Neurol Med Chir (Tokyo) 45, 379～383, 2005

Progression of a Lumbar Spinal Osteoblastoma
—Case Report—

Hakan EMMEZ, Memduh KAYMAZ, Nil TOKGÖZ*,
Güldal YILMAZ**, and Gökhan KURT

*Departments of Neurosurgery, *Radiology, and **Pathology,*
Gazi University Medical School, Besevler, Ankara, Turkey

Abstract

A 24-year-old woman presented with a lumbar spinal osteoblastoma manifesting as a 5-year history of low back pain radiating to the left foot. Neuroimaging showed suspicious hypertrophy of the left L4-5 facet which transformed in 3 years to an expansile mass lesion that compressed the dura mater and neural structures. Primary benign bone tumors such as osteoblastoma and osteoid osteoma should be considered in the differential diagnosis of back pain and the patients should be followed up carefully.

Key words: osteoblastoma, back pain, bone tumor

Introduction

Osteoblastoma is a benign primary bone neoplasm that accounts for approximately 3% of benign and 1% of all primary bone tumors.[1,2,5,6,15] Osteoblastoma is a rare benign tumor mostly seen in children and young adults, with a male to female ratio of approximately 2 to 1.[4,12,15,16,20] Spinal involvement occurs in 34% to 41% of cases.[6,13] Spinal osteoblastomas are located in the lumbar spine in 7–25% of cases, in the neural arch in 66%, in the posterior elements in 24%, and in the vertebral body in 3%.[14,15] Associated scoliosis is the major problem in more than half of the patients with spinal osteoblastoma.[19] The posterior elements of the spine tend to be involved.[15] Spinal osteoblastoma is similar to osteoid osteoma in many ways but is distinguished by pain refractory to salicylate treatment, larger radiological size, and absence of reactive perifocal bone formation. Osteoblastomas of the spine average approximately 3 cm in diameter.[15] Here we describe the progression of a lumbar spinal osteoblastoma in a young woman which was smaller than average, as a result of early diagnosis and follow up.

Case Report

A 24-year-old woman was admitted with a history of low back pain persisting for 5 years. Physical and neurological examinations found no abnormalities. The patient was treated with non-steroid analgesics and muscle relaxants under a diagnosis of postural low back pain. One year after her first visit she was readmitted as the symptoms remained unchanged and she had additional nocturnal low back pain that was also evident in the morning and aggravated by movement.

Neurological examination only found restriction of spinal movements in the lumbar region. Lumbar computed tomography (CT) showed hypertrophy of the left L4-5 facet, and a suspicious small (1 × 0.5 cm) lytic lesion with central ossification in the lamina and superior articular process of the L-5 vertebra (Fig. 1). Magnetic resonance (MR) imaging revealed expansion and abnormal signal intensity changes in the left L4-5 facet and the lamina of the L-5 vertebra (Fig. 2). Whole body bone scintigraphy showed increased focal uptake in the left side of the L-4 and L-5 vertebrae (Fig. 3). The diagnosis was osteoblastoma or osteoid osteoma. Exploration and biopsy was planned but the patient refused.

Nearly 2 years later, she was readmitted again with severe low back pain that reflected to the left thigh and posterior lateral of her leg. Neurological examination revealed positive left straight leg raising at 30 degrees, and weakness in dorsiflexion (3/5) of the left foot with L4-5 hypesthesia. Lumbar CT showed that the lesion had enlarged (1.5 cm diameter) with prominent expansion of the bone,

