10.5005/jp-journals-10039-1194

CASE REPORT

Large Giant Cell Tumor at Dorsal Spine with Spinal Instability

[1]Anil Kumar, [2]Lokesh Nehete, [3]Jitender Chaturvedi, [4]Nighat Hussain

ABSTRACT

Giant cell tumors (GCTs) are rare in the mobile spine above the sacrum that most frequently presents with pain and neurologic deficit depending on the site of involvement. Complete excision of GCTs with appropriate reconstruction for the preservation of spinal integrity is the treatment of choice. We report a case of GCT involving dorsal vertebrae of a female patient, who was treated by wide local excision of the tumor, reconstruction of spinal integrity with expandable interbody cage and posterior instrumentation for large D2 and D3 giant cell tumor. Histopathology confirmed it as GCT. After 1 year of follow-up, the patient is doing well without any evidence of local and distant tumor recurrence.

Keywords: Dorsal, Giant cell tumor, Spinal Instability, Spine.

How to cite this article: Kumar A, Nehete L, Chaturvedi J, Hussain N. Large Giant Cell Tumor at Dorsal Spine with Spinal Instability. J Spinal Surg 2018;5(4):174-177.

Source of support: Nil

Conflict of interest: None

INTRODUCTION

Giant cell tumor (GCT) is the most aggressive of all the histologically benign primary tumors of the spine, with a high predilection for recurrences).[1] GCTs are rare in the mobile spine above the sacrum with sacrum being the most common site for GCT involving the axial skeleton.[2] GCT in rest of the spine is a rarity, more so in cervical or dorsal spine. Complete excision of GCTs with appropriate reconstruction for the preservation of spinal integrity is the treatment of choice and is recommended. Radiation therapy can be given in cases of subtotal resection. We, hereby, report a case of large GCT involving upper dorsal vertebrae (D2 and D3) in a female patient, surgically treated by wide local excision of a tumor with simultaneous reconstruction of spinal integrity using the expandable inter-body cage and posterior instrumentation.

[1-3]Assistant Professor, [4]Additional Professor

[1,2]Department of Neurosurgery, All India Institute of Medical Sciences, Raipur, Chhattisgarh, India

[3]Department of Neurosurgery, All India Institute of Medical Sciences, Rishikesh, Uttrakhand, India

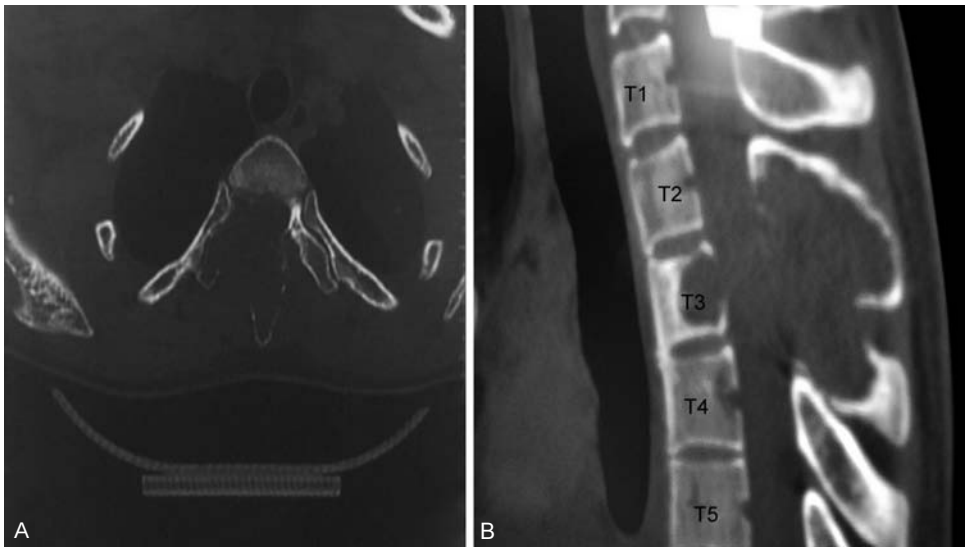
[4]Department of Pathology, All India Institute of Medical Sciences, Raipur, Chhattisgarh, India

Corresponding Author: Anil Kumar, Assistant Professor, Department of Neurosurgery, All India Institute of Medical Sciences, Raipur, Chhattisgarh, India, Phone: +919902629505, e-mail: dr.anilsharma02@gmail.com

