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Giant cell tumor of dorsal spine: A rare case report

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Abstract
Giant cell tumor is a relatively rare neoplasm. In GCT the axial skeleton is extremely rarely involved. Most GCT arises in the meta-epiphyseal ends of the long bones. Peak incidence is between 30 to 40 years of age. GCT is usually classified as benign, but shows aggressive behavior and occasionally undergo transformation to malignancy. The patients with GCT in the spine often complain of the lower back pains, as the tumors primarily involve the sacrum. We report a case of an adolescent female complaining of the upper back pain with a sudden weakness of the lower extremities, later diagnosed with the GCT of the D8 vertebra. The present patient was operated using posterior lateral approach of spine and proper rehabilitation was done. Subsequent follow up revealed improvement in carrying out her daily activities.

Keywords: Neoplasm, posterior lateral approach, giant cell tumor, malignant

Introduction
Benign tumors of the bone such as giant cell tumors which have the ability to metastasize with aggressive behavior accounts for 5% pf primary bone tumor [1, 2]. They have the characteristic for recurrence [3, 4]. The locations which are reported most commonly are distal femur, proximal tibia, distal radius and sacrum and rarely involve above the sacrum bone [5, 6, 7]. In spine the most common site is sacrum and rare site to involve in spine is the dorsal vertebrae. The local aggressive behavior of these lesions in the spinal column is often the reason for presentation of the patients with compressive myelopathy. Since, it is situated on the either side of neural tissues, resection of the complete mass is difficult [8, 9]. Hence, marginal or intra-lesional excision with some backup therapy is required. Modalities in past have been tried like cement injection, phenol ablation, cryotherapy and radiotherapy which have been reported in the literature [10]. With appropriate reconstruction and total spondylectomy for preservation of spinal integrity is the treatment of choice [11]. Radiation therapy can be given in cases of subtotal resection. With this background we report a rare case as follows;

Case report
A 24-year-old female presented to the outpatient department of orthopedics with chief complaints of pain in her upper back for two months, fever, and weight loss. The pain was insidious in onset and progressive in nature. The patient reported pain intensity to be 6/10, which increased to 8/10 during movement. It was a dull aching type of pain. There was no history of trauma reported by the patient. General physical examination revealed that the patient used a wheelchair with an average build and poor nourishment. Neurological examination revealed the power of 3/5 in the lower limb and 5/5 in the upper limb. The sensation of light touch, pressure, temperature, vibrations and discriminative sensations of the lower limb were decreased. We noted extensor hallucis longus muscle weakness, and the straight leg raising test was positive (knee extension 3/5 and hip flexion 3/5). The patient had reduced bowel and bladder sensations. Lower limb reflexes were present but exaggerated. We diagnosed it as compressive myelopathy of spinal origin based on the history and examination. The routine blood investigations were normal, including complete blood count, kidney function tests, and vitamin B12, vitamin D3, and folic acid levels. Serum parathyroid hormone levels were normal.
X-ray of dorsal spine (fig 1) was suggestive of expansile lytic lesion of dorsal vertebrae and destruction of the cortex. Magnetic resonance imaging of the dorsal spine (figure 2) demonstrated heterogeneous mass based on posterior elements of D8 and D10 vertebrae

and the destruction of the cortex. The lesion extended to adjacent soft tissue components involving erector spinae muscle. There was an intra-thecal extension of lesion and compression of the spinal cord at D8 vertebrae. We gave the zoledronic acid injection pre-operatively [11]. After the imaging modalities, we suspected the lesion to be giant cell tumor of the dorsal spine, causing compressive myelopathy in the D8 region. Under general anesthesia, we did en bloc resection of the mass along with wide margins using high speed burr (figure 3). We used the posterolateral approach for decompression of the spinal cord. Also, we did spinal fixation between D7 and D10 vertebrae using pedicle screws and connecting rods. Adjuvants like H2O2 was used in soft tissue regions. We sent the resected mass for histopathological examination, which revealed a giant cell tumor of vertebrae. (Figure 4)

Postoperatively, the neurological symptoms improved, the pain subsided, and the patient could walk with support. On follow-up at 12 weeks and 24 weeks, the patient's pain-free and overall performance were good, was walking without support and no recurrence was seen on subsequent follow up.

