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AJNR Am J Neuroradiol 1982, 3 (6) 670-673

<http://www.ajnr.org/content/3/6/670.citation>

This information is current as of April 20, 2024.

Computed Tomographic Metrizamide Myelography in the Evaluation of Thoracic Spinal Osteoblastoma

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Osteoblastoma is an uncommon benign bone-forming tumor originally described in 1932 by Jaffe and Mayer [1]. It presents clinically with unusually severe pain that may or may not respond to mild analgesics such as aspirin. The radiographic appearance of osteoblastoma is often considerably varied, but, in most cases, it is an expanding lytic bone lesion that is usually well circumscribed even when it has attenuated and expanded the cortex [2, 3]. Some degree of calcification may be present [2, 3]. It is usually more than 1.5 cm in diameter. It has been described in almost all of the bones of the body, but the vertebral column is the most common location of this tumor and it usually involves the appendages [2–5]. Its differential diagnostic possibilities include osteoid osteoma, aneurysmal bone cyst, osteosarcoma, and giant cell tumor. It bears a close similarity to osteoid osteoma clinically, histologically [2, 4], and ultra-structurally [6]. Radiographic presentation is the most useful means of differentiating between these two entities [2, 4]. The purpose of this communication is to report on the findings and usefulness of computed tomography (CT) metrizamide myelography in four patients with spinal osteoblastoma.

Case Reports

Case 1

A 20-year-old man had 2½ years of localized upper thoracic pain that radiated somewhat to the right. The pain had gradually increased in severity, was most marked at night, and was partially relieved by aspirin. An unconfirmed clinical diagnosis of osteoid osteoma was made elsewhere 2 years before. There were no neurologic symptoms. Physical examination revealed minor back tenderness between the scapulae. Neurologic examination was entirely normal.

Plain films of the thoracic spine showed scoliosis convex to the left centered at T2–T3. The T3 pedicle on the right was not clearly seen (fig. 1A). Polytomography through this region did not confirm destruction of the pedicle. A metrizamide myelogram via a lateral C1–C2 puncture showed a right extradural mass at the T2–T3 level with concomitant displacement of the spinal cord and subarachnoid

space to the left (fig. 1B). CT following the myelogram revealed expansile and cortical erosion of the right pedicle and lamina of T3. A well circumscribed intraspinal mass of density similar to that of cord, measuring about 1.5 cm, was located adjacent to the eroded bone displacing the spinal cord and subarachnoid space to the left (fig. 1C). The vertebral body was also involved.

At surgery, a well defined discrete extradural mass was found opposite T3 extending over the posterior aspect of the dural sac on the right side, distorting and displacing the sac to the left. The adjacent T3 lamina was expanded and porous. The mass was purplish brown, firm, and very vascular.

The intraspinal mass was removed along with as much as possible of the involved vertebra. Histologic examination revealed a benign osteoblastoma. A repeat CT scan at 18 months showed no evidence of recurrence and the patient was free of pain.

Case 2

A 14-year-old girl suffered from severe infrascapular pain for 6 months. The pain was intermittently present day and night. In the several weeks before admission she had been unable to sleep in bed because of aggravation of the pain and had been sleeping on the floor. The pain was most severe in the midthoracic region between the scapulae. There were no neurologic symptoms.

Physical examination was normal except for a scoliosis of the thoracic spine convex to the left. Neurologic examination revealed only brisk tendon reflexes in the lower extremities.

Plain films of the thoracic spine showed a lytic lesion of the right half of the body and pedicle of T4. A small contiguous paraspinal soft-tissue density was present (fig. 2A). Polytomography confirmed the findings. It also revealed the full extent of the destruction of the body of T4 (fig. 2B).