CASE REPORT

A 32-year-old lady had presented with complaints of an upper backache, progressive weakness, and stiffness of both lower limbs. She also had urinary incontinence of 3 months duration. Her medical history was unremarkable. On examination, tenderness was present over the upper dorsal spine. The tone was increased in both lower limbs with the power of grade 3. Tone and power were normal in the upper limb. Bilateral ankle and knees jerks were brisk. Computed tomography (CT) scan of dorsal spine showed expansile lytic lesion involving posterior elements of D2, D3 vertebrae with infiltration into the adjacent soft tissue of right paravertebral region. The lesion was extending into epidural space causing compression of the spinal cord (Fig. 1). She was further evaluated with magnetic resonance imaging (MRI) which discloses that expansile lobulated lesion involves interspinous ligaments, posterior elements of D2, D3 vertebrae and more than 2/3 rd of the body of D3 vertebrae posteriorly. The lesion was compressing the spinal cord and displacing it anterolaterally towards the left side. Altered signal intensity was also noted in right paravertebral soft tissue at this level; likely due to involvement by the mass. The lesion was homogenously isointense on T1W, heterogeneously iso- to hyper-intense on T2W/STIR as compared to adjacent skeletal muscle. On postcontrast, it showed heterogeneous enhancement with central nonenhancing area likely necrosis (Fig. 2). Preoperatively, we had considered the possibility of a giant cell tumor or aneurysmal bone cyst and a remote possibility of metastasis.

To confirm the diagnosis, CT guided needle biopsy was done. Biopsy findings were suggestive of giant cell tumor. Based on clinical, imaging, and histopathological study, diagnosis of GCT was established. The patient underwent wide local excision of the tumor, transpedicular D3 corpectomy, and posterior instrumentation with expandable interbody cage for large D2 D3 giant cell tumor through a posterior approach (Fig. 3). The tumor was highly vascular, soft to firm; friable brown mass containing areas of hemorrhage and greyish firm areas. Histopathology of the lesion revealed multiple irregular pieces of tan brown elastic to hard tissue in



Figs 1A and B: (A) Axial; (B) Sagittal computed tomography showing the destruction of vertebral body involving all three columns with preservation of only anterior rim

a macroscopic view. Microscopic examination showed large multinucleated giant cells admixed with regular and uniform stromal cells with foci of new bone formation with multiple areas of necrosis and hemorrhage (Fig. 4). All these findings were suggestive of GCT.

After surgery, the patient had significant and documented clinical improvement in power as well as stiffness of her both the lower limbs. She was able to walk with support 1 week following surgery. Radiation therapy was not offered to her to prevent anticipated osteoradionecro-