Received July 26, 2004; Accepted January 13, 2005

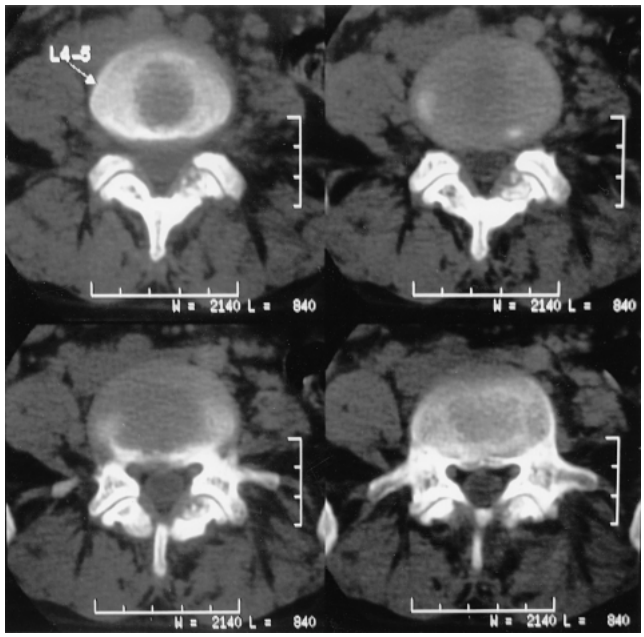


Fig. 1 Computed tomography scans demonstrating hypertrophy of the left L4-5 facet and a well-defined lytic lesion in the lamina and superior articular process of the L-5 vertebra. The lesion is very small (1 × 0.5 cm) and contains ossification.



Fig. 2 Axial T_1-weighted magnetic resonance image showing expansion and abnormal signal intensity changes in the L4-5 facet and the lamina of the L-5 vertebra on the left side.

and ossification within the lesion associated with prominent surrounding sclerosis (Fig. 4). MR imaging showed that the expansile lesion had compressed the thecal sac and narrowed the neural foramina, with associated reduced signal intensity of the left L4-5 facet and the lamina of the L-5 vertebra consistent with sclerosis (Fig. 5). She

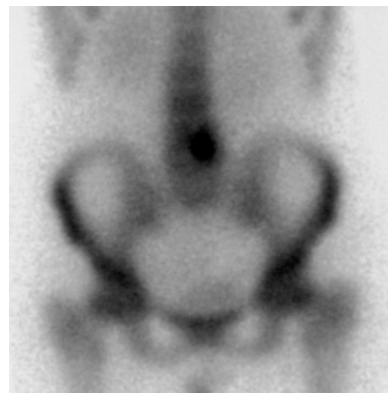


Fig. 3 Radionuclide bone scan showing increased focal uptake in the left side of the L4–5 vertebrae.



Fig. 4 Follow-up computed tomography scan after 3 years showing the lesion had enlarged (1.5 cm diameter) with prominent expansion of the bone, and ossification within the lesion associated with prominent surrounding sclerosis.

finally agreed to undergo surgery.

Left L-4 laminectomy, L4-5 medial facetectomy, and gross total excision of the mass lesion were performed. A well-defined, soft, highly vascularized mass lesion with epidural extension was observed during the operation. Histological examination of the tumor found randomly interconnecting trabeculae of woven bone prominently rimmed by osteoblasts. The osteoblasts appeared plump and active, and the nuclei had regular contours with a single nucleolus. The stroma consisted of loosely fibrovascular tissue, with many thin-walled capillaries. There were several multinucleated giant cells (Fig. 6). The histological diagnosis was osteoblastoma.

Follow-up MR imaging obtained 4 months after the operation showed postoperative changes and no



Fig. 5 **Axial T_2-weighted (A) and sagittal T_1-weighted (B) magnetic resonance images showing the expansile lesion as intermediate and low signal intensity, respectively. Compression of the thecal sac and narrowing of the neural foramina have occurred. Associated reduced signal intensity of the left L4-5 facet and the lamina of the L-5 vertebra is consistent with sclerosis. There is no associated soft tissue component.**

