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(CASE REPORT)

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Management of a thoracic osteoblastoma revealed by slowly progressive spinal cord compression: A case report

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Abstract

Background: Osteoblastoma is a rare benign bone tumor accounting for approximately 1% of all primary bone tumors. Accurate diagnosis is essential for determining the most appropriate treatment strategy and prognosis. In most cases, diagnosis is based on clinical, radiological, and especially histopathological findings. The radiological appearance of osteoblastoma is highly variable, ranging from indolent lesions to locally aggressive tumors. We report the case of a 31-year-old woman presenting with a D12 osteoblastoma causing intercostal neuralgia and progressive paraparesis.

Case Description: A 31-year-old woman with no significant medical or surgical history presented with symptoms of spinal cord compression evolving over a six-month period. Thoracic CT and MRI demonstrated a lytic lesion involving the posterior portion of the vertebral body and the right pedicle of the D12 vertebra. An emergency D12 laminectomy and biopsy were initially performed. Because of the highly hemorrhagic nature of the lesion observed intraoperatively, definitive tumor excision and spinal fixation were scheduled as a second-stage procedure. Postoperatively, the patient experienced significant neurological improvement, including recovery from paraparesis and reduction of dorsal pain.

Conclusion: Early and appropriate surgical management of thoracic osteoblastoma resulted in a favorable clinical outcome.

Keywords: Osteoblastoma; Spinal Fixation; Tumor Excision; Radiotherapy

1. Introduction

Osteoblastoma is one of the most characteristic benign primary bone tumors. Its peak incidence occurs during the second and third decades of life. It is known for its osteoblastic activity and locally aggressive behavior. Various studies have shown that osteoblastoma accounts for approximately 1–5% of all benign bone tumors and about 1% of all bone tumors. [1,2]

The spine is the most common site of involvement, representing 28–36% of reported cases, followed by the long bones. Within the spine, osteoblastomas show a marked predilection for the posterior elements, particularly the laminae and pedicles, and account for approximately 10% of all spinal bone neoplasms. [3–7].

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These tumors frequently cause significant bone destruction, soft tissue invasion, and epidural extension. Their aggressive behavior may lead to uncontrolled local recurrence. If left untreated, progressive tumor growth can result in malignant transformation, extensive bone destruction, and neurological deficits [5]. Osteoblastoma is generally resistant to conventional radiotherapy and chemotherapy. Consequently, surgical resection remains the accepted cornerstone of treatment, particularly in patients presenting with neurological impairment, providing substantial relief of pain and neurological symptoms. [6-9].

2. Case presentation

2.1. Clinical Presentation

A 32-year-old woman with no relevant medical history, no previous surgical history, and no history of tuberculosis exposure presented with progressive heaviness and weakness of both lower limbs for six months. The neurological deterioration was accompanied by genitourinary dysfunction, including acute urinary retention.

Clinical examination revealed a lower thoracic spinal syndrome associated with anal hypotonia and paraparesis graded 2/5.

Because of the severity of spinal cord compression, emergency surgical intervention was indicated. The initial plan consisted of complete tumor excision, laminectomy, and spinal fixation. However, significant active bleeding encountered during surgery prevented definitive resection during the first procedure. Therefore, only decompressive laminectomy and biopsy were performed to establish a histological diagnosis. The patient was subsequently scheduled for a second-stage tumor resection.

