The Practicing Orthopedic Surgeon's Guide to Managing Long Bone Metastases

Felix H. Cheung, MD

KEYWORDS

• Long bone metastasis • Skeletally related events • Pathologic fracture • Evaluation and treatment • Practical primer • Bone tumor

KEY POINTS

- A thorough evaluation should be conducted to confirm metastatic disease before definitive fixation.
- Placement of the biopsy is crucial to prevent further morbidity.
- Prophylactic fixation (long nails) for impending fractures is preferred.
- Cemented arthroplasty options for periarticular pathologic fractures and long nails for other kinds of fractures including peritrochanteric are preferred.

INTRODUCTION

Treatment of skeletal metastases is a significant part of cancer care in the United States. The estimated prevalence of metastatic bone disease in the United States is at least 280,000 per year and is expected to increase as medical management improves overall survivorship.[1] Postmortem analysis shows that around 70% of all patients with breast and prostate cancer have skeletal metastases, and it involves between 35% and 42% of patients with lung, thyroid, and renal cancer.[2] The economic costs of treatment of metastatic bone disease in the United States per year are an estimated $12.6 billion, which is 17% of the total annual cost of cancer treatments.[3]

The purpose of this article is to review the presentation, workup, and treatment options for metastatic disease to the long bones. Seven scenarios are presented to help the practicing orthopedist identify and treat metabolic bone disease safely.

PRESENTATION

The typical patient will present with a history of a primary carcinoma and bony pain. Occasionally (about 15% of the time), the patient will present with no known primary. The bone pain is typically described as a "gnawing, tooth-achy" pain, or "night" pain. Pain with weight-bearing or sharp pain is concerning for impending pathologic fracture. The most common locations for metastatic disease include the spine, pelvic girdle, shoulder girdle, and distal femur.[2] Metastasis distal to the knee and elbow is rare except for lung cancer.[4]

A thorough history and physical examination are mandatory, including past medical history, smoking history, exposure to carcinogens and radiation, and a full review of symptoms including constitutional symptoms (**Table 1**).

Physical examination should include an examination of the limb, looking for causes of pain other than cancer, as well as goiter examination, lymph node examination, auscultation of the lungs, breast examination, and digital rectal examination (**Table 2**).

LABORATORY WORKUP

Standard laboratory workup for patients without a known primary include CBC with Diff, CMP, U/A, ESR/CRP, PSA, SPEP/UPEP, PTH (**Table 3**).[5]

Department of Orthopaedic Surgery, Joan C Edwards School of Medicine, Marshall University, 1600 Medical Center Dr, Ste G500, Huntington, WV 25701, USA
E-mail address: cheungf@marshall.edu

Orthop Clin N Am 45 (2014) 109–119
http://dx.doi.org/10.1016/j.ocl.2013.09.003
0030-5898/14/$ – see front matter

Table 1
Review of systems

Review of System	Possible Malignancy
Fevers, sweats, chills, weight loss	Lymphoma
Shortness of breath, pleuritic pain, hemoptysis	Lung
Voiding difficulty	Prostate
Hematuria	Renal
Breast discharge or mass	Breast
Rectal bleeding, anemia	Colon

Table 2
Physical examination

Physical Examination	Possible Malignancy
