Misleading magnetic resonance imaging in spinal osteoid osteomata

A report of 3 children

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Radionuclide imaging and computed tomography have proved to be useful complements to conventional radiographs in diagnosing spinal osteoid osteoma (Helms et al. 1984, Kirwan et al. 1984, Greenspan 1992, Kchouk et al. 1993). However, nowadays magnetic resonace imaging (MRI) is often the first choice in spinal imaging. We describe 3 patients with an osteoid osteoma of the spine, in which MRI was not diagnostic.

Case 1

A 9-year-old girl presented with an 8-month history of back pain. The pain was mild but worsened at night and was relieved by salicylates. She had a left thoracolumbar scoliosis, without any neurologic symptoms. Radiographs of the lumbar vertebrae were normal, except for the scoliosis. Radionuclide bone scanning showed a hot spot in the 4th lumbar vertebra. The most probable diagnosis was an osteoid osteoma. To confirm this diagnosis and locate the nidus, MRI was performed. It showed abnormal signal intensity in the right lamina of L4. There was a thickened neural arch with a decrease in the T1- and T2-weighted signal intensities. At the medial side, a focus of an intermediate signal intensity was seen. However, there was no clear nidus and an osteoid osteoma could not be confirmed. CT scan demonstrated the typical appearance of a subperiosteal osteoid osteoma in the right lamina of L4 (Figure 1). There was a clear central nidus and surrounding sclerosis. After excision of the lesion, the pain resolved completely. Microscopic investigation confirmed the diagnosis.

Figure 1. Case 1.

Axial MRI (T1-weighted) demonstrates a thickened neural arch with a localized intermediate signal intensity.

CT scan shows a nidus and surrounding sclerosis.

Figure 2. Case 2.

Axial MRI (T1-weighted) demonstrates a thickened neural arch with a soft tissue mass located dorsolaterally.

Axial MRI (T2-weighted) shows edema dorsal to the neural arch.

CT scan shows a nidus and surrounding sclerosis.

Case 2

A 13-year-old boy had a 10-month history of back pain with occasional radiation into the right leg. His pain was worst in the mornings. Physical examination revealed a healthy boy with a left convex scoliosis. He had marked spinal stiffness and a positive straight leg-raising test at 20 degrees. There were no neurologic deficits. The clinical diagnosis was a herniated disc. On MRI a broadened neural arch was seen, with decrease in the T1- and T2-weighted signal intensities. A soft tissue mass was seen at the foramen of L4 and edema dorsal to the neural arch. This did not lead to a definite diagnosis. The CT scan showed a clear osteoid osteoma in the right lamina of L4 (Figure 2). Because of the difficulty in interpreting this imaging examination, an exploration and en bloc resection was performed. During the operation, the presumed soft tissue mass, seen at the foramen of L4 on MRI, appeared to be edema, especially arround the L5 nerve root. Histologic investigation confirmed the diagnosis of an osteoid osteoma. After the operation, the pain resolved completely.

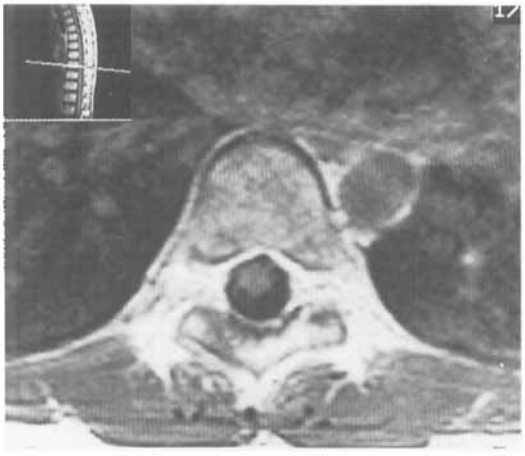
Case 3

A 12-year-old girl presented with a 3-month history of back pain. Her pain was worse in the mornings. She had a left convex scoliosis. Plain radiographs were normal. Radionuclide imaging showed an increased uptake by the Th9 vertebra and an osteoid osteoma was suspected. To confirm the diagnosis and localize the nidus, MRI was done. On T1-weighted imaging no clear nidus was seen, although gadolinium-DTPA had been administered i.v. The T2-weighted imaging showed some edema. Additional CT scanning showed an osteoid osteoma (Figure 3). Since the pain is mild, the girl has been treated with only salicylates with good result.

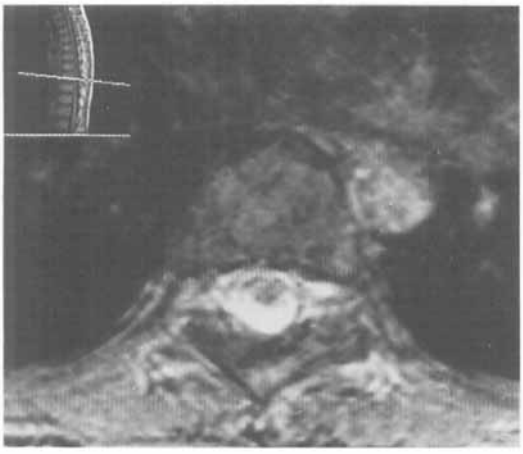
Discussion

Osteoid osteoma of the spine are rare (Mulder et al. 1993) and mostly located in the neural arch. The diagnosis can be difficult and delayed, because plain radiographs often fail to establish the diagnosis. Radionuclide bone scanning shows increased uptake in most cases. Salicylates may relieve the pain (Enneking 1983, Mulder et al. 1993). Early experience with MR of osteoid osteomata in long bones has shown that the nidus is not consistently identified and that the presence of secondary marrow edema and/or joint effusion can lead to false diagnoses, including Ewing's tumor, osteonecrosis, stress fracture, Lyme arhtritis, and juvenile inflammatory arthritis

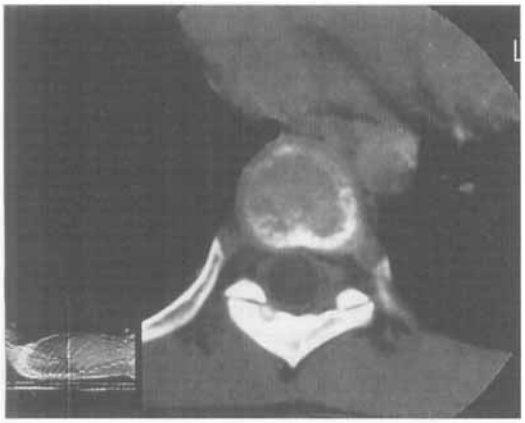
Figure 3. Case 3.



Axial MRI (T1-weighted and Gadolinium-DTPA i.v.). In spite of the Gad.-DTPA, no clear nidus is found.



Axial MRI (T2-weighted) shows a thickened neural arch. No clear nidus is found.



CT scan demonstrates a nidus and surrounding sclerosis.

(Thompson et al. 1990, Goldman et al. 1993). None of the MR images in our patients was initially interpreted as osteoid osteoma.

Since the nidus is well vascularized, Heuck et al. (1988) suggested that it should be visualized after administration of intravenous gadolinium-DTPA. We could not confirm this in our case 3.

By contrast, CT is diagnostic because it shows a bony lacuna surrounded by osteosclerosis and it localizes the nidus of the osteoid osteoma clearly (Helms et al. 1984, Kirwan et al. 1984, Greenspan 1992, Kchouk et al. 1993).

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