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CASE REPORT

Tuberculosis transverse myelitis in a pediatric patient

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Abstract

Tuberculosis myelitis usually impacts adult patients and is associated with tuberculous meningitis, miliary tuberculosis, or human immunodeficiency virus infection. Pediatric tuberculosis myelitis cases without any associated diseases have never been reported. The author reported a case of a pediatric patient with tuberculosis myelitis without any other organ involvement and the outcome after treatment. Girl 13 years old suffered from paraplegia of her lower extremities. Two months before paraplegia she felt weakness in her left leg and followed by the right side. The legs were spastic and ankle clonus was positive. She lost sensation from epigastrium level to her both legs and bowel difficulty. Laboratories result was normal but spinal magnetic resonance imaging showed a hyperintense lesion of spinal cord thoracic vertebrae 5-8. During the laminectomy procedure, there was no tumor, abscess, or tuberculoma, but the spinal cord looked brown. A biopsy was performed, and the histopathology results showed the granuloma containing lymphocytes, epithelioid macrophages, and Datia Langhans cells. The patient was treated with anti-tuberculosis chemotherapy for twelve months. Clinical symptoms improved gradually and the patient was able to walk slowly. Tuberculosis myelitis is an inflammatory spinal cord disease and it can cause paralyzed and also sensory and autonomic disturbance. Magnetic resonance imaging can differentiate between spinal tuberculosis and spinal tumors, but it will be difficult if there are no signs of vertebral body and discs inflammation. Tuberculosis myelitis should be considered as a differential diagnosis of spinal cord lesions in children and its response to anti-tuberculosis chemotherapy is excellent..

Keywords: *Tuberculosis myelitis, Pediatric, Paraplegia, Biopsy, Chemotherapy*

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Introduction

Global tuberculosis report 2020 from World Health Organization (WHO) has reported tuberculosis incidence in 2019 at 391 every 100,000 population. The total amount between 8.9-11 million patients and 44% of them was located in south-east Asia.[1] Meanwhile, based on the Indonesian Health Ministry survey of 2018, tuberculosis prevalence of Indonesian citizens was 0.42%. It was approximately 1: 100 000 patients.[2]

Pigrau-Serralach C, *et al.*,[3] described extrapulmonary tuberculosis in Europe and the United States has increased from 7.6% to 20-40% from all tuberculosis cases. Twenty percent were pediatric patients. In Asia was believed that extrapulmonary tuberculosis increase 15-20%.

About 10% of extrapulmonary tuberculosis affected bone, and half of them were spinal tuberculosis.[4] Pediatric spinal tuberculosis incidence has been reported varied in a different country. It was between 26% until 58% of all spinal tuberculosis. Myuang Sang Moon, *et al*.,[5] in their retrospective study have revealed 124 children with spinal tuberculosis out of 229 pediatrics tuberculosis patients in three decades. The location was mostly in the thoracic region, and the cervical region was the second.

Pathophysiology of spinal tuberculosis was believed to spread hematogenously from pulmonary infection into spinal bone and discs. The other source comes from a genitourinary infection. Destruction of the bone and discs which followed by abscess formation can compress the spinal cord adjacent to the lesion. In young age patients, the disc is the first time involved because more vascularize.[4,6] Neurologic deficits in spinal tuberculosis result from mechanical pressure by the sequester of bone and disk, abscess, tuberculoma, or because of myelitis and thrombosis. Tuberculosis myelitis is very uncommon, but the patient's symptom can be an early onset of tetra or paraplegia.[4,7]

Imaging is needed to make a diagnosis of spinal tuberculosis and magnetic resonance imaging is the best modality for evaluation. Hypointense signal from the infected vertebrae was shown on T1-weight and hyperintense on T2-weight from the diseased soft tissue. Injected-contrast MRI will demonstrate very well the involvement of meninges, and also the ring or nodular enhancement of the abscesses.[6]

Intramedullary tuberculoma signal on MRI was well-circumscribed hypo-isointense lesions on T1-weight and the rim was slight hyperintense. When the tuberculoma was mature, the signal was hypo or isointense on T2-weight images. But central liquefaction of necrosis will have a hyperintense signal.[6,8] Turamari RU, *et al*.,[9] revealed in their study of MRI evaluation on 30 spine tuberculosis patients about 83.3% (25 cases) of patients have prevertebral and paravertebral abscess, 70% (21 cases) with epidural abscess, 6.6% (two cases) with intradural, and 6.6% intramedullary involvement.

