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Case report

A diagnostic challenge in cervical spine mass of spinal giant cell tumor mimicking tuberculosis: Case report

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ABSTRACT

Introduction and importance: There were many reported cases that misdiagnosed cervical tuberculosis because cervical tuberculosis can mimic the characteristics of benign tumours. In this case report, we are reporting a case of a giant cell tumor (GCT) that was misdiagnosed with cervical tuberculosis.
Case presentation: A 24-year-old male came with a chief complaint of being unable to move his hands and feet four months before admission. Total collapse/ destruction of C3 vertebrae body. The MRI non-contrast result showed an anterior translation of VC2-3 and bilateral stenosis of the foraminal canal. The patient was suspected of cervical tuberculosis, and then the patient was planned for an Anterior Cervical Corpectomy and Fusion (ACCF). The gene X-pert MTB result is negative, and the histopathologic result showed the domination of multinucleated giant cells. The patient was reassessed with cervical GCT. The neurological function was significantly improved from Frankel B to Frankel D in the follow-up.
Clinical discussion: Spinal GCT was imitated both clinical and radiological of the spinal tuberculosis. Gene X-pert is the definitive diagnosis in cases of tuberculosis. The histopathologic analysis and Gene X-pert should be the main tools used to evaluate a lesion miming spinal tuberculosis.
Conclusion: With the availability of a wide range of diagnostic options, the appropriate selection of a diagnostic approach is one of the most important steps in patients with spinal tumours and mimicking lesions.

1. Introduction and importance

Tuberculosis infection in bones can mimic the characteristics of benign tumours or locally aggressive tumours, such as giant cell tumours. In some cases, it may even resemble malignant tumours like osteogenic sarcoma or chondrosarcoma. This uncommon presentation poses challenges in distinguishing these lesions from sarcomas.

Spinal tuberculosis can present with non-specific lower back pain and neurological symptoms in the lower extremities. When presented in the vertebrae, that condition is like a Giant Cell Tumor (GCT). The GCT is a rare cause of lower back pain, accounting for only 1.9 % to 9.4 % of all GCT cases. The diagnosis of this tumor can often be suspected based on characteristic imaging features and is ultimately confirmed through biopsy [1].

Patients afflicted with spinal giant cell tumours typically present with pain, and up to 72 % of individuals also experience neurological deficits such as radicular pain and motor weakness due to compression of nerve roots or the spinal cord. The distinctive features of neck pain and paraparesis/paraplegia can lead to misdiagnosing the cause of spinal stenosis. The presence of a mass in the cervical spine region poses a significant clinical challenge in the differential diagnosis between tumours and tuberculosis [2].

2. Case presentation

A 24-year-old male, referred from another hospital, came with the chief complaint of being unable to move his hands and feet four months before admission. Initially, the complaint was in the form of pain with cramps in the neck, which became a weakness in both hands and feet. The patient was unable to stand and walk. History of chronic coughing, sweating in the night, wasting, and contact with TB patient is denied. No history of diabetes mellitus or hypertension. The motoric examination of C5-T1 and L2-S1 was zero and the sensory examination showed no hypoaethesia. Physiological reflexes were increased and there were no pathological reflexes. Total collapse/ destruction of C3 vertebrae body, involving inferior endplate of C2 and superior end plate of C4 (Fig. 1A). The MRI undergoes a non-contrast cervical MRI from the previous hospital. The result showed an anterior translation of VC2-3, spinal cord

