

Giant cell tumor of the thoracal spine treated with decompression and posterior stabilization: a case report



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ABSTRACT

Background: Giant cell tumors (GCT) are benign tumors that can also develop in the bone. GCTs commonly affect women aged 30-40 years. The spine is a rare site of GCTs, which accounts for 1.4-9.4% of primary spine tumors. Therefore, we aimed to present a case of spinal GCT in a young male adult, which we considered unique due to the unusual age and localization.

Case presentation: We reported an 18-year-old male admitted to Hasanuddin University General Hospital with complaints of paralysis in both lower limbs, lower back pain, loss of sensation in defecation, difficulty in urinating, and tenderness at the T12 level. There was a wound on the sacral region. The mass and osteolytic lesion in the T12 seen on CT scan and MRI, respectively, followed by a biopsy, confirmed the spinal GCT.

Conclusion: The management of spinal GCT requires precise and multidisciplinary treatment planning with a case-by-case approach in order to achieve total or partial tumor resection, neural decompression, and stabilization of the spine.

Keywords: decompression, giant cell tumor, spine, stabilization.

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INTRODUCTION

Giant Cell Tumors (GCT) were first described by Cooper and Travers in 1818.¹ GCTs are tremendously named so because they appear histologically as nodules of osteoclast-like giant cells from which they arise. GCT of bone is a common benign tumor and typically occurs in the metaphyseal regions of long bones. The tumor frequently develops between the ages of 30-40 years with female predominance¹ GCTs consist of three major cell types and a spindle-like stromal cell, with the latter being the neoplastic component. The spine is a relatively rare site for GCTs, accounting for 1.4-9.4 % of primary spine tumors. Meanwhile, the incidence of GCTs in the sacrum is around 6.7% to 9.4% in different series of cases.^{2,3} In addition, GCTs are locally aggressive despite their benign nature. They may metastasize or undergo malignant transformation with an incidence of 2-3%.^{1,4}

GCTs generally occur in the vertebral body (corpus) instead of the posterior part.⁵ They form osteolytic and destructive

lesions, as shown on plain radiographs.⁶ The presentation of these tumors is often solitary, although multicentric distributions have been documented. Spinal computed tomography detects the consequent destruction and mass lesion infiltrating the vertebra. However, the gold standard of spinal GCT imaging modality is magnetic resonance imaging (MRI). GCTs appear as hypointense on T1-weighted images, hyperintense on T2-weighted images, and heterogeneous contrast enhancement with gadolinium.⁷⁻⁹ The classical appearance of GCTs in histology is multinucleated giant cells distributed in a background of mononuclear and spindle-shaped cells. The tissue is highly vascular and usually without stroma.¹⁰

The objectives of Spinal GCT treatment are tumor removal, spinal stability, and neural tissue decompression. The choices of treatment include total en bloc spondylectomy (TES), total en bloc resection (TER), and intralesional resection (IR). Due to the proximity of vital structures to the vertebrae, en bloc resection may be too damaging to perform in several cases and thus, intralesional

curettage could be the alternative. And because total resection is sometimes not possible in spinal GCTs, adjuvant treatments are also included in these types of tumors. On the other hand, in the case of aggressive spinal GCTs, extraosseous involvement makes the tumor difficult to manage and achieve total resection. Therefore, a systematic analysis of a large case series to analyze the treatment and outcome of primary aggressive GCT in the spine is significantly essential.⁷⁻⁹ Based on the fact that was written above, this study would like to explain a case about giant cell tumor of the thoracal spine treated with decompression and posterior stabilization.

CASE PRESENTATION

We reported a case of an 18-year-old male admitted to Hasanuddin University General Hospital on November 30th, 2020, with a complaint of inability to move both of his lower limbs. Prior to the publication, the patient had given written consent. He also acknowledged the concealment of identity in the present report. The patient had suffered for ten days, and the symptom

worsened five days before admission. Previously, he was able to walk normally. The patient also complained about pain in his lower back that radiated to the back of the thigh five months prior to admission. He described the pain as burning and sometimes sharp, which appeared when he tried to lie on his back but felt better when he sat. There was a loss of sensation when he passed a stool and difficulty in urinating in the past seven days. Moreover, the patient complained about a wound on his sacral region, which began about five days before admission. There was a history of trauma seven months beforehand when he fell in a sitting position while playing football, although he could continue his activity normally. He usually used mefenamic acid for the pain, which he received from an internist. However, recently, the medication did not affect him anymore. There was no history of treatment by bonesetter. Fever, night sweats, hypertension, diabetes, prolonged cough, anti-tuberculosis drug consumption, and weight loss were all denied. In addition, there was no family history of tumors.