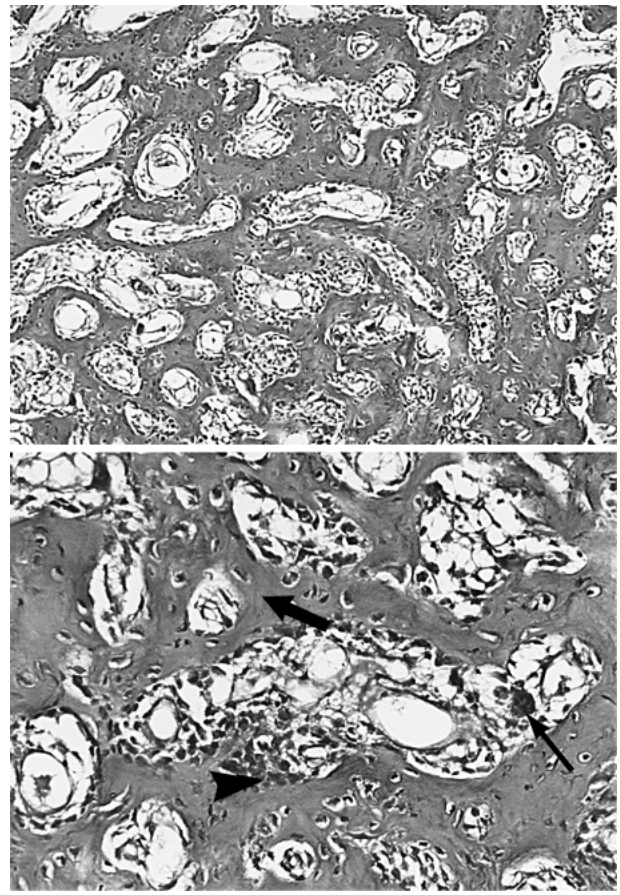


Fig. 6 ***upper*: Photomicrograph showing randomly interconnecting trabeculae of woven bone and local aggregates of osteoblasts, and the stroma consisting of loosely fibrovascular tissue. HE stain, original magnification ×40. *lower*: Photomicrograph showing a giant cell (*arrow*), focal rimming of osteoblasts around the bone component (*arrowhead*), and bone tissue (*thick arrow*). HE stain, original magnification ×100.**

residual lesion (Fig. 7). Her neurological deficits had resolved after 1 year. There has been no complaint or recurrence at follow up for 2 years.

Discussion

Patients with spinal osteoblastoma show a wide variety of usually mild neurological deficits.[1,8,10,15,16] Most patients have localized dull pain and tenderness which gradually increase in intensity and are usually not relieved by salicylates, unlike patients with osteoid osteoma.[11,17,18] Diagnosis may be difficult unless the significance of the association between the pain and neurological deficit is appreciated. The correct diagnosis has required 3 months to 2 years to establish.[3,14,15]

Histological differentiation of osteoblastoma from osteoid osteoma and osteosarcoma is essential. Osteoblastoma is defined as a vascular, osteoid, and bone-forming tumor containing numerous benign-appearing osteoblasts. Histologically, osteoid osteo-

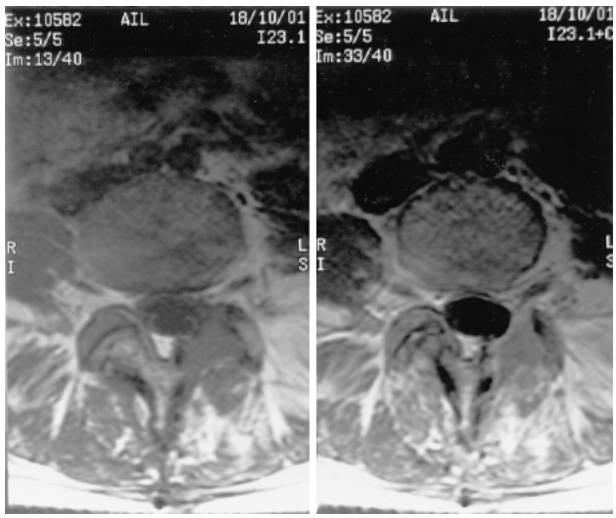


Fig. 7 Follow-up axial T_1-weighted magnetic resonance images (*left*) and with contrast medium (*right*) obtained 4 months after the operation showing the laminectomy defect and enhancement of the granulation tissue at the operation site. There is no residual lesion.

ma is characterized by scanty stromal reaction and rare multinucleated giant cells, and osteosarcoma by significant cellular atypia, mitotic figures, and thick osteoid and woven bone.[6]

Surgery should attempt to achieve total excision of the tumor to prevent recurrence. Recurrence usually results from incomplete removal or histological confusion with low-grade osteosarcoma.[7,9] We believe that except for the associated scoliosis in more than 50% of patients,[15] the most important problem with spinal osteoblastoma is the delay in diagnosis. Generally, a young outpatient who is admitted with a complaint of back pain without neurological deficits is not evaluated in detail, if radiography shows no abnormalities. Since the pain responds well to analgesics, patients do not pay any attention to persistent pain for a long duration. The present case demonstrated the transformation of a suspicious hypertrophic lesion in the L4-5 facet to an expansile mass lesion, suggesting that osteoblastoma could act as a ''ghost tumor'' in the early stages.