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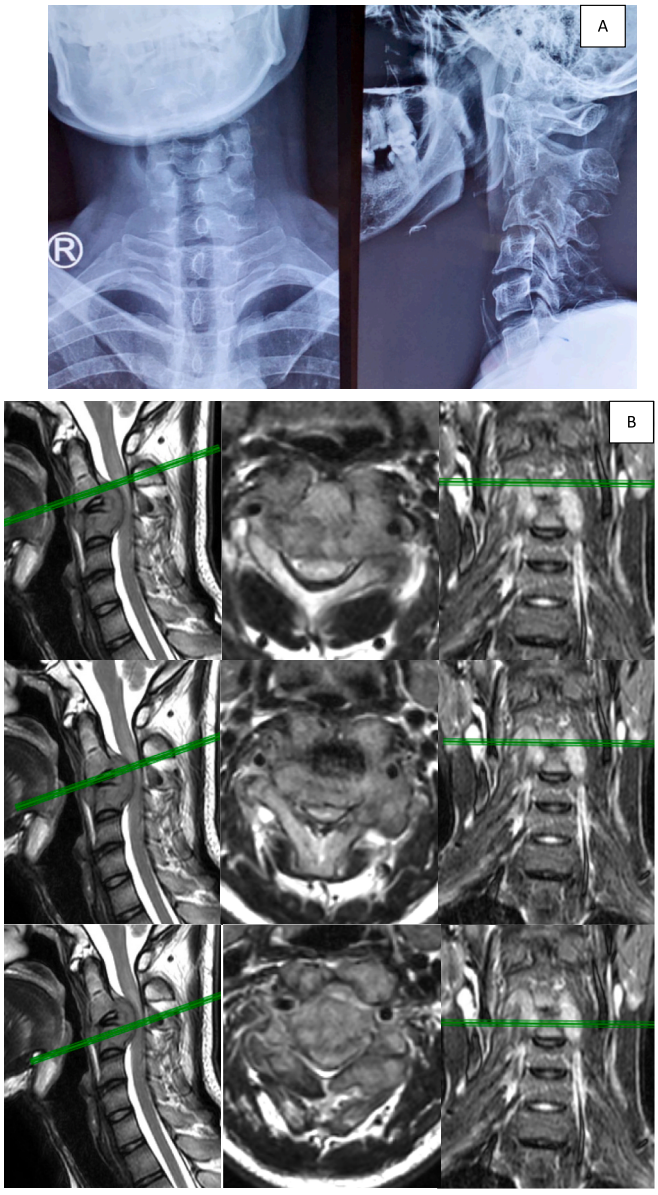

Fig. 1. (A) Preoperative Cervical Xray Anterior-Posterior and Lateral View, (B) Preoperative Non-Contrast Cervical MRI in V2-V4.

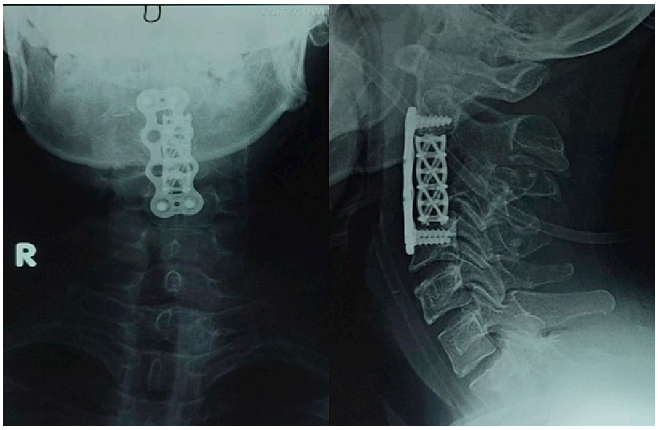

Fig. 2. Postoperative Cervical Xray AP/ Lateral.

edema in VC2-3, and bilateral stenosis of the foraminal canal (Fig. 1B). The patient was suspected of cervical spinal tuberculosis, and then the patient was planned for debridement and Anterior Cervical Corpectomy and Fusion (ACCF). The surgery was done by resection in the C2 end-plate and corpus vertebrae C3-4. No pus was found during the operation, but we found granulation tissue, which is difficult to distinguish from infectious tissue or tumor tissue. Post-operative cervical X-ray is shown in Fig. 2. The neurological function was significantly improved from Frankel B to Frankel C in a few days after surgery, and Frankel C to D in the follow-up (Table 1). The motoric test from C5 until S1 is zero, there was +3/+3 for physiological reflex and there was no pathological reflex.

The result of histopathologic shown the proliferation of a Mono-nuclear stromal cell with a round to oval nuclear, smooth chromatin, and cytoplasm; dominated by a Multinucleated giant cell, the number of nuclei is more than ten nuclei (> 10 Nucleus), a Nucleus that's mimic stroma that concludes giant cell tumor of the bone (Fig. 3A). Post-operatively, Gene Xpert MTB results were not detected, while histo-pathologic analysis showed a giant cell tumor of the bone. The patient was reassessed with GCT at cervical vertebrae 2,3 and 4 and re-evaluated in a multidisciplinary musculoskeletal discussion. It was decided to undergo contrast cervical MRI evaluation and suggest the need for posterior component resection with posterior stabilization (Fig. 3B). The patient refused further surgery. Evaluation 1 year post-operatively, the patient's condition is good and can work again. The patient also performed a cervical CT scan evaluation and obtained C2–5 post ACCF fusion (Fig. 3C).