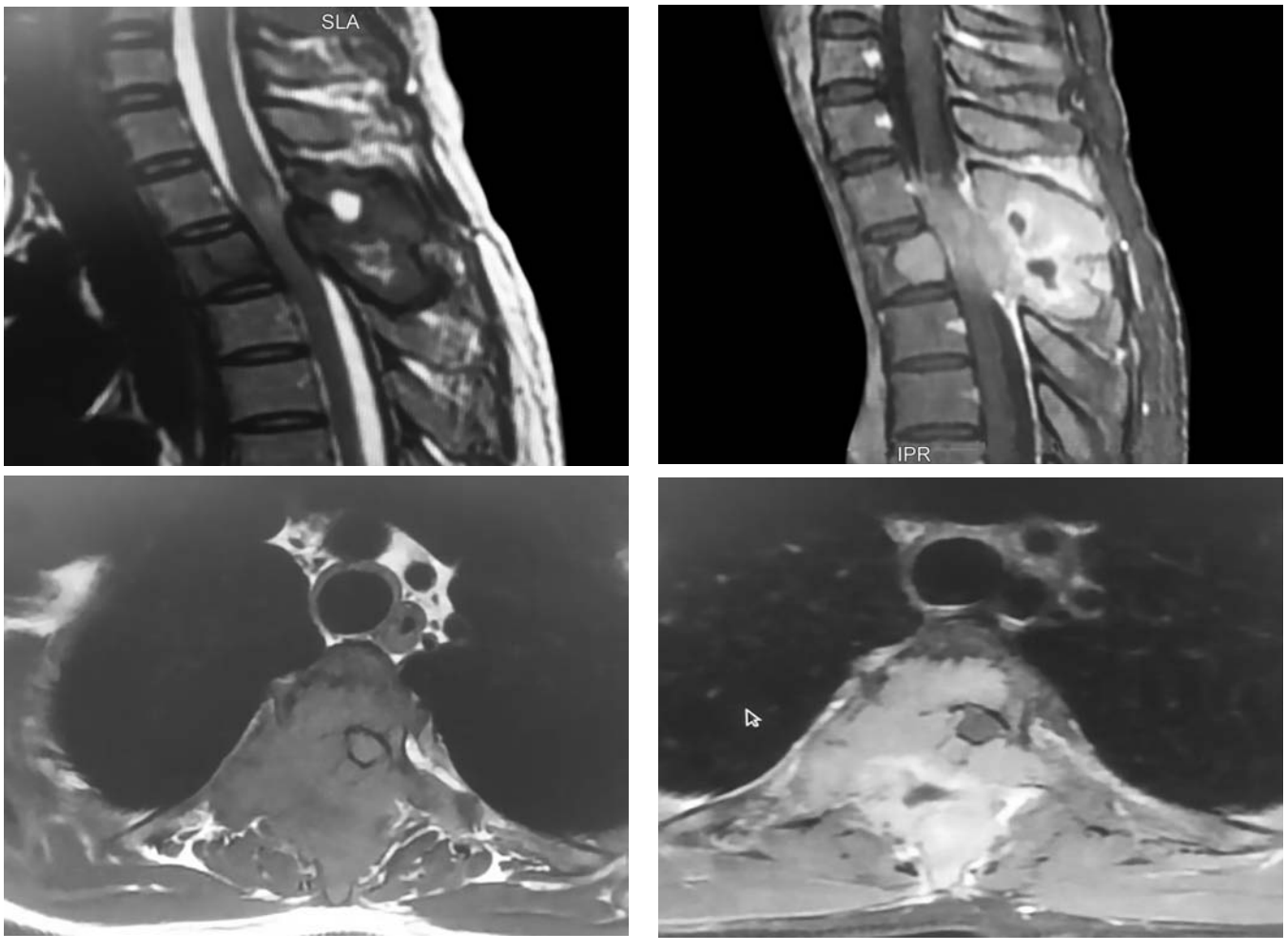


Fig. 2: Preoperative axial and sagittal magnetic resonance images of a GCT in the thoracic spine. Note the lesion extending through the pedicle, affecting all three columns. Saggital T2 weighted MRI showing tumor mass with extension into the spinal canal causing severe compression on the spinal cord.On post contrast it showed heterogeneous enhancement with central nonenhancing area likely necrosis

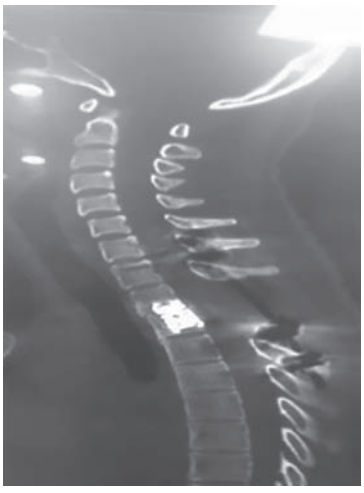


Fig. 3: Post-operative CT image showing reconstruction using expandable cage in place of excised tumor and pedicular screw and rod fixation

