Paget's Disease of the Spine and Secondary Osteosarcoma

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This is a case of a 72-year-old male with a known history of Paget's disease with worsening back pain. Images from computed tomographic (CT) myelography performed 4 years prior to recent presentation demonstrate the characteristic appearance of Paget's disease of the spine with diffuse coarsened, thickened trabeculae and enlargement of the bone resulting in central canal stenosis (see Fig. 1). Selected images of the T12 vertebral body also demonstrate the characteristic appearance of Paget's disease to a slightly lesser degree than the more inferior L1 vertebral body (see Fig. 2).

Four years later, the patient presents with worsening back pain. High-resolution CT scanning of the spine demonstrates, at the T12 level, lytic destruction of the left margin of the vertebral body and pedicle with associated soft tissue involvement (see Fig. 3). Nuclear medicine bone scan demonstrates multifocal involvement of Paget's disease with characteristic increased radiotracer uptake and enlargement of the bones, as noted in the left femur, right hemipelvis, and spine (see Fig. 4).

CT-guided biopsy of the T12 vertebral body was performed, given the change in morphology of the vertebral body. An 11-gauge Osteo-Site (Cook Inc., Bloomington, IN, USA) device was inserted coaxially over an 18-gauge discogram needle to obtain two core biopsies of bone and soft tissue (see Fig. 5). A diagnosis of osteosarcoma was made.

Discussion

Paget's disease of bone is not uncommon with spine involvement seen in over half of cases [1]. Paget's disease is

seen radiographically as areas of enlargement of the bone with thickened, coarsened trabeculae. Usually, a mixed picture of sclerotic and lytic Paget's is encountered; however, there are dominantly lytic forms of Paget's that can confuse the radiographic picture. Increased radiotracer uptake is seen in Paget's with nuclear scintigraphy and does not necessarily indicate malignant transformation.

Malignant transformation of Paget's disease remains uncommon with a wide range of reported incidences, depending on the population sampled, ranging from 0.9 to 20% [2]. Sarcomatous degeneration of Paget's disease into osteosarcoma has been reported rarely with resultant neurologic compromise when occurring in the spine [3–5]. A familial incidence of osteosarcoma in the setting of Paget's disease has also been reported, suggesting a potential environmental or genetic association [6].

The most reliable imaging indication of potential malignant transformation of Paget's is noting a change over time. On conventional radiographs as well as CT, lytic areas of bone destruction, which are new compared to previous serial imaging examinations, can be seen, often in association with a soft tissue mass.

Fig 1. Axial CT image of the L1 vertebral body obtained post myelography and viewed with bone windows obtained 4 years prior to recent presentation demonstrates the characteristic appearance of Paget's disease with thickened, coarsened trabeculae and overall enlargement of the bone

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Fig 2. Axial post myelogram CT of the T12 vertebral body obtained 4 years prior to presentation demonstrates mild Pagetic involvement

The use of imaging guidance to solve potential cases of malignant degeneration of Paget's can provide a reliable diagnosis with less morbidity than open biopsy [7]. Percutaneous transpedicular biopsy of spinal lesions with imaging guidance has been demonstrated to be safe, efficacious, and cost effective [8, 9]. Direct visualization of the needle within the area of interest provides the most reliable means of ensuring that accurate biopsy samples are taken. The procedure can be performed as an outpatient with a minimum of potential complications [10].

A variety of pathologies can be diagnosed with percutaneous biopsy including both primary and secondary neoplastic lesions as well as infectious spondylodiscitis [8]. The most commonly encountered complications include localized bleeding, usually self-limited, and with proce-

Fig 3. (a) Axial CT image of the T12 vertebral body at recent presentation at approximately the same level as in Fig. 2 (at the level of the celiac axis) demonstrates marked lytic destruction of the left margin of the vertebral body extending into the pedicle with an associated soft tissue mass (arrow). (b) Sagittal reformatted CT image of the spine demonstrates Pagetic involvement at multiple consecutive levels at the thoracolumbar junction with lytic destruction of the left T12 pedicle (arrow)

Fig 4. Nuclear medicine bone scan demonstrates characteristic Pagetic appearance with multifocal areas of increased radionuclide uptake and enlargement of the bone including the left femur, right hemipelvis, and spine

Fig 5. Images from CT-guided biopsy of the T12 vertebral body demonstrate accurate needle placement into the abnormal Pagetic bone

dures involving the thoracic or upper lumbar spine, potentially pneumothorax. Meticulous trajectory planning prior to inserting the needle, however, can lessen the incidence of pneumothorax [11, 12]. A large prospective study of 128 cases evaluated not only diagnostic accuracy but also patient discomfort levels, surgeon satisfaction with the core samples, and total procedure time of percutaneous image-guided biopsy vs. open surgical biopsy. The results demonstrated that with image-guided biopsy, the average procedure time was only 30 min, with overall high patient satisfaction and less patient discomfort [13].

In conclusion, image-guided biopsy of the spine is an accurate and safe method for providing rapid diagnosis of a variety of pathologies and is a reliable problem-solving tool.

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