3. Discussion

In a TB-endemic country like Indonesia, the bone tumor should be considered as a differential diagnosis for lesions in the spine regardless of age or TB symptoms. Spinal TB has similar clinical and radiological characteristics to several different diseases [3]. However, there is a scarcity of literature that discusses these non-infectious disorders, which have the potential to mimic spinal tuberculosis.

The neoplastic disorders, which encompass primary malignancies and metastases, together with aseptic inflammatory illnesses, were shown to be the most prevalent non-infectious mimickers [4]. Due to the lack of defined indications and symptoms, this condition might be readily misinterpreted as other disorders. Radiological characteristic features were typically used to confirm the diagnosis of spinal TB following clinical suspicion in most cases. The identification of spinal tuberculosis on MRI relies on detecting a paravertebral abscess and the engagement of adjacent vertebrae and the intervening disc. However, in many instances, MRI results may not provide enough information to diagnose tuberculosis definitively [4].

The biopsy or histopathological examination is a gold standard and method for making a definitive diagnosis. Huang et al. documented a case of primary non-Hodgkin lymphoma coming from a lumbar vertebra that was initially misdiagnosed as tuberculous spondylitis. The diagnosis of spinal TB was made based on radiological and clinical evaluation, and the patient was treated with anti-tuberculous medication. After an un-successful response to anti-tuberculous treatment, the patient had spinal cord decompression and lesion biopsy, leading to the conclusive diag-nosis of non-Hodgkin lymphoma. Paravertebral masses can develop due to either benign or malignant tumours [5,6].

In our case, the clinical and radiological aspects mimicked spinal tuberculosis. However, in the histopathologic analysis, the diagnosis was more likely to be malignancy. Gene X-pert is the definitive diagnosis in tuberculosis cases, but in our case, it was negative. The histopatho-logic analysis and Gene X-pert should be the main tools used to evaluate a lesion in various locations, especially in the cervical region.

The Spinal GCT presentations are infrequent in comparison to spinal TB. The GCT of the spine is a rare but highly aggressive benign cancer that affects the spine. It has an unpredictable result, which may include the development of tetraplegia. The occurrence of this condition in the

Table 1
Neurological function evaluation.

PRE-OP		POST-OP		FOLLOW UP (1 MONTH)	
Motoric	Sensoric	Motoric	Sensoric	Motoric	Sensoric
C5 0/0	No Hypoesthesia	C5 2/3	No Hypoesthesia	C5 3/4	No Hypoesthesia
C6 0/0		C6 2/3		C6 3/4	
C7 0/0	Physiological reflex	C7 1/3	Physiological reflex	C7 3/4	Physiological reflex
C8 0/0	BPR = +3/+3	C8 1/2	BPR = +3/+3	C8 3/4	BPR +2/+2
Th1 0/0	TPR = +3/+3	Th1 1/1	TPR = +3/+3	Th1 3/4	TPR +2/+2
	KPR = +3/+3		KPR = +2/+2		KPR +2/+2
L2 0/0	APR = +3/+3	L2 2/2	APR = +2/+2	L2 5/5	APR +4/+4
L3 0/0	Clonus −/−	L3 2/3	Clonus −/−	L3 5/5	Clonus +/+
L4 0/0		L4 1/2		L4 0/5	
L5 0/0	Pathological reflex	L5 1/2	Pathological reflex	L5 0/5	Pathological reflex
S1 0/0	Hoffman −/−	S1 1/1	Hoffman −/−	S1 5/5	Hoffman −/+
	Tromner −/−		Tromner −/−		Tromner −/+
	Babinski −/−		Babinski −/−		Babinski −/+
	Chaddock −/−		Chaddock −/−		Chaddock −/−

cervical spine is exceedingly rare, with a documented prevalence of <1 % in scientific literature [7,8].

Spinal GCTs typically cause bone destruction and expansile lesions primarily affecting the vertebral body. They can also extend into the posterior elements and cross-disc spaces. In this case, the patient underwent subtotal resection. After surgery, the patient underwent MRI evaluation and was reviewed in a multidisciplinary discussion with the aim of resection of the residual mass and posterior stabilization. However, the patient refused the second stage of surgery because the patient no longer felt pain and could carry out daily activities without complaints. There were no motor or sensory complaints. Since the patient refuse surgery, we perform CT scan to assess the fusion rather than MRI to evaluate extension of the tumor. Luckily, fusion occur both anteriorly and posteriorly (right and left lateral mass).