Metrizamide myelography via a lateral C1–C2 puncture revealed an extradural mass on the right side at the level of T4. CT after the myelogram showed an expansile lytic lesion extending across the midline of the T4 vertebral body producing a mass of inhomogenous density. The lesion extended into the pedicle and lamina on the right side. The spinal cord and the subarachnoid space were displaced to the left side by the intraspinal component of this mass. The mass measured about 3 × 3 cm in sagittal and transverse diameters and was sharply delimited with no evidence of infiltration of surrounding structures (figs. 2C and 2D).

A two stage operation was performed: biopsy of the lesion and

Received May 15, 1981; accepted after revision February 9, 1982.

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Fig. 1.—Case 1. A, Plain film of upper thoracic spine. Scoliosis convex to left. T3 right pedicle (*arrow*) not clearly seen. B, Metrizamide myelogram through lateral C1–C2 puncture. Extradural defect right side extending from T3 to T4. C, CT after myelography. Some expansion of right lamina and pedicle of T3 with erosion of inner cortex. Extradural mass (*star*) displaces spinal cord and subarachnoid space to the left.

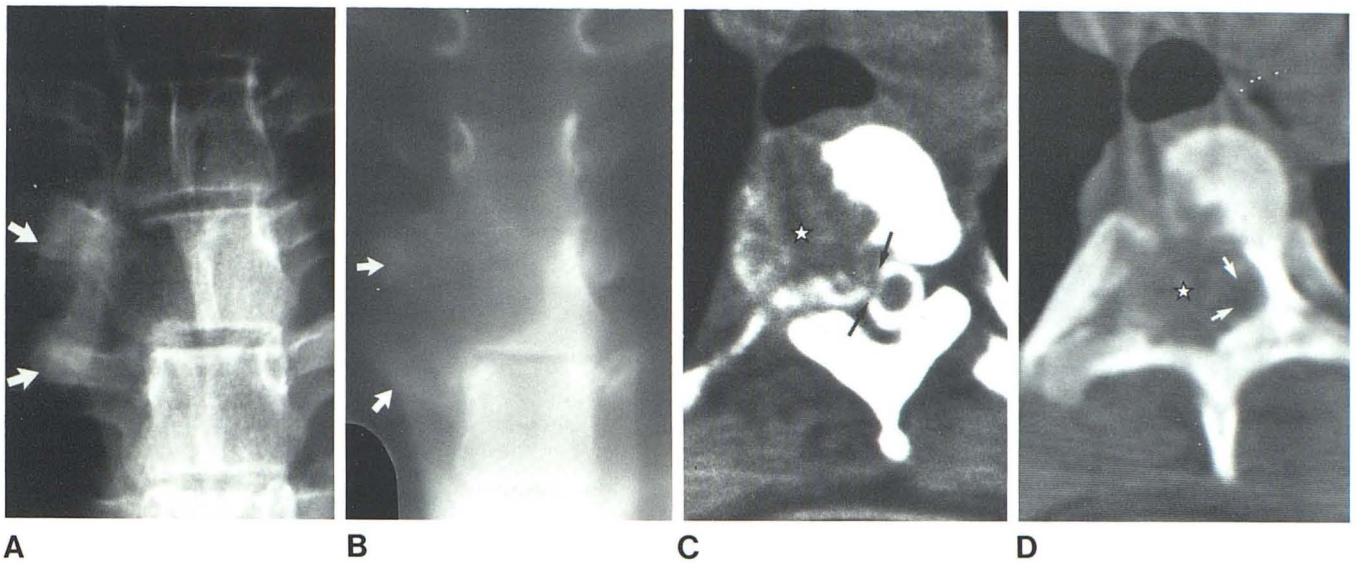
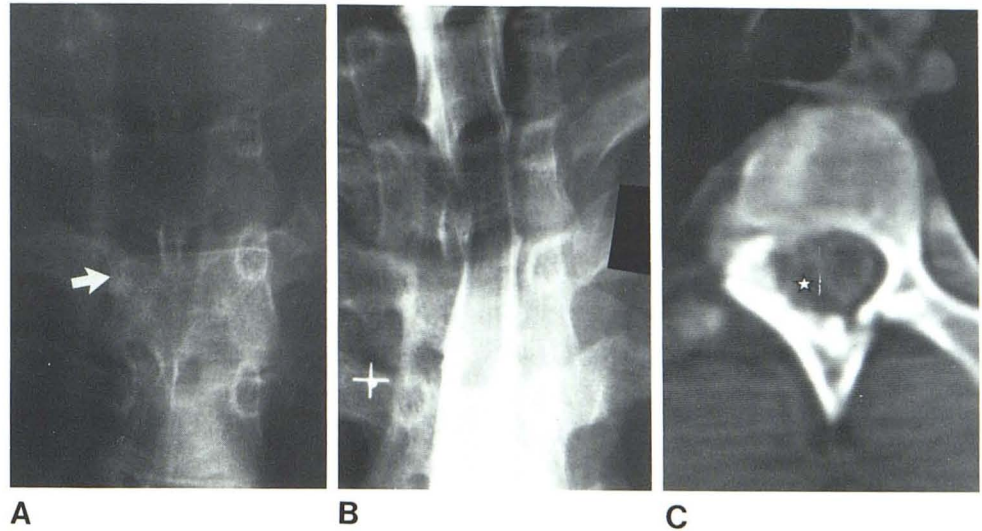