2.2. Diagnostic Assessment

2.2.1. Medullar MRI

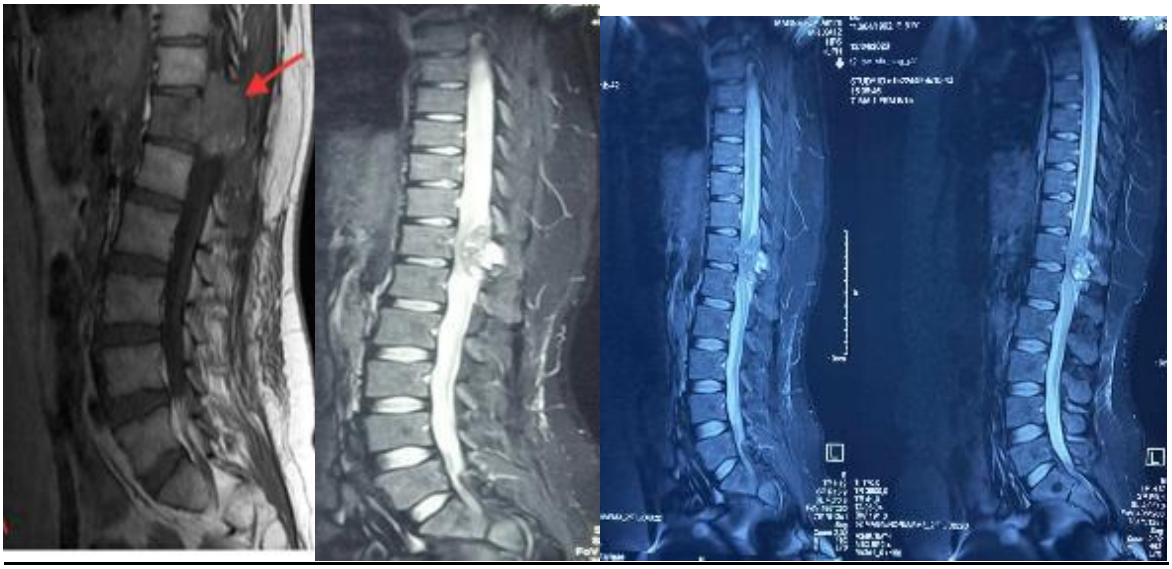

Figure 1a Medullar MRI

Thoracolumbar MRI demonstrated a lytic lesion centered at D12 (red arrow) with extension into the vertebral body and spinal canal, causing spinal cord compression. The lesion was oval, well circumscribed, and multilobulated. MRI characteristics included low signal intensity on T1-weighted images, heterogeneous high signal intensity on T2-weighted images, and internal calcifications.

2.2.2. Spinal Arteriography

Preoperative spinal angiography played a crucial role in the vascular assessment of this thoracic osteoblastoma and in the identification of the artery of Adamkiewicz, the principal anterior radiculomedullary artery supplying the anterior spinal artery. Precise localization of this vessel is essential before any surgical or endovascular intervention involving hypervascular spinal tumors, particularly in the thoracolumbar region, as inadvertent injury or occlusion may result in

catastrophic spinal cord ischemia and irreversible neurological deficits. In the present case, selective spinal angiography demonstrated that the artery of Adamkiewicz originated from the right D10 intercostal artery, whereas the tumor was centered at the D12 vertebral level on the right side. This anatomical information was of major importance for surgical planning, as it confirmed that the dominant radiculomedullary supply to the spinal cord arose cranial to the lesion and was not directly involved in the tumor vascularization. Consequently, the angiographic study allowed a safer operative strategy by delineating the relationship between the tumor-feeding vessels and the spinal cord vascular supply, thereby minimizing the risk of ischemic injury during tumor resection. Beyond its diagnostic value, spinal angiography remains the gold standard for evaluating the vascular anatomy of spinal tumors and for identifying critical radiculomedullary arteries that must be preserved throughout treatment.