The assessment results indicated fusion of the cervical spine despite the patient's absence of bisphosphonate/denosumab medication. Bisphosphonates are a dependable treatment for osteolytic tumours and metastases and have shown effectiveness in treating bone loss caused by osteoclasts. Bisphosphonates attach to hydroxyapatite on the bone surface and prevent osteoclasts from adhering to the mineralized bone surface. Bisphosphonates impact stromal cells of GCTs by inhibiting protein prenylation through the mevalonate pathway, leading to activation. Bisphosphonates prevent the development of osteoclast-like large cells from immature precursors and trigger cell death in adult osteoclasts. Some studies have documented the use of bisphosphonates in treating GCTB, resulting in increased mineralization of the lesion and transformation of pathological bone into normal bone structure. However, these studies were primarily noncomparative single-arm studies with a limited sample size [9]. Denosumab is another recommended adjuvant therapy for giant cell tumours. Denosumab, acting as a RANKL inhibitor, has been shown to be advantageous in inhibiting cancer growth and decreasing morbidity. In a study by Lau et al. [10] comparing Denosumab and Zoledronic Acid, Zoledronic Acid demonstrated the ability to decrease cell proliferation, induce apoptosis in a majority of cell lines, and notably limit mRNA expression of RANKL and Osteoprotegerin [10]. Denosumab lacks these qualities, which raises concerns about the possibility of cancer return upon discontinuation of the treatment. Denosumab did not demonstrate a lasting apoptotic effect on the neoplastic stromal cell population [11]. This case report has been reported in accordance with the Surgical Case Report (SCARE) 2023 Criteria [12].

4. Conclusion

Clinical, radiological, and histopathologic analysis should be the main means of evaluating a lesion in various locations. With the availability of a wide range of diagnostic options, the appropriate selection of imaging modality is one of the most important steps in patients with spinal tumours and mimicking lesions.

Ethical approval

Regarding to the observational study of outcome in our case report, the ethical approval was waived by our institution. However, the copies of informed consent are available for review by the Editor-in-Chief of this journal on request.

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CRediT authorship contribution statement

Firas Febrian involved in performing surgical technique, conceptualization, data curation, investigation, formal analysis, methodology, visualization, project administration, writing- original draft.

Aries Rakhmat Hidayat involed in performing surgical technique, data curation, investigation, formal analysis, methodology, visualization, project administration, writing- review and editing.

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Informed consent

Appropriate consent was obtained from all individual participants included in the study.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Declaration of competing interest

The authors have no conflicts of interest to disclose.