Treatment of spinal tuberculosis with anti TB drugs varies in different guidelines but minimally from 6 months until 18 months. The world health organization recommends four drugs consist of isoniazid (INH), rifampicin, pyrazinamide, and streptomycin for two months and followed by INH and rifampicin. Meanwhile, surgery will be indicated when any instability of the spine, severe kyphosis, abscess, or tuberculoma with neurology deficit, and for diagnostic purposes.[10]

Even though many reports of intramedullary tuberculosis, most of them were intramedullary tuberculomas or abscesses which are very clearly shown by contrast MRI features. Transverse myelitis with severe deficit neurology caused by tuberculosis was very rare and usually associated with military tuberculosis, tuberculous meningitis or optic neuritis.

The author presented a pediatric patient with paraplegia caused by an early onset of tuberculosis transverse myelitis of thoracic 5-8 without laboratory results supporting tuberculosis and not accompanied by tuberculosis meningitis, optic neuritis or miliary tuberculosis.

Case Report

A young girl 13 years old visited our outpatient neurosurgery clinic due to paraplegia of her lower extremities. In the beginning, she felt her left leg weakness and followed by the right side. Two months later she could not move her both legs, but they were moving involuntary, and then she started having bowel difficulty.

On physical examination the vital sign was normal and there was no bulging on her spine. Motoric examination revealed both hands were normal. Both legs were paraplegic and spastic. The ankle clonus was positive bilaterally. Loss of sensation was starting from epigastrium level into her both feet.

Blood test has shown hemoglobin 12.5 g/dl, leucocytes 7,500 cells/mm^3, hematocrit 35.5%, erythrocyte sedimentation rate 19 mm/hr, differential white blood cell count: neutrophil 59%, lymphocyte 30%, monocyte 7%, eosinophil 3%, and basophil 1%.

Chest x-ray examination was normal. Spinal magnetic resonance imaging with gadolinium contrast showed a hyperintense lesion at T1-weight and T2-weight in the sagittal and axial view at the level of thoracic vertebrae 5-8 (Figure 1A-D).

Surgery reports

Based on the clinical symptoms, blood test, and MRI results the patient was operated on with pre-operative diagnosis intramedullary spinal cord tumor T5-8. Under general anesthesia, the patient was operated on in the prone position. After making a marking with a C-arm x-ray, the skin, fascia, and paravertebral muscles were dissected. Then, a laminectomy procedure was performed before opening the dura. The dura mater was tagging, and the spinal cord was looked brownies and different from the adjacent normal cord (white). There was not an abscess, tuberculoma, or cord bulging as shown in Figure 2. The author chose to perform a biopsy of midline myelotomy. After five days hospitalized and physical therapy, the patient was discharged from the hospital.