Spine region examination revealed a wound at the sacral region sized 4 x 3 cm with an irregular shape, subcutaneous base, and redness at the wound (Figure 1). The Patient also complained of tenderness at the level of thoracic vertebra 12 (T12). Motoric function at the upper limbs was normal, but it was 0 over 5 at the lower limbs. There was hypoesthesia below T12. From the reflex examination, we found an absence of patellar and Achilles reflexes despite no pathologic ones.

Preoperative thoracolumbar radiographs showed destruction of T12 and lytic lesion seen from AP plain radiographs of the thoracolumbar spine. Through MRI, we found the destruction of T12 with a posterior fracture retropulsion fragment and compressed spinal cord at the spinal canal of that level. The imaging also revealed an extrusion of the thoracic disc XI-XII and T12 - lumbar 1 (L1), which pressed the thecal sac, T11 exiting nerve root, and transversing T12 and L1. Meanwhile, a myelography MRI showed spinal canal stenosis at T11-12.

Then, we formulated a treatment plan of decompression and posterior



Figure 1. Preoperative photograph (reproduced with the patient's permission). The photo taken before the surgery showed a wound at the sacral region with an irregular shape, subcutaneous base, and redness. The size of the wound was 4x3 cm.

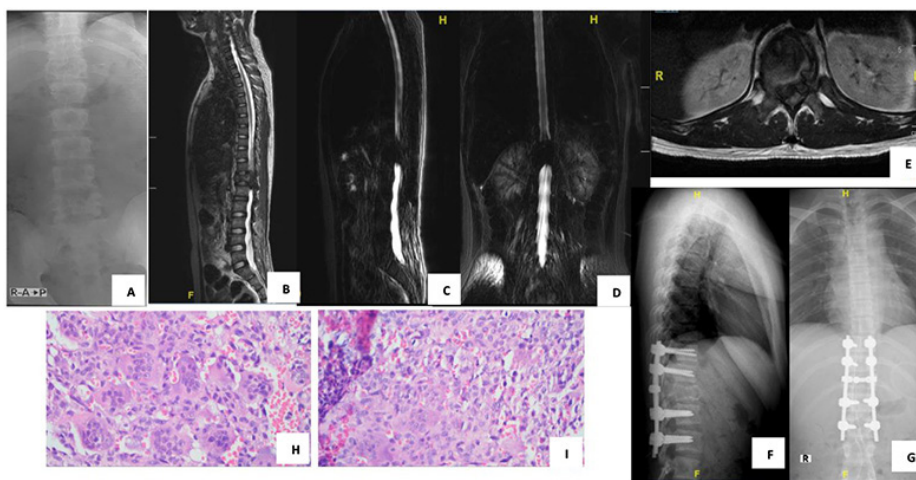


Figure 2. (a) Preoperative Radiograph result showing the destruction of T12 vertebra; (b) The sagittal T2 MRI revealed a neural compression and posterior fracture retropulsion fragment at the level of T12; (c, d) Spinal canal stenosis at T11-12 seen on myelography; (e) Axial T2 MRI; (f, g) The lumbosacral brace installation on plain radiograph following the surgery; (h, i) Pathologic anatomic results (40x) showing a tumor mass made of scattered osteoclast-like giant cells and mononuclear cells.

stabilization followed by postoperative installation of the lumbosacral brace and aggressive physical therapy along with postural exercises.

