Osteoid osteoma of the third lumbar vertebra

Sequential observations with MRI—a case report

Shukuki Koh, Susumu Yazaki, Yoshihiro Owaki and Hitoshi Kato

Department of Orthopedics, Anjo Kosei Hospital, 12-38 Miyukihonmachi, Anjo, Aichi, Japan
Tel +81 566-75 2111. Fax -76 4335
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An 11-year-old girl had low back pain for 1 month, worsening during the night. She had restricted lumbar spine motion and tenderness over the spinous process of L3, with normal neurological findings. All laboratory data were normal. Plain radiographs were normal. Scintigraphy showed an increased uptake at the left lamina of L3. CT showed sclerotic changes in the spinous process of L3, but no osteolytic lesion. MRI was performed on a 0.5 T Toshiba MRT-50A. T1-weighted images were made with a repetition time (TR) of 400 ms and echo time (TE) of 20 ms, while T2-weighted images were produced with a TR of 1800 ms and a TE of 120 ms. MRI showed a widespread abnormal low-intensity signal throughout the bone marrow and soft tissue around the spinous process and the left lamina of L3 on T1-weighted images and a high-intensity signal on T2-weighted images (Figure 1). The diagnosis was uncertain and the patient was repeatedly (n 6) examined by MRI. 2 years after her initial presentation, a CT scan was performed again and it demonstrated a nidus in the left lamina of L3 with a central calcification and surrounding sclerosis (Figure 2). The abnormal high intensity on the MR T2-weighted images gradually normalized during this period (Figure 3). The patient was treated with mephenamic acid, which gradually relieved her pain but not sufficiently, and surgery was performed. A nodular, 1-cm gray mass was found. It was clearly delineated from the surrounding normal bone in the left lamina and extended partially into the left pedicle. The tumor was excised en bloc with surrounding normal bone. Microscopic study revealed an osteoid osteoma. The pain disappeared immediately after the operation and there has been no recurrence of symptoms during 2 years of follow-up.

Figure 1. MR T1-weighted image. Low intensity at the L3 spinous process is noted.

MR T2-weighted image. Abnormal high intensity at the L3 spinous process and interspinous ligament.

Figure 2. CT taken 2 years after her first presentation. The diagnosis was based on the presence of a nidus in the left lamina of L3.

Figure 3. Sequentially taken MR T2-weighted images (left paramedian images). The bone marrow of the L3 pedicle and the left paravertebral muscle initially showed high intensity but they normalized with time.

Discussion

Yeager et al. (1987) reported a case of osteoid osteoma of the talus diagnosed by MRI and mentioned an increase in the bone marrow vascularity around the nidus, which was hypointense on T1-weighted and hyperintense on T2-weighted images. Thompson et al. (1990) cautioned that the secondary bone marrow changes may be misleading because the same abnormal intensities could be observed in osteomyelitis or in malignancy. Houang et al. (1990) concluded that the abnormal intensity observed on MRI reflects a local inflammatory process. Biebuyck et al. (1993) stated that on MRI the edema was observed, not only in the bone marrow but also in the soft tissue adjacent to the tumor showing inflammatory myxomatous changes.

To our knowledge, there are no previous reports describing the sequential change in these MRI findings. In our case, the series of MRI examinations demonstrated that the abnormal high intensity on T2-weighted images, which was seen widely around the tumor, gradually decreased in intensity, indicating that the inflammation adjacent to the nidus was severe in the early stage of the process and subsided with time. Makely and Dunn (1982) suggested that the pain in osteoid osteomas is due to prostaglandins within the nidus, because prostaglandin inhibitors relieve the pain.

Our findings suggest a self-limiting nature of this tumor. Sabanas et al. (1956) reported 3 cases of clinically diagnosed osteoid osteomas of the spine, where the pain was spontaneously relieved during 4–8 years of observation. Nakashima et al. (1989) performed a clinicopathological study of 9 surgically excised osteoid osteomas. They classified the histology of the nidus into 3 stages by the maturation of osteoid tissue and found a direct correlation between the stages and the duration of the symptoms. The authors concluded that the osteoid tissue of the nidus matures into bone tissue and the tumor thus takes a self-limiting course.

References

Biebuyck J C, Katz L D, McCauley T. Soft tissue edema in osteoid osteoma. Skeletal Radiol 1993; 22: 37-41.

Houang B, Greiner N, Greselle J F, Vital J M, Douws C, Broussin J, Caille J M. Osteoid osteoma of the cervical spine—Misleading MR features in a case involving the uncinate process. Neuroradiol 1990; 31: 549-51.

Makely J T, Dunn M J. Prostaglandin synthesis by osteoid osteoma. Lancet 1982; 2: 42.

Nakashima M, Komiya S, Ikuta H, Yamamoto S, Nishimuta H, Inoue A. A clinicopathological study on nine cases of osteoid osteoma. J Orthop Trauma 1989; 37 (4): 1774-7. (in Japanese, with English summary)

Sabanas A O, Bickel W H, Moe J H. Natural history of osteoid osteoma of the spine. Am J Surg 1956; 91: 880-9.

Thompson G H, Wong K M, Konsens R M, Vibhakar S. Magnetic resonance imaging of an osteoid osteoma of the proximal femur: a potentially confusing appearance. J Pediatr Orthop 1990; 10: 800-4.

Yeager B A, Schiebler M L, Wertheim B, Schmidt R G, Torg J S, Perosio P M, Dalinka M K. MR imaging of osteoid osteoma of the talus. J Comput Assist Tomogr 1987; 11 (5): 916-7.