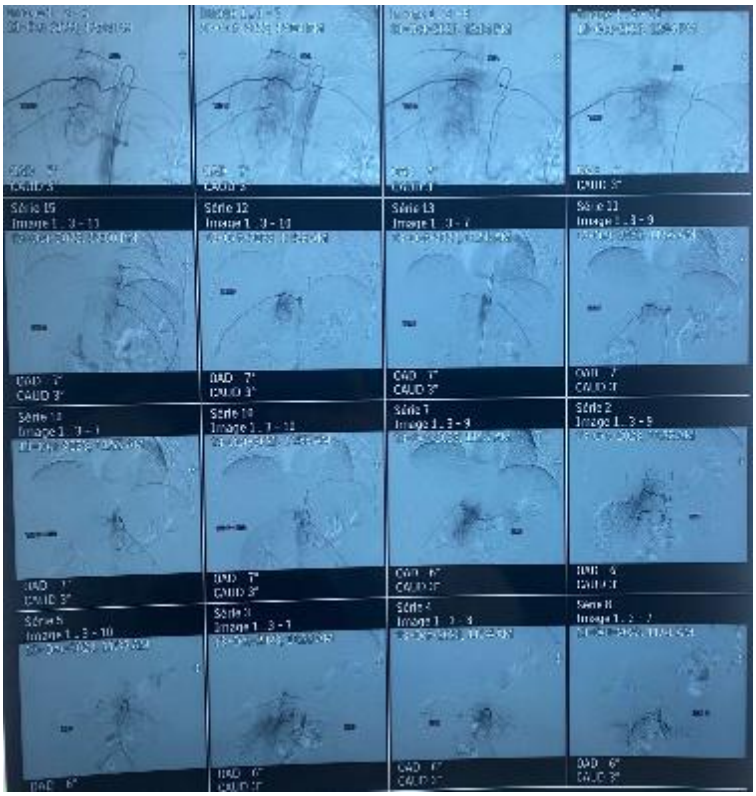

Figure 1b Spinal arteriography demonstrated that the artery of Adamkiewicz originated from the right D10 intercostal artery

2.3. Surgical management

The patient was positioned prone with thoracic and abdominal supports. Fluoroscopic localization of the D12 level was performed before a midline dorsal incision was made.

Following bilateral exposure of the paravertebral gutters from D11 to L1, a fibrous mass was identified on the right side of D12 involving the pedicle. Four pedicle screws were inserted at D11 and L1 to provide stabilization.

Tumor devascularization was first performed. Tumor excision then proceeded by developing a cleavage plane between the tumor capsule and surrounding musculature. En bloc resection of the tumor and involved pedicle was achieved while preserving an intact dura mater.

The resection continued deeply into the epidural space, with gentle retraction of the dural sac until the posterior wall of the D12 vertebral body was visualized. Superior dissection extended toward the D11 epidural space.

The tumor was highly vascular and hemorrhagic. Hemostasis was achieved using bipolar coagulation. The tumor capsule, which was adherent to surrounding muscular structures, was removed. The resection was considered subtotal. Because of significant blood loss, the patient required transfusion of three units of packed red blood cells.

The postoperative course was uncomplicated.

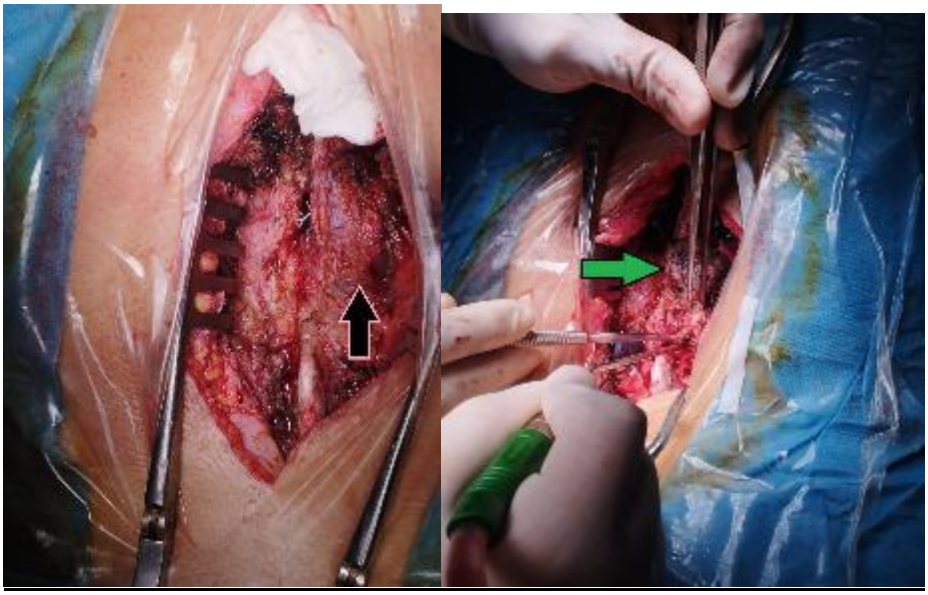

Figure 2 A right-sided fibrous mass with a firm consistency (black arrow)