Histopathological examination was performed using tumoral samples of the patient (Figure 2). Through the examination, we discovered a lesion characterized by connective tissue and a few trabeculae of bone, among which the tumor mass was seen consisting of scattered osteoclast-like giant cells and mononuclear cells. The nucleus shape

ranged from rounded to spindle-like, found between the vascular stroma and many bleeding foci. The pathological diagnosis was GCT of the T12 vertebra.

DISCUSSION

Osteoclasts express the receptor activator of nuclear factor kappa B ligand (RANKL), which is an essential mediator for osteoclast survival. The expression occurs more in females who have completed skeletal maturation in the third and fourth decades of life.² GCTs have a large biologic

spectrum, ranging from latent benign to highly recurrent and occasionally metastatic malignant.¹¹

Spinal GCT accounts for 2.7% to 6.5% of all GCTs in the bone.¹² The proximity between the spinal cord and vertebral corpus as the common site of spinal GCT might cause the spinal cord and/or nerve root decompression resulting in pain and neurological deficits in up to 72% of the patients.^{5,9}

The most common site of GCTs in the spine is the sacrum. The tumor at this location has a more aggressive course and is diagnosed late due to nonspecific symptoms.¹³ Depending on the level of sacral vertebra affected, the patients may suffer from weakness in the gastrocnemius muscle in the upper sacral segments, loss of bladder and bowel control in the lower sacral segments, as well as perineal numbness and sexual dysfunction.¹⁴

In our 18-year-old male case, based on the thoracic CT, the mass was located in the corpus of T12. This is contradictory to the literature stating that it occurs mostly in women aged 30-40 years with skeletal maturation. There was a well-circumscribed lytic lesion in the T12 corpus, which was hypointense on T1-weighted images and hyperintense on T2-weighted images of the CT scan. On anatomical pathology examination, we found some connective tissue and a few bone trabeculae, including a tumor mass consisting of scattered osteoclast-like giant cells and mononuclear cells. The shapes of nuclei ranged from rounded to spindle-like, and they were found between the vascular stroma and many bleeding foci. The pathological diagnosis was GCT of the T12 vertebra. Differential diagnoses of the tumor include brown tumors secondary to hyperparathyroidism, spinal metastases, hematological malignancies, chordoma, and aneurysmal bone cysts.¹⁵

One of the goals of GCT treatment is a total or partial tumor resection. In the case of resectable tumors, en bloc surgical resection, which is an excision of a margin-free tumor that is entirely covered by healthy tissue, has been associated with a lower recurrence rate and increased disease-free survival, despite the significantly higher risk of surgical morbidity.^{2,9,16,17} This is because complete

resection of spinal GCT is still challenging, and the rate of local recurrence is high.

Adjuvant therapies have been used to reduce the recurrence rate, including radiation and medications such as denosumab.⁹ Denosumab, a human monoclonal antibody, inhibits osteoclast function.¹⁸ GCTs contain stromal cells which express RANKL. Researchers have studied the effects of denosumab against RANKL and found tumor response in 86% of patients with recurrent or unresectable GCTs.¹⁸ The efficacy in reducing the number of osteoclast giant cells has been proven, but it does not necessarily eradicate neoplastic stromal cells.^{4,19} Consequently, spinal GCT should be approached on a case-by-case basis with a collaboration among spine surgeons, medical oncologists, and radiation oncologists, which is critical in creating the best treatment plan for the patients.⁹

CONCLUSION

Giant cell tumors (GCT) of the spine is a rare tumor that frequently occurs with pain and neurologic deficits depending on the site of involvement. This kind of tumor has a high recurrence rate in women aged 30-40 years. Spinal GCT is diagnosed through biopsy, and the management requires precise treatment planning. The treatment of choice is surgical intervention, especially en bloc excision, whenever feasible. When en bloc excision is prohibited due to the high risk of postoperative morbidity, complete excision through an intralesional approach should be considered. Additionally, simultaneous fixation of the spine prevents post-op deformity and, thus, avoids a second surgery.

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CONFLICT OF INTEREST

None.

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ETHICAL APPROVAL

This case report was approved by Universitas Hasanuddin ethic committee 405/UN 4.6.4.5.31/PP 36/20213 UH20150302.

ETHICAL STATEMENT

Written informed consent was obtained from the patient for the 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.

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