Fig. 2.—Case 2. A, Lytic lesion right half of T4 with paraspinal soft-tissue mass (*arrows*). B, Tomogram, upper thoracic spine, confirms lytic destruction of right half of T4 with paraspinal soft tissue (*arrows*). C, CT after metrizamide myelography. Well circumscribed lesion of inhomogeneous density expands

T4 vertebral body (*star*). Subarachnoid space (*arrows*) displaced to left. D, 10 mm lower. Erosion of right pedicle and lamina of T4 by large extradural lesion (*star*) compresses spinal cord (*arrows*).

decompressive laminectomy. After histologic confirmation of a benign osteoblastoma, a radical excision of the lesion was undertaken. On the basis of the topographic display by CT, the lesion was approached via a right thoractomy. A right hemilaminectomy of T3, T4, and T5 was carried out along with removal of the transverse processes, and the heads of the fourth and fifth ribs. The tumor was extradural and peeled off the lateral aspect of the dura and the involved body of T4. Total gross removal of the tumor was achieved. A rib bone strut graft as well as cancellous bone chips taken from the right hip was applied. Postoperatively, the patient had no recurrence of the pain.

Case 3

A 13-year-old boy had right shoulder pain and a scoliosis. A vertebral lesion was diagnosed, and, after he developed paralysis

of his lower limbs, a laminectomy revealed a T3 osteoblastoma. He was referred 2 years later to our hospital because of a kyphoscoliosis of the upper thoracic spine and inability to walk without holding onto furniture. Examination showed a gibbus at the level of the surgery, a T3 sensory level, lower limb hyperreflexia, sustained bilateral ankle clonus, and a right foot drop.

Plain film examination showed a kyphosis centered at the T3 level with destruction of the body of T3. A metrizamide myelogram via a lateral C1–C2 puncture revealed an almost complete block at T3 with the cord and subarachnoid space displaced backward and to the right (figs. 3A and 3B). CT after the myelogram showed expansion of right T3 pedicle extending into the body of the vertebra. The contents of the spinal canal were displaced to the left. The lesion was inhomogeneous but mostly high density and sharply delimited from the surrounding soft tissues (fig. 3C).