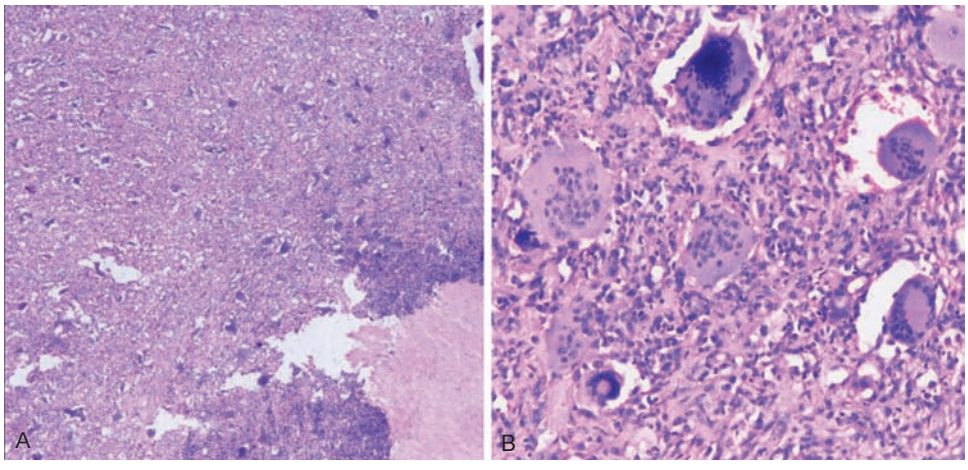
sis and myelitis. After 1 year of follow-up, the patient is doing well without any evidence of local or distant tumor recurrence and is ambulant without support, as well as improved bladder and bowel function.

DISCUSSION

Giant cell tumor of bone is a benign lesion that is usually solitary, locally aggressive and commonly seen in the 20 to 45 years age group.[3] GCT of bone has an incidence of 5% among all primary bone tumors and involvement of the mobile spinal segment is seen in only 1 to 1.5% of these cases. Spinal GCTs have considerably poorer prognosis than those in the extremities, with recurrence rates of up to 70% and poses difficulty for the surgeon due to its proximity to vital neurovascular structures.[4] Inherent local aggressiveness and high recurrence rates after incomplete excision make the prognosis less favorable as compared to the patients with another primary benign tumor of spine. Common symptoms include back pain, neurological deficit due to compression of the spinal cord, bladder and bowel dysfunction, and structural deformity of the spine. The most common site being sacrum, GCT remains asymptomatic for a long duration of the period, unless the tumor is large enough to occupy and obliterate the pre- or para-sacral space. GCT at other sites of spine leads to early compression of the neural element and therefore, earlier symptomatology and presentation.

The radiographic characteristics of spinal GCT are considered to be a round or oval mass with shell-like calcification of the marginal lesion and the absence of a mineralized matrix. Contrary to other tumors, the vertebral body along with soft-tissue involvement is seen more frequently. Review of the literature reveals that GCT of the spine is an expansile lytic lesion and almost always begins in the vertebral body. It may lead to vertebral collapse or extend into adjacent soft tissues. Since GCT does not have specific imaging features, lesions such as an aneurysmal bone cyst, brown tumor in the setting of hyperparathyroidism, chondroblastoma, tuberculosis, and metastasis should be kept in mind. Most common primary for so-called "benign metastasis" is the lung.

Various modalities of treatment are recommended for spinal GCTs such as surgery, radiotherapy, embolization, cryosurgery and chemical adjuvants like liquid nitrogen or phenol. Although en-bloc surgical excision is generally agreed to be the best management option, but it is not always achievable due to potential technical obstacles such as excessive bleeding, spinal cord injury, injury of the major vessels during blunt dissection of the vertebral body, possible contamination by tumor cells and complete spinal instability resulting from spinal osteotomy.[3] When complete surgical resection of the tumor is performed efficiently without missing any tumor part, which is the key to prevent recurrence, it can result in oncological control, a negated risk of local recurrence and the obviation of comorbidities associated with repeat surgery.[5] Subtotal excision leaves the possibility of recurrence and



Figs 4A and B: (A) H and E, 20X: Photomicrograph shows tumor comprised of sheets of round to oval mononuclear cells with poorly defined cytoplasm interspersed with numerous osteoclastic giant cells uniformly distributed throughout the tumor;(B) H and E, 100X: Photomicrograph shows higher magnification of the same focus

re-emergence of symptoms. The efficacy of radiotherapy in spinal GCTs remains controversial due to recurrence, malignant transformation, risk of myelitis and bone graft complications. Hence it should be reserved for incomplete tumor excision or in case of local recurrence.[6]

Boriani et al. reported, 22 % (11/49) overall recurrence rate for GCTs and most of these cases were involving thoracolumbar spine.[2] Higher recurrences has been reported in tumors that had extra-osseous extension into the canal and the paraspinous musculature.[7] GCTs that involved the vertebral body and posterior elements compared to those of the GCT limited to the vertebral body only were also found to have higher recurrence rate. Since local recurrence of GCT can usually manifest 3 to 5 years after initial surgery, close follow-up is required.[8] Donthineni et al. noted a higher rate of lung metastases from GCT of the mobile spine as compared to long bones.[9] Plain radiograph of local site and chest are simple tools to look for any recurrent lesion. Periodic CT and MRI are excellent tools to identify the recurrent lesion and plan necessary treatment.