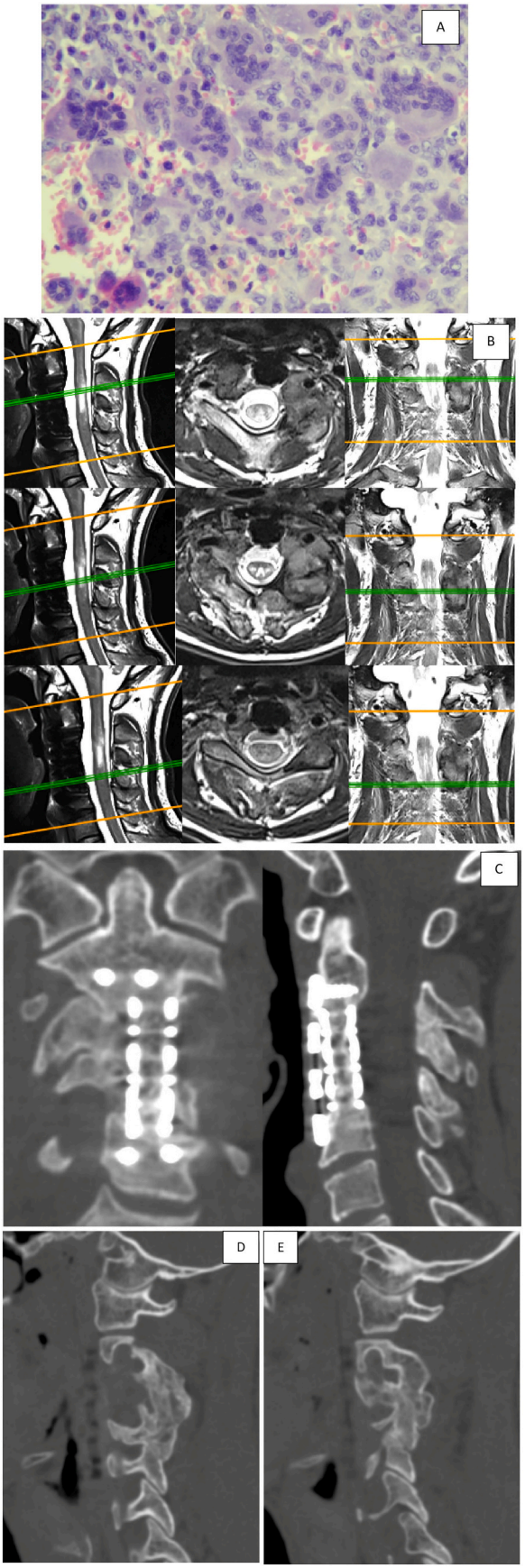

Fig. 3. (A) Histopatologhic Examination Show Giant Cell Tumor; (B) Post Operative Cervical MRI in V2-V4; (C) CT Scan Examination (fusion on anterior); (D) Fusion on Right Lateral Mass; (E) Fusion on Left Lateral Mass.

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References

[1] L.V. Maldonado-Romero, W.A. Sifuentes-Giraldo, M.A. Martínez-Rodrigo, C. de la Puente-Bujidos, Giant cell tumor of the spine: a rare cause of cervical pain, Reumatol. Clín. (Engl. Ed.) 13 (1) (2017 Jan) 58–59.
[2] P. Szmygin, B. Kulesza, C. Grochowski, J. Litak, W. Janusz, Upper cervical spine giant cell tumour of the vertebra – case report, J. Pre-Clin. Clin. Res. 10 (2) (2016 Dec 31) 133–135.
[3] S. Bayusentono, E. Ramawan, H. Dominica, Neglected Coxitis tuberculosa management in children, J. Orthop. Traumatol. Surabaya 8 (1) (2019 Dec 9) 35.
[4] İ. Sertbaş, M. Karatay, U.P. Hacisalihoğlu, Cervical spine giant cell bone tumor: a case report, World J. Surg. Oncol. 17 (1) (2019 Dec 11) 82.
[5] T. Sakuda, T. Furuta, T. Okimoto, N. Adachi, Giant cell tumor of the cervical spine treated by carbon ion radiotherapy, Medicine 100 (41) (2021 Oct 15) e27393.
[6] B. Garg, N. Mehta, R.N. Mukherjee, A. Aryal, D. Kandasamy, R. Sharma, Unmasking the great imitators-noninfectious conditions masquerading as spinal tuberculosis in a developing country: a single-center case series analysis, North Am. Spine Soc. J. 16 (2023 Dec) 100245.
[7] M. Junming, Y. Cheng, C. Dong, X. Jianru, Y. Xinghai, H. Quan, et al., Giant cell tumor of the cervical spine, Spine (Phila Pa 1976) 33 (3) (2008 Feb) 280–288.
[8] P. Luksanapruksa, J.M. Buchowski, W. Singhatanadgige, P.C. Rose, D.B. Bumpass, Management of spinal giant cell tumors, Spine J. 16 (2) (2016 Feb) 259–269.
[9] M.F. Deslivia, S.D. Savio, I.G.E. Wiratnaya, P. Astawa, K.S. Sandiwidayat, N. G. Bimantara, The efficacy of bisphosphonate in the treatment of giant cell tumour of the bone: a systematic review and MetaAnalysis, Malays. Orthop. J. 17 (1) (2023 Mar 1) 98–110.
[10] C.P.Y. Lau, L. Huang, K.C. Wong, S.M. Kumta, Comparison of the anti-tumor effects of denosumab and zoledronic acid on the neoplastic stromal cells of giant cell tumor of bone, Connect. Tissue Res. 54 (6) (2013 Nov 23) 439–449.
[11] C.L. Gaston, R.J. Grimer, M. Parry, S. Stacchiotti, A.P. Dei Tos, H. Gelderblom, et al., Current status and unanswered questions on the use of Denosumab in giant cell tumor of bone, Clin. Sarcoma Res. 6 (1) (2016 Dec).
[12] C. Sohrabi, G. Mathew, N. Maria, A. Kerwan, T. Franchi, R.A. Agha, The SCARE 2023 guideline: updating consensus Surgical CAse REport (SCARE) guidelines, Int. J. Surg. Lond. Engl. 109 (5) (2023) 1136.