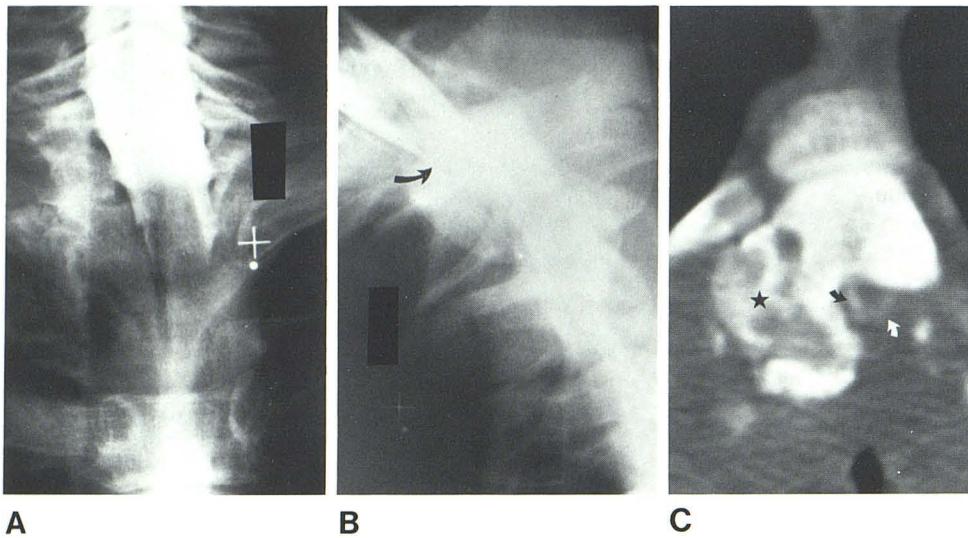


Fig. 3.—Case 3. A, Myelogram via lateral C1–C2 puncture. Almost complete block at T3. Only a trickle of metrizamide passed below obstruction. B, Lateral view. Posterior displacement of cord and subarachnoid space at T3 level (arrow). C, CT after myelography. Inhomogeneous (star) expanded right pedicle and lamina extend into body of T3. Subarachnoid space (arrows). Surgical absence of left pedicle and lamina.

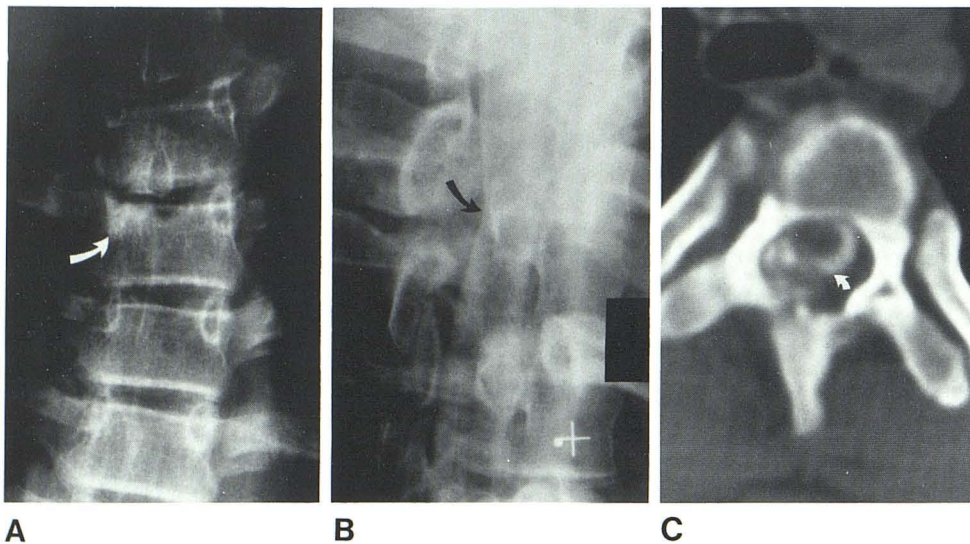


Fig. 4.—Case 4. A, Scoliosis convex to left at T4. Sclerosis of right pedicle at T4 (arrow). B, Oblique view of metrizamide myelogram via lumbar puncture. Extradural indentation of subarachnoid space (arrow). C, CT after myelography. Mass extends into spinal canal from lamina. Subarachnoid space (arrow) displaced by mass.