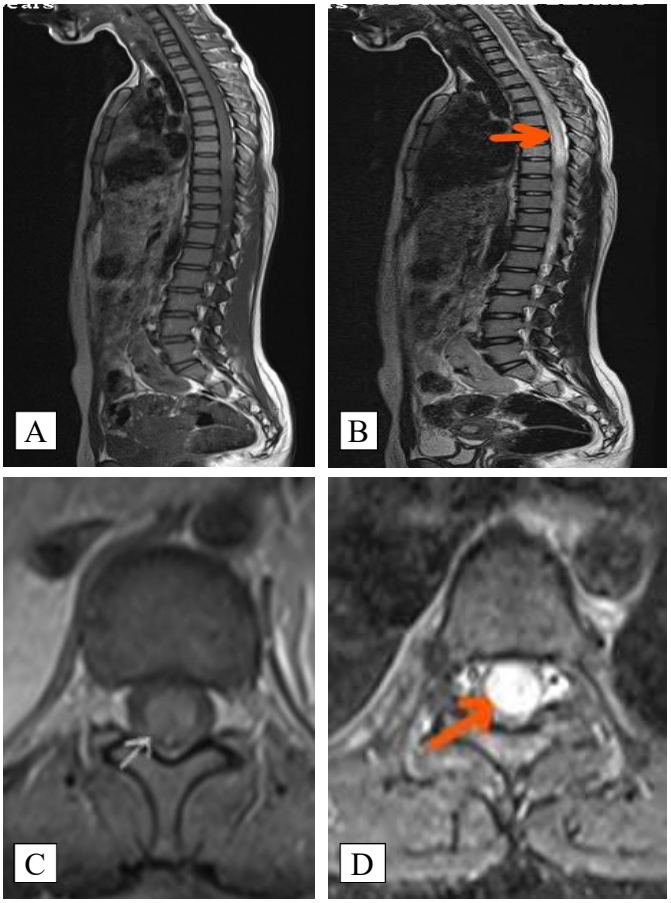

Figure 1. *A) T1-weight sagittal view: the lesion was not looked clear; B) T2-weight: hyperintense lesion at T5-8 (orange arrow); C) T1-weight: spinal cord was isointense (white arrow); D) T2-weight: spinal cord was hyperintense (orange arrow)*

Histopathology results

The histopathology result of the biopsy was not a neoplasm lesion but tuberculosis. The preparation consists of small pieces showing the granuloma containing lymphocytes, epithelioid macrophages, and Datia Langhans cells (Figure 3).

Treatment of TBC

The patient was treated with anti-tuberculosis consisting of isoniazid 300mg, rifampicin 600mg, pyrazinamide 1000mg, and ethambutol 600mg for two months, and followed by isoniazid and rifampicin for 10 months.

Follow up of neurologic function progress

One month after surgery the patient's symptom was relieved gradually. The power of her legs has improved into 3 of 5, and the clonus significantly reduced. Three months later, the patient has been able to exercise on a stationary bike and the clonus has disappeared. One year follow-up after surgery she can walk slowly without a walker. Urination and defecation are normal.

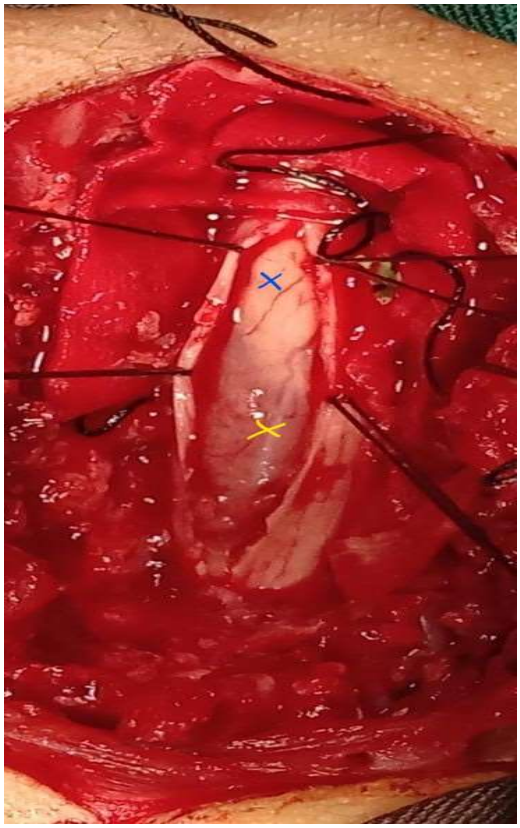

Figure 2. *Intraoperative picture, the upper part of the spinal cord was normal (blue cross) and myelitis lesion (yellow cross)*

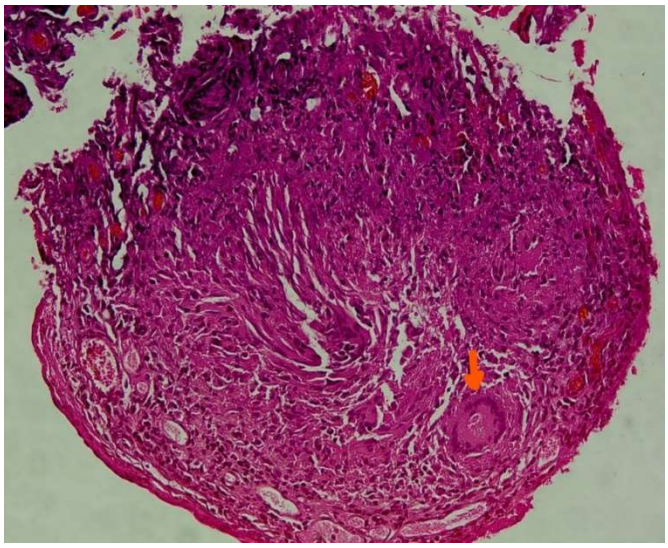

Figure 3. *Histopathology: H&E Staining, magnification 200X, showed tuberculosis granuloma (arrow)*

Discussion

The author has reported a young girl with paraplegia, sensory deficit, and bowel difficulty due to an early onset of T5-8 transverse myelitis of Tuberculosis.