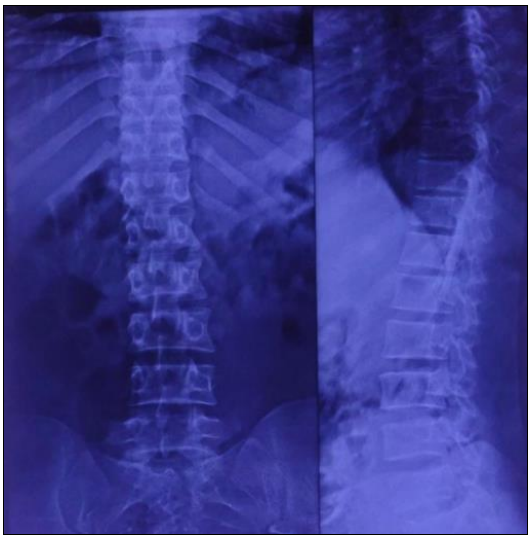


Fig 1: Pre- operative radiological modality x-ray of dorso-lumbar vertebrae

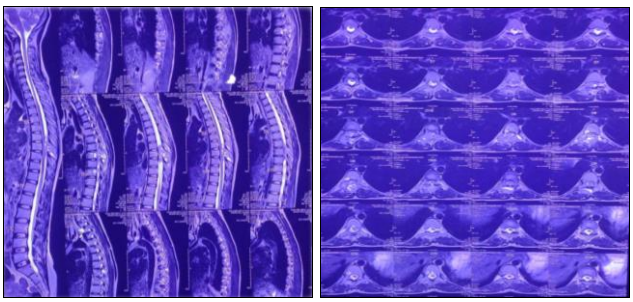


Fig 2: MRI of dorsal spine

Fig 3: Intra operative images during surgery

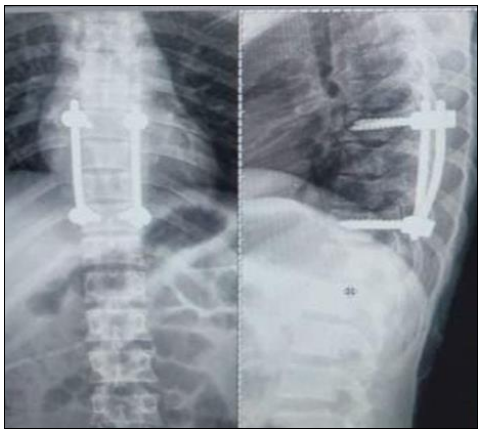
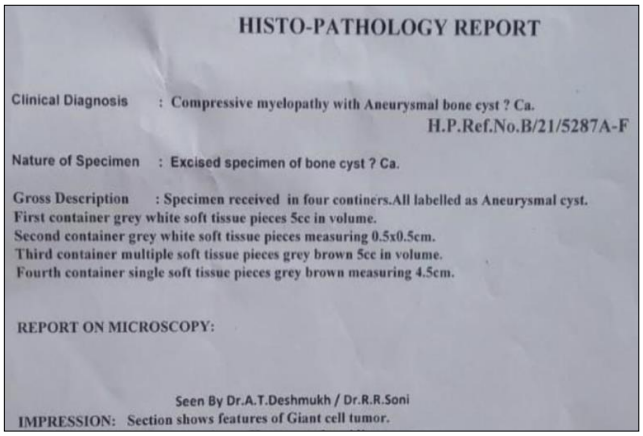


Fig 4: post op x-ray (posterior fixation using pedicle screws & connecting rod)



HISTO-PATHOLOGY REPORT

Clinical Diagnosis : Compressive myelopathy with Aneurysmal bone cyst ? Ca.
H.P.Ref.No.B/21/5287A-F

Nature of Specimen : Excised specimen of bone cyst ? Ca.