In the present case, complete tumor excision was achieved by the posterior intralesional approach, and spinal integrity was restored using the expandable interbody cage, posterior instrumentation using pedicular screw and rod fixation. Our case had different extents of spinal canal involvement which ruled out en-bloc resection. We had planned our surgical approach based on a variety of factors influencing local pathological anatomy of the lesion in this patient. These factors included, but not limited to, the size and location of the lesion; evidence of ventral, paraspinal, and/or lateral tumor extension; evidence of spinal cord and/or nerve root compression; and spinal instability resulting from pathologic vertebral body collapse. With our experience, in this case, the authors state that in properly selected cases, adequate decompression is achievable through a posterior approach only. Also, this approach gives enough access for reconstruction of spinal integrity. Prevention of anticipated and unwanted occurrence of post-radiation osteonecrosis and myelitis was a reason for not subjecting the patient to radiation therapy as the anticipated gain from reverse transcriptase (RT) was uncertain owing to complete excision of the lesion.

Recent studies have reported that preoperative denosumab treatment induced marked regression of GCTs of the spine, which subsequently permitted surgical resection on tumors that may otherwise have been unresectable. Denosumab can be a useful adjuvant therapy, and it can reduce the complexity of total en-bloc spondylectomy, a major surgical procedure used for the effective treatment of GCTs of the spine.[5]

CONCLUSION

Giant cell tumor (GCT) of the spine is a rare tumor that most frequently presents with pain and neurologic deficit depending on the site of involvement. Management of spinal GCT requires precise treatment planning. Whenever feasible, en bloc excision should be pursued as the surgical procedure of choice for management of GCT. When en bloc excision is prohibited due to the high risk of postoperative morbidity; complete excision through intralesional approach should be the procedure of choice. Simultaneous fixation of the spine prevents post-op deformity and thus avoid a second surgery. We also found that a CT guided a needle biopsy is a valuable tool in establishing a preoperative diagnosis and therefore definitive treatment planning.

REFERENCES

1. Luther N, Bilsky MH, Härtl R. Giant cell tumor of the spine. Neurosurgery Clinics of North America. 2008 Jan 1;19(1):49-55.
2. Boriani S, Bandiera S, Casadei R, Boriani L, Donthineni R, Gasbarrini A, et al. Giant cell tumor of the mobile spine: a review of 49 cases. Spine. 2012 Jan 1;37(1):E37-E45.
3. Afsoun S, Saied SA, Amir N, Hamed J. En-bloc resection of a giant cell tumor causing cervical vertebral collapse. Asian journal of neurosurgery. 2018 Jan;13(1):150.
4. Martin C, McCarthy EF. Giant cell tumor of the sacrum and spine: series of 23 cases and a review of the literature. The Iowa orthopaedic journal. 2010;30:69.
5. Inoue G, Imura T, Miyagi M, Saito W, Tazawa R, Nakazawa T, Takaso M. Total en bloc spondylectomy of the eleventh thoracic vertebra following denosumab therapy for the treatment of a giant cell tumor. Oncology letters. 2017 Oct 1;14(4):4005-4010.
6. Caudell JJ, Ballo MT, Zagars GK, Lewis VO, Weber KL, Lin PP, et al. Radiotherapy in the management of giant cell tumor of bone. International Journal of Radiation Oncology* Biology* Physics. 2003 Sep 1;57(1):158-165.
7. Dahlin DC. Giant-cell tumor of vertebrae above the sacrum. A review of 31 cases. Cancer. 1977 Mar;39(3):1350-1356.
8. Hart RA, Boriani S, Biagini R, Currier B, Weinstein JN. A system for surgical staging and management of spine tumors: a clinical outcome study of giant cell tumors of the spine. Spine. 1997 Aug 1;22(15):1773-82; discussion 83.
9. Donthineni R, Boriani L, Ofluoglu O, Bandiera S. Metastatic behaviour of giant cell tumour of the spine. International orthopaedics. 2009 Apr 1;33(2):497-501.