CASE REPORT 4
Osteoblastoma of the first thoracic spine treated with corpectomy and fusion: A rare case report

ABSTRACT

Keywords - Osteoblastoma, Osteoid osteoma, First thoracic spine, Corpectomy, Upper back pain.

Abstract

Introduction and importance: Thoracic spine involvement of the osteoblastoma is a rare occurrence. A multidisciplinary approach will provide a good outcome.

Case presentation: We present a 16-year-old patient with a first thoracic spine managed surgically.

Clinical discussion: A 16-year-old schoolboy presented with a history of dull aching type neck pain which progressively worsens over the last four months without any neurological weakness. Radiographic studies of the spine show an expansile well-corticated lesion with central radiolucent nidus with bony sclerosis in the first thoracic spine which is suggestive of osteoblastoma. A corpectomy with a tricortical iliac graft fusion and anterior instrument stabilization was achieved by a multidisciplinary team. The patient is pain-free and a full range of neck movement is achieved.

Conclusion: Osteoblastoma of the spine can be treated surgically with a low risk of recurrence successfully. Torrential bleeding during the surgery is a devastating complication. Preoperative radiological embolization and Intraoperative navigations are the available options to overcome it. A combined multidisciplinary team approach will provide a good outcome.

Introduction

Osteoblastoma is a rare osteoid-producing primary bone tumor with a predilection for the long bone(1). Jaffe apud Samdani et al first describe osteoblastoma and osteoid osteoma in 1935(2). Incidence of spinal osteoblastoma was noted in the literature as 36% with a high prevalence in the cervical and lumbar region(1)(3). Clinical presentation varies according to the location of the tumor; however, dull aching type night pain is common. Surgical excision and stabilization of the spine will give an excellent outcome and return of normal life to the patient. We shared our Sri Lankan experience of managing a patient with osteoblastoma of first thoracic spine osteoblastoma with a corpectomy and fusion with an iliac bone graft.

Case

A 16-year-old previously healthy schoolboy presented with a history of a dull aching type of pain in the lower cervical and upper thoracic region which was difficult
to localize by himself for six months duration. The pain gradually got worse over the last four months which it was not responding to the analgesics. He had on and off right-side hand numbness but no weakness. He had strongly denied any history of trauma and family history of malignancy. He had midline tenderness at the lower cervical spine region and a global restriction of neck movement. His detailed neurological examination and systemic examination were completely normal.

His initial cervical spine X-ray showed a lucent area with surrounding sclerotic lesion at the first thoracic spine mostly on the right side. Computed tomographic studies revealed an expansile well-corticated lesion with central radiolucent nidus with bony sclerosis. The transitional zone is preserved. It was causing a spinal canal narrowing. T1 images of MRI showed iso/intermediate signal intensity with an area of low/flow void due to calcification. T2 imaged of MRI shows a hypodense with surrounding vertebral body high intense favor of bone marrow edema. This edema also extends into the right pedicle, lamina, and spinous process. In the surrounding paravertebral soft tissue illuminated a high signal. There was no spinal cord compression, and a mild thecal sac impingement was seen. The initial blood investigation is within the normal range.

**Figure 1** shows a radiolucent area in the first thoracic spine in the lateral of cervical spine X-rays

**Figure 2** shows an expansile well-corticated lesion with central radiolucent nidus and bony sclerosis in an axial view of first thoracic spine computed tomographic image

**Figure 3**
A corpectomy and fusion with instrument stabilization using an anterior approach were planned in the multidisciplinary team meeting. The surgery was performed along with a neurosurgeon. His first thoracic vertebral body was completely excised using a standard Smith and Robinson approach. The tumor was peeled off from the dura and hemostasis was achieved. A tricortical iliac graft was harvested and used as a strut graft for fusion. An anterior plating was applied to provide instrumental stability. Initial postoperative care was uneventful. His histological report confirmed it as osteoblastoma. He is now pain-free, his normal range of movement is achieved and followed up in the clinic.

**Figure 5** (an anterior posterior view of lower cervical and upper thoracic spine) & **Figure 6** (a lateral view of lower cervical and upper thoracic spine) shows immediate postoperative Xrays of corpectomy of first thoracic vertebra and instrumental stabilization.

**Figure 7** shows a bony lesion composed of woven bone trabeculae. These trabeculae are haphazardly arranged and lined by a single layer.
of osteoblasts. A rich vascularity is identified with extravasated red blood cells.

**Discussion**

Osteoblastoma is a benign primary bone tumor that mimics osteoid osteoma histologically(4). The size of the lesion is the main differentiating feature. The diameter of the osteoblastoma is usually more than 2cm in diameter whereas osteoid osteoma is less than 1.5cm(5). The incidence of osteoblastoma in all bone tumors is only 1% and among the spinal tumors, it is 10%(1). It predominately affects the posterior elements of the spine mainly the pedicle and lamina(6). It affects the children with the age of 10 to 15 years mostly, but the age of presentation varies from 6 months to 75 years(3). However, nearly 80% of the people will present before the age of 30 years. Males are having 2.5 times more risk than females to develop osteoblastoma in their lifetime(3).