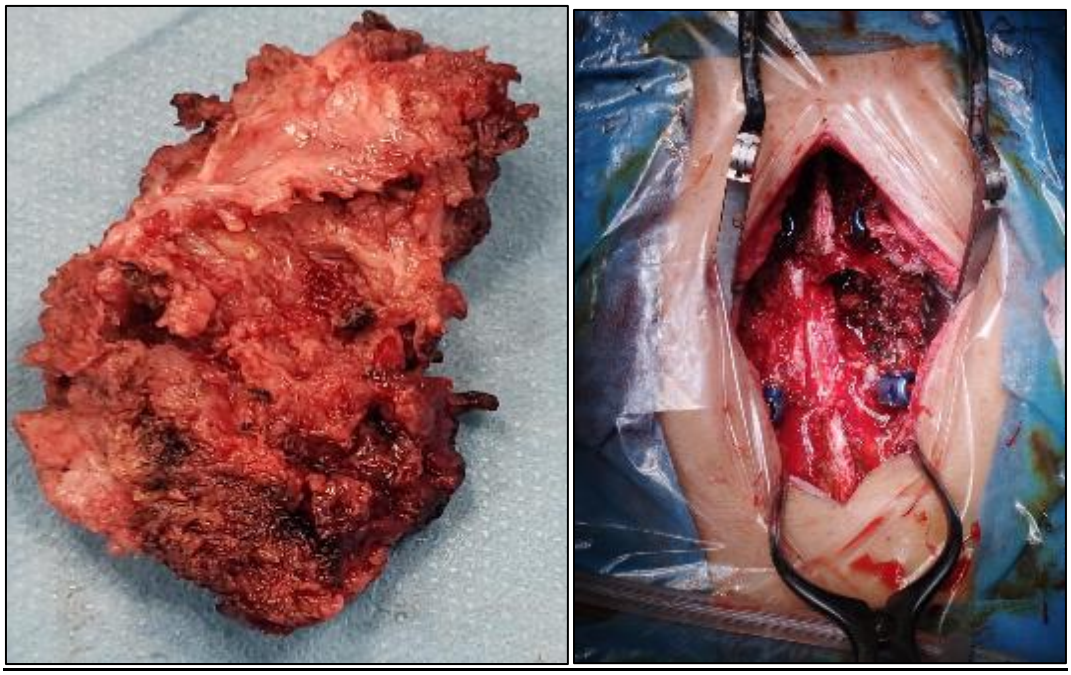

Figure 3 An en bloc resection of a 3 cm fibroelastic mass with intralesional calcifications was performed

The resected specimen measured approximately 3 cm and had a fibroelastic consistency containing calcified areas.

Given the risk of postoperative spinal instability, stabilization and fixation of the adjacent levels (D11–L1) were performed.

2.4. Outcome

Postoperative recovery was favorable. Motor function improved from grade 2/5 to grade 3+/5. Genitourinary dysfunction resolved completely. The patient also experienced significant relief of dorsal pain.