At surgery, the lesion was seen to involve the right pedicle, body, and the remnant of the lamina of T3. An attempt at total excision was made and a spinal fusion was performed. Histology of the lesion was again that of a benign osteoblastoma. Postoperatively, the neurologic symptoms remained unchanged.

Case 4

A 15-year-old boy had a gradual, 2 year onset of sharp, stabbing, localized sternal pain. The pain was increased by jarring movements, such as flexing his neck. The pain was unaffected by body position and time of day. Examination revealed that percussion over the thoracic spine between the scapulae produced the sternal pain. The neurologic examination was normal.

Plain films of the thoracic spine showed a scoliosis of the thoracic spine with convexity to the left centered at T4 (fig. 4A). The pedicle on the right appeared to be slightly sclerotic. Metrizamide myelography via lumbar puncture showed extradural mass indenting the contrast column at the T3–T4 level from posterolaterally on the right (fig. 4B). CT following the myelogram revealed a sclerotic

lesion in the right arch of T4 with displacement of the subarachnoid space by a well circumscribed mass of a density similar to that of the spinal cord (fig. 4C).

At surgery a discrete extradural mass was found extending from the T4 lamina and distorting the dural sac on the right side. The mass was removed along the T4 laminal arch, the articular pillar, and the pedicle on the right. Histologic examination of the specimen revealed a benign osteoblastoma. Postoperatively the patient's course was unremarkable, and no recurrence of pain was reported up to 2 months after surgery.

Discussion

Several reports have emphasized the usefulness of CT and CT metrizamide myelography in evaluating lesions of the spinal cord [7–9]. CT metrizamide myelography is particularly effective in defining the topography of mass lesions. As in each of the patients presented here, it was very useful in preoperative planning, particularly in adequately localiz-

ing the position and extent of the lesions. The extent of bony destruction, the degree of encapsulation of the tumor, the paraspinal and intraspinal components, as well as the relationship of the cord and the subarachnoid spaces to the mass were all well shown on CT metrizamide myelography. This degree of tumor mapping could not be achieved by either CT or metrizamide myelography alone.

CT metrizamide myelographic findings in spinal osteoblastoma have not been previously described. The expansile lesion, which is sharply delimited from surrounding soft tissues, corroborates the already well known plain film findings of osteoblastoma. The inhomogeneity of the lesion probably reflects coexistence of both the radiographic lytic and calcified portion of this bone-forming tumor. The degree of delimitation of the lesions from surrounding tissues attests to the benignity of this tumor.

The sharp delimitation of the tumor outline allows malignant lesions such as osteosarcoma and chondrosarcoma, which are differential possibilities, to be excluded. A previous report on the CT appearance of osteoid osteoma [10] described no intraspinal lesions or soft-tissue masses, and, therefore, it may be indistinguishable from osteoblastoma. Also, sclerosis, which is a significant feature of osteoid osteomas, was not prominent in our cases. In the patient with an osteoid osteoma examined by CT [10], a well circumscribed nidus surrounded by sclerosis of adjoining bone was demonstrated. No specific nidus was demonstrated in any of the patients in this series.

All our patients showed involvement of the body of the vertebra and, in one patient, the lesion crossed the midline. Whereas most osteoblastomas involve the vertebral appendages, about 14% of all osteoblastomas occurring in the spine are located within the vertebral body, and midline crossing is rare [11]. Recurrence of osteoblastomas after surgical excision is not uncommon [4]. Perhaps the demonstration of the total geography of the lesion by CT metrizamide myelography will enable adequate preoperative planning and, hence, a more radical total excision to prevent

recurrence. However, some reported cases of osteoblastoma regress or become arrested after incomplete surgical removal [4].

These four cases of benign osteoblastoma were excellently imaged with CT metrizamide myelography. This report supports the concept that all myelographic extradural lesions that are not discogenic should be studied by CT metrizamide myelography.

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