Clinically presentation of the lesion varies according to the location of the tumor. But typically, a dull aching type of night pain that is difficult to locate and respond to the simple analgesics is the common presentation(7). Thoracic osteoblastoma may present with upper back pain, intercostal neuralgic pain, or even with myelopathic features(7). Cervical osteoblastoma patients may present with neck discomfort or oropharyngeal pain(8). Lower cranial nerve palsy with the craniovertebral junction involvement of osteoblastoma and abdominal symptoms with the sacral bone involvement was also described in the literature(8). New onset of scoliosis and torticollis in a child warrant exclusion of spinal osteoblastoma(9). One-third of the spinal involvement of the osteoblastoma presented with neurological involvement. Thoracic lumber osteoblastoma or osteoblastoma involving the ribs may present with painful rapid progressing scoliosis(10).

The aggressive and conventional type of osteoblastoma is the two types of osteoblastoma elaborated in the literature(11). Aggressive type osteoblastoma can extend to the paravertebral and epidural spaces. It is larger than conventional type osteoblastoma(11). Histologically osteoblastoma is an expansile lesion with high vascularity that exhibits both osteolytic and osteoblastic activities. Evidence of aneurysmal bone cyst formation and areas of hemorrhage were also noted histologically(12). Large epithelioid osteoblasts and invasion of cortical bone are the two differentiating histological features to differentiate aggressive type from the conventional type(11). The transition of osteoid osteoma into osteoblastoma was documented in the literature but less commonly(13).

Osteoblastoma usually appears as an osteolytic lesion in the plain X-ray. It can also appear as a central osteolytic nidus which is surrounded by osteosclerotic margins like osteoid osteoma(14). Matrix calcification, mineralization of the nidus, cortical bone destruction, and extension into the surrounding structures are the common radiological features of aggressive type tumor which can be demonstrated with the help of computer tomographic studies(14). MRI imaging technique is needed to demonstrate the involvement of the surrounding structures. Technetium-99 bone scan shows uptake at the site of the lesion. But bone scintigraphy studies are more sensitive in diagnosing the lesion of the osteoblastoma(5).

Enneking classification system is commonly used to classify musculoskeletal tumors which classify osteoblastoma into three types. It is based on the histological, radiological, and clinical presentation of the tumors(15). The Latent (S1) stage is an inactive tumor that grows slowly and is surrounded by a well-circumscribed capsule. The Active (S2) stage is a slowly growing active tumor with a thin capsule. The Aggressive (S3) stage is an aggressively growing tumor with an incomplete or no capsule(15). It tends to acquire a pseudo capsule by invading into the surrounding structures. It is associate with a high level of recurrence rate(15).

The goal of surgical treatment is resection of the tumor and prevention of recurrences.
Radical excision, curettage of the lesion combined with or without radiotherapy are available surgical treatments. Radical excision of the tumor rather than a curettage is proven to be beneficial in the outcome(11). Stabilization with instruments and fusion is necessary to prevent progressive deformity in the future. Because of the high vascularity, bleeding is a devastating complication during the surgery(15). Cervical spine osteoblastoma is closed to the foramen to the vertebral artery. Iatrogenic damage to the vertebral artery is also one of the commonest complications during the excision of cervical spine osteoblastoma. Intraoperative navigation and pre-operative embolization of the feeding vessel to the tumor are options available to reduce the bleeding during surgery(15).

Radiotherapy is not commonly used as a primary modality of treatment because of the risk of late transition of sarcomatic changes(16). It has been used as an adjuvant to surgical treatment for stage 3 osteoblastoma which is not suitable for complete excision. Methotrexate, bisphosphonate, and bufotalin are used as chemotherapeutic agents’ adjuvant to surgical excision. A combination of doxorubicin, methotrexate, and cisplatin was also used as chemotherapeutic agents which successfully stopped the tumor progression up to three years(5). Radiofrequency ablation of spinal osteoblastoma is also a treatment option described which requires experts and the facilities(17).

The recurrence rate of tumors is less than ten percentage following complete excision of tumors(5). survival of stage 3 osteoblastoma following a surgical excision adjuvant with radiotherapy reported up to 25 years(5). Profuse bleeding which leads to death during surgery, local recurrence, progressive development of kyphosis, and hardware failure are the documented surgical complication following excision of spinal osteoblastoma(18).

**Conclusion**

Thoracic spine involvement of osteoblastoma is a rare entity that can be successfully treated surgically. Young males are the most affected population. Early diagnosis and a multidisciplinary team approach need to provide a better outcome to the patient. A preoperative radiological guided embolization will reduce the devastating bleeding during the surgery. A multidisciplinary approach is important in diagnosis and treatment.

**References**