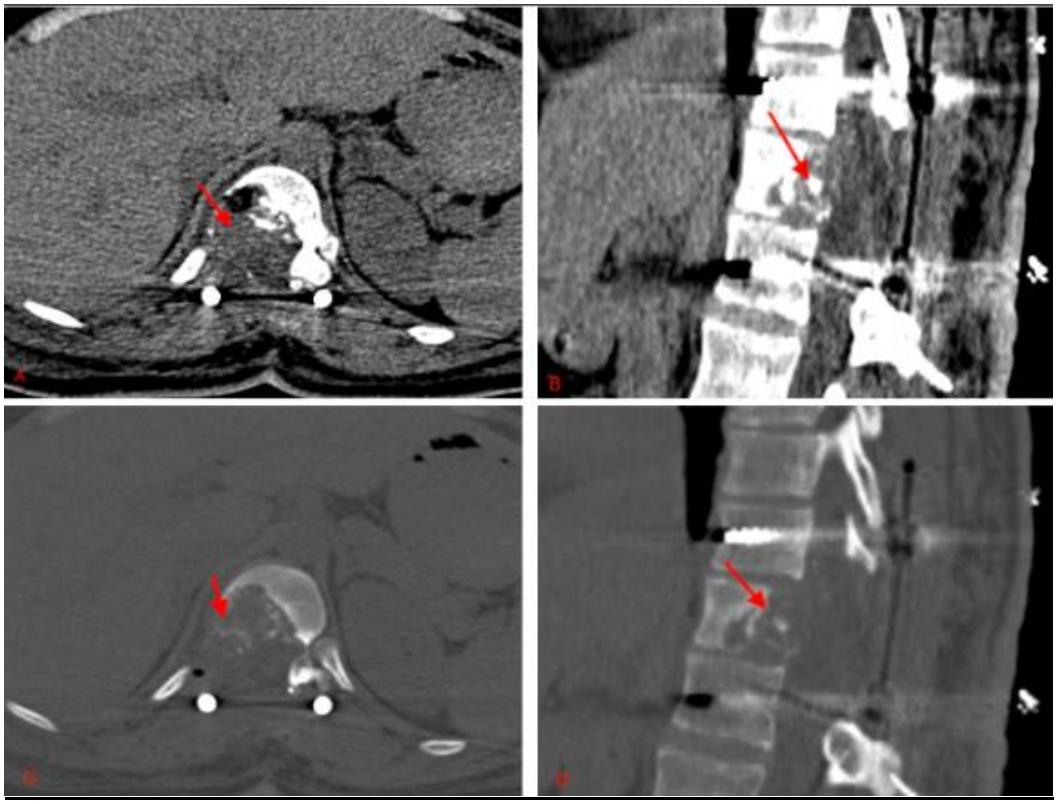

Figure 4 Postoperative CT imaging demonstrated residual tumor tissue causing expansion of the bone, together with expected postoperative changes and spinal fixation hardware in satisfactory position

The patient was subsequently referred for adjuvant radiotherapy as part of the overall management strategy.

3. Discussion

According to the World Health Organization classification, osteoblastoma is considered a benign osteoblastic tumor with locally aggressive behavior. [2–4].

Patients with thoracic osteoblastoma commonly present with persistent back pain, paravertebral muscle spasm, stiffness, and pain that is often resistant to anti-inflammatory drugs and aspirin. Neurological deficits such as paraparesis and paraplegia occur in approximately one-third of patients. Back pain may also result from pathological fractures or soft tissue extension producing a mass effect[1-6-10].

The principal differential diagnoses include osteoid osteoma and osteosarcoma. Osteoblastoma typically produces more osteoid tissue and exhibits greater vascularity than osteoid osteoma. Its highly vascular nature explains the substantial intraoperative bleeding frequently encountered during surgical resection.

Recent studies have suggested that hypoxia-associated microRNA-210 may serve as a useful biomarker for distinguishing osteoblastoma from osteosarcoma.

The role of radiotherapy remains controversial. Nevertheless, open surgical resection continues to represent the standard treatment. Surgical options include intralesional curettage, subtotal resection, or en bloc excision.

The choice of surgical strategy depends on several factors, including clinical presentation, tumor location, tumor size, and degree of local invasion. Accepted indications for surgery include persistent pain, progressive tumor enlargement, neurological deficits, risk of malignant transformation, and progressive destruction of spinal structures. [3-8].

According to the Enneking staging system, stage 2 lesions are classified as active benign lesions, whereas stage 3 lesions are considered aggressive benign tumors. Aggressive stage 3 lesions may require marginal or en bloc resection, while less aggressive lesions may be managed by curettage. [2–4].

Accurate preoperative evaluation is essential for achieving complete tumor resection. MRI and CT imaging provide critical information regarding tumor extension and involvement of surrounding structures. Larger lesions often require more extensive resections, which may compromise spinal stability. Consequently, instrumentation and spinal fixation are recommended whenever substantial portions of the pedicles or facet joints must be removed. [8-9–10].

Because osteoblastoma is a hypervascular tumor, preoperative embolization of feeding vessels may reduce intraoperative blood loss and facilitate complete resection.

For aggressive stage 3 osteoblastomas, en bloc resection with wide surgical margins should be considered the preferred treatment option whenever technically feasible. [4-6].

4. Conclusion

Osteoblastoma is a rare benign bone tumor with a strong predilection for the posterior elements of the spine. Because of its rarity, clinical experience remains limited. Accurate diagnosis requires a combination of multimodal imaging, histopathological examination, and careful surgical assessment.

Aggressive surgical management, when indicated, combined with appropriate spinal stabilization, can produce excellent clinical and radiological outcomes. Early diagnosis and timely intervention remain critical to preventing neurological deterioration and preserving spinal stability.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

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

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