The diagnosis of ''spinal osteoblastoma'' should always be considered in young patients with back pain to establish an early diagnosis, and requires further investigation with bone scintigraphy even if MR imaging and CT identify no abnormalities. The increased focal radioactivity on bone scintigraphy in osteoblastomas, as in our case, may be the only positive finding. Positive bone scintigraphy and CT or MR imaging findings of a suspicious lesion should be followed by CT-guided biopsy to confirm the diagnosis. However, total excision should be attempted for curative treatment.

References

1) Akbarnia BA, Rooholamini SA: Scoliosis caused by benign osteoblastoma of the thoracic or lumbar spine. *J Bone Joint Surg Am* 63: 1146–1155, 1981
2) Cobb JR: Outline for the study of the scoliosis. *American Academy of Orthopaedic Surgeons* 5: 261–275, 1948
3) Dahlin DC, Unni KK: *Bone Tumors. General Aspects and Data on 8542 Cases*. Springfield, Charles C Thomas, 1986, pp 102–117
4) DiLorenzo N, Nardi P, Ciapetta P, Fortuna A: Benign tumors and tumorlike conditions of the spine: Radiological features, treatment and results. *Surg Neurol* 25: 449–456, 1986
5) Healey JH, Ghelman B: Osteoid osteoma and osteoblastoma: Current concepts and recent advances. *Clin Orthop* 204: 76–85, 1986
6) Huvos AG: *Bone Tumors. Diagnosis, Treatment and Prognosis, ed 2*. Philadelphia, WB Saunders, 1991, pp 67–83
7) Jackson RP: Recurrent osteoblastoma: A review. *Clin Orthop* 131: 229–232, 1978
8) Janin Y, Epstein JA, Carras R, Khan A: Osteoid osteomas and osteoblastomas of the spine. *J Neurosurg* 8: 31–38, 1981
9) Kenan S, Floman Y, Robin GC: Aggressive osteoblastoma: A case report and review of the literature. *Clin Orthop* 195: 294–298, 1985
10) Kirwan EOG, Hutton PAN, Pozo JL, Ransford AO: Osteoid osteoma and benign osteoblastoma of the spine. Clinical presentation and treatment. *J Bone Joint Surg Br* 66: 21–26, 1984
11) Kroon HM, Schurmans J: Osteoblastoma: clinical and radiologic findings in 98 new cases. *Radiology* 175: 783–790, 1990
12) Lucas DR, Unni KK, McLeod RA, O'Connor MI, Sim FH: Osteoblastoma: clinicopathologic study of 306 cases. *Hum Pathol* 25: 117–134, 1994
13) Marsh BW, Bonfiglio M, Brady LP, Enneking WF: Benign osteoblastoma: Range of manifestations. *J Bone Joint Surg Am* 57: 1–9, 1975
14) McLeod RA, Dahlin DC, Beabout JW: The spectrum of osteoblastoma. *Am J Roentgenol* 126: 321–325, 1976
15) Nemoto O, Moser RP, Van Dam BE, Aoki J, Gilkey FW: Osteoblastoma of the spine. A review of 75 cases. *Spine* 15: 1272–1280, 1990
16) Nguyen VD, Hersh M: A rare bone tumor in an unusual location: osteoblastoma of the vertebral body. *Comput Med Imaging Graph* 16: 11–16, 1992
17) Obenberger J, Seidl Z, Plas J: Osteoblastoma in a lumbar vertebral body. *Neuroradiology* 41: 279–282,

1999
18) Orbay T, Ataoğlu Ö, Talı T, Kaymaz M, Alp H: Vertebral osteoblastoma: Are radiologic structural changes necessary for diagnosis? *Surg Neurol* 51: 426–429, 1999
19) Saifuddin A, White J, Sherazi Z, Shaikh MI, Natali C, Ransford AO: Osteoid osteoma and osteoblastoma of the spine. Factors associated with the presence of scoliosis. *Spine* 23: 47–53, 1998
20) Skylawer R, Osborn RE, Kerber CW, Glass RF: Magnetic resonance imaging of vertebral osteoblastoma: a report of two cases. *Surg Neurol* 34: 421–426, 1990

Address reprint requests to: H. Emmez, M.D., Department of Neurosurgery, Gazi University Medical School, 06510, Besevler, Ankara, Turkey.
e-mail: hakanemmez@hotmail.com