Transverse myelitis in acute onset is an inflammatory that affected one segment or more of the spinal cord. The motoric, sensory, and autonomic functions under the lesions will be impaired day by day.[11] In this case, the patient totally suffered paraplegia, sensory disturbance starting from epigastrium level into both feet, and difficulty defecating after two months since she felt light paralyzed on her left legs. These symptoms closely match with spinal cord tumor moreover the results of blood tests, chest x-ray, and spinal MRI has no sign of tuberculosis. But the histopathology revealed a sign of tuberculosis. The granuloma of tuberculosis is containing peripheral rim epithelioid histiocytes, surrounding central caseous necrotic. Some histiocytes formed multinucleate giant cells (Langhans), and the outer rim consists of lymphocytes and plasma cells.[12]

Paraplegia in spinal tuberculosis was caused by mechanical pressure of debris and abscess, granuloma, or myelitis.[4,7] It will be difficult to differentiate between spinal tuberculosis with a spinal tumor when the vertebral body and discs inflammation signs were not revealed on MRI.[13]

Tuberculosis myelitis is mostly associated with intracranial tuberculosis or arachnoiditis. Exudate's extension into the spinal arachnoid can produce spinal arachnoiditis, and then spinal tuberculosis.[11] But, this patient did not have any intracranial symptoms. How to explain the mechanism in this patient is still unclear.

There were many procedures or diagnostic tools for investigations of spinal tuberculosis to complete the clinical examination from the low until high sensitivity and specificity results. MRI is the best imaging for spinal tuberculosis, while plain radiography is the worst.[14] MRI can differentiate between tuberculous spondylitis with pyogenic spondylitis. The presence of abnormal paraspinal signals, thin abscess wall, spreading into adjacent multilevel vertebrae subligamentous was typical of tuberculous spondylitis.[6] Meanwhile, myelitis showed hypo-isointense on T1-weight and hyperintense on T2-weight image, with or without spinal cord edema.[7,15]

Gram staining and acid-fast bacilli (AFB) culture procedures have 99-100% specificity but low sensitivity (25-75%). The GeneXpert test has 82.9% sensitivity and 98% specificity. Histopathology also has sensitivity until 81%.[14]

Cerebrospinal fluid analysis can support the diagnosis of tuberculous myelitis. Usually, the lymphocytic cells increased, low glucose, and high protein.[16] In this case, the cerebrospinal fluid analysis was not investigated while the working diagnosis before surgery was an intramedullary tumor.

After the biopsy, tuberculosis chemotherapy was started according to the histopathology results, and the patient's symptoms improved. The prognosis of tuberculosis myelitis was depending on how severe the demyelination of the nerve fibers already settled before the treatment started. Spinal cord atrophy and syrinx appearance on MRI suggested poor outcomes. Permanent disability due to impaired motoric, sensory, and autonomic functions is likely to occur and is a disaster for the patient.[17]

Transverse myelitis usually followed tuberculosis meningitis, arachnoiditis, miliary tuberculosis, human immunodeficiency virus infection, and intracranial tuberculoma. Sahu SK *et al*.,[18] has reported four cases of patients with long extensive myelitis because of tuberculosis on adult patients and following extra-spinal cord tuberculosis. Noh MSFM *et al*.,[19] have reported from their literature study only got seven papers and 10 patients with tuberculosis myelopathy. All the patients were adults and always had previously had another organ tuberculosis or human immunodeficiency virus (HIV) infection.

Conclusion

Tuberculosis myelitis can occur in the pediatric patient even though without associated with another organ tuberculosis or HIV infection. A spinal cord biopsy is very helpful for establishing transverse tuberculosis myelitis diagnosis if the laboratories and imaging results were inconclusive. Early-onset tuberculosis myelitis responds very well to anti-tuberculosis chemotherapy.

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