

From page 21

■ OVERVIEW OF THE DISEASE

The skeleton is the most common site of hematogenous metastases from prostate cancer, and bone metastases can be found in 85% of patients dying of the disease. Osteoblastic (80%) and, less commonly, osteolytic (5%) or mixed osteoblastic-osteolytic (10% to 15%) changes can be seen in the pelvis, lumbar spine, or other bones of patients with bone metastases from prostate cancer. Early bone changes may present as focal areas of increased density on radiography, which may have the appearance of benign bone islands. More commonly, large areas of bone are replaced by irregular dense deposits, leaving little question of the diagnosis as the case presented. Abnormal findings may be seen in only one bone, such as a lumbar vertebra, or may be extensive.

■ DIAGNOSIS

PLAIN FILMS AND BONE SCAN

Plain films are not very sensitive for detecting bone metastases because there must be a change in bone density of at least 50% before metastases can be seen radiographically.

Due to the high sensitivity of radionuclide bone scintigraphy in detecting osteoblastic bone metastases bone scans have replaced the skeletal survey in the evaluation of patients with suspected bone metastases. It has been shown that radionuclide scintigraphy detects bone metastases in 23% of patients with normal skeletal surveys and that 16% of patients who are stage T1–3NoMo, are upstaged to T1–3NoM1 after a bone scan.

CT AND MRI

Although CT is excellent in demonstrating the osteoblastic, osteolytic, and mixed bone metastases from prostate cancer, it should not be used to screen for bone metastases. Radionuclide bone scintigraphy is preferred because it evaluates the entire skeleton and is more accurate in the diagnosis of small or early metastatic lesions. For similar reasons, scintigraphy is preferred over MRI. Because bone metastases are most commonly osteoblastic, they may appear hypointense compared with normal fatty marrow on both T1-weighted and T2-weighted MR images. MR imaging may have a problem-solving role in the evaluation of patients with suspected bone metastases when other diagnostic studies are inconclusive or when spinal cord compression is suspected.

■ ROUTES OF SPREAD

LYMPHATIC SPREAD

Distant spread of prostate cancer may occur by lymphatic spread or hematogenous dissemination. The most frequent sites of lymphatic spread are the obturator nodes (medial chain of the external iliac group), followed by the presacral, internal iliac, and common iliac nodes. When para-aortic nodal disease is seen in patients with newly diagnosed prostate cancer, it is always associated with pelvic lymph node involvement. In pa-

tients with advanced metastatic prostate cancer, massive retroperitoneal disease with contiguous invasion of the perirenal space and adrenal glands may be seen, which may mimic retroperitoneal lymphoma.

HEMATOGENOUS SPREAD

It is currently thought that lymphatic and hematogenous metastases occur independently. Hematogenous spread of prostate cancer usually causes bone metastases, which most commonly involve the lumbar spine, pelvic bones, femur, thoracic spine, and ribs (in decreasing order of frequency). Occasionally, extradural metastases can cause spinal cord compression. Hematogenous spread of prostate cancer less commonly causes visceral metastases to the lungs, liver, and adrenal glands. Pulmonary and pleural metastases can also occur via lymphatic spread. Rarely, metastases to the brain or skull can be seen.

Visceral metastases are rarely seen in patients with newly diagnosed prostate cancer and are uncommon even in patients dying of the disease. Liver metastases, for example, are found in only about 20% of patients dying of disseminated prostate cancer, and lymphangitic spread to the lungs is seen in only about 25% of these patients.

Common sites of hematogenous metastases are:

- Bone (90%)
- Lung (~45%)
- Liver (~25%)
- Pleura (~20%)
- Adrenal glands (~15%)

■ SIGNIFICANCE OF METASTATIC DISEASE TO CLINICAL MANAGEMENT

In patients with newly diagnosed prostate cancer, the identification of metastatic disease represents an absolute contraindication to definitive local therapy (e.g., radical prostatectomy, radiation therapy). Patients with metastatic disease do not benefit from definitive therapy, and the cost and morbidity associated with such treatment should be avoided in these patients.

In patients without previously documented metastatic disease who have undergone definitive local therapy, the development of a persistently rising serum prostate-specific antigen (PSA) is suspicious for disease recurrence, which may be due to locally recurrent cancer in the prostatic fossa, or development of metastatic disease (distant spread of cancer). The diagnosis of local recurrence post treatment generally requires biopsy confirmation, whereas conclusive evidence of metastatic disease usually comes in the form of a positive radionuclide bone scan.

Identification of metastatic disease indicates that these patients will not benefit from salvage radiation therapy or cryotherapy, and that palliative treatment (androgen ablation therapy) is in order. Exclusion of metastatic disease, on the other hand, suggests that salvage radiotherapy may be considered in patients previously treated with radical prostatectomy, and salvage cryosurgery may be considered in patients previously treated with radiation therapy.

■ REFERENCES

1. Kyle K Yu, MD, Randall A. Hawkins, MD, PhD. The prostate: Diagnostic evaluation of metastatic disease. Radiologic clinics of North America. January 1, 2000. Volume 38, Issue. Pages 139-157

2. Verma S, Rajesh A. A clinically relevant approach to imaging prostate cancer: review. AJR Am J Roentgenol. 2011; 196 (3_supplement): S1-10 Quiz S11-4. doi:10.2214/AJR.09.7196 –

3. Roman Kleinberg, MD; Mitchell Gross, MD, PhD. Prostate Cancer: Diagnosis and Staging. May 4, 2017

Answer to Radiographic Quiz



Irregular areas of increased radiopacities affecting the entire thoracic skeleton consistent with osteoblastic lesions. The pulmonary fields are clear. No mediastinal lymphadenopathy.

Which choice best characterizes the salient findings?

- Right lower pulmonary lobe pneumonia*
- Bilateral pulmonary congestion*
- Osteolytic images of the thoracic skeleton*
- Osteoblastic lesions affecting the entire thoracic skeleton*
- Mediastinal lymphadenopathy*

Considering the radiographic findings, ultrasound results, clinical history of weight loss and markedly elevated PSA (prostatic-specific antigen) what is the diagnosis?

- Osteolytic metastases of the thoracic skeleton*
- Mediastinal lymphoma*
- Osteoblastic metastases secondary to prostatic cancer*
- Fibrous dysplasia*
- Paget's disease of bones.*