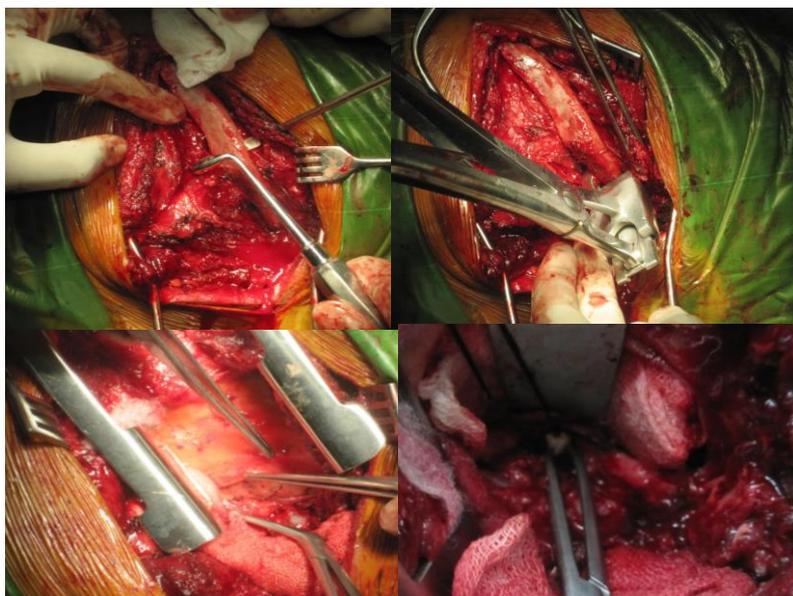


Figure 4. Osteotomy of the lower costae to obtain a good exposure of the anterior element of thoracic vertebrae. It was shown that iliac bone graft was used for anterior fusion of the thoracicvertebral body in which corpectomy had been performed previously.

After the operation, both of the patients continued the treatment with antituberculous chemotherapy, physiotherapy and a high protein diet. Within six months after the intervention, the patients could resume their activity normally.

II. CONCLUSION

Tuberculous spine disease remains a major problem of musculoskeletal tuberculosis infection in South East Asia. Surgical treatment is still the preferred treatment combined with antituberculous chemotherapy for tuberculous spine disease patients with myelopathy. In our institution, the corpectomy debridement procedure together with fusion with autologous (iliac) bone graft provides satisfying results.

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