Gross Description : Specimen received in four continers.All labelled as Aneurysmal cyst.
First container grey white soft tissue pieces 5cc in volume.
Second container grey white soft tissue pieces measuring 0.5x0.5cm.
Third container multiple soft tissue pieces grey brown 5cc in volume.
Fourth container single soft tissue pieces grey brown measuring 4.5cm.

REPORT ON MICROSCOPY:

Seen By Dr.A.T.Deshmukh / Dr.R.R.Soni

IMPRESSION: Section shows features of Giant cell tumor.

Fig 5: Histopathological report of the resected mass

Discussion

GCT of bone constitutes 5% of all primary bone tumors, and spine involvement is only around 1-1.5% of these cases. Middle age and slight male preponderance has been reported. Common symptoms include [12, 13]:

- Back pain.
- Neurological deficit due to spinal cord compression.
- Bladder and bowel dysfunction.
- Structural deformity of the spine.

The radiographic characteristics of spinal GCT are round or oval extrapleural mass with shell-like calcification of the marginal lesion and the absence of a mineralized matrix [14, 15]. Compared to other tumors, they involve the vertebral body, and soft-tissue involvement may be present. The most common site for so-called "benign metastasis" is the lung [16]. The histologic appearance of GCT is a uniform distribution of multinucleated giant cells against a background of round to spindle-shaped mononuclear stromal cells [17]. Enneking staging system is used to plan treatment for GCTs. This classification system divides low-grade tumors into stage 1 and high-grade tumors into stage 2 [18].

Various treatment modalities are recommended for spinal GCTs, such as surgery, radiotherapy, embolization, cryosurgery, cementation, and chemical adjuvants like H2O2, phenol or liquid nitrogen [17, 19-21]. Total en bloc surgical excision is the treatment of choice in long bones and the spine. Still, it is not always feasible in the spine due to the unacceptable risk of permanent neurological deficit. Prior adjuvant radiotherapy was thought to convert this low-grade tumor into a high-grade malignant tumor with a poor

prognostic outcome [17]. Still, with improved treatment protocols, this is not the case. However, the risk of myelitis and bone graft complications should be reserved for incomplete tumor excision and local recurrence [17]. Close follow-up is required to detect the recurrence of the tumor. Plain radiographs of the local site and chest are simple tools to look for any recurrent lesion. Periodic computed tomography and MRI are excellent tools to identify the recurrent lesion and plan necessary treatment [18, 19]. The present case report had typical symptoms of myelopathy, pain, and neurological weakness, which improved after the correct diagnosis and surgical resection. Prior to the introduction of denosumab, zoledronic acid was widely used in the management of Giant cell tumor. Denosumab and zoledronic acid both inhibit osteoclast differentiation from mononuclear cells containing osteoclast precursors. In addition, zoledronic acid also inhibits osteoclast survival, which is not seen in denosumab treatment [22].

We routinely use zoledronic acid pre operatively and post operatively.

Recurrence of giant cell tumor are common hence the patients need to follow up for at least 10 yrs. CT Scan of chest to detect pulmonary mets is mandatory. Treatment option for recurrence depend upon the spread of tumor. If it is localized to bone intralesional curettage and bone cementing can be done. However if it is spread to periphery then the treatment need to be supplemented with chemotherapy and radiotherapy [23].

Conclusion

GCT of the dorsal spine are extremely rare. Few rare cases have been reported in literature. Early diagnosis of the disease with imaging modalities and intraoperative biopsy yields better prognosis for the patient. Wide resection of the mass with spinal fixation procedure is necessary. A close follow up is mandatory to pick up both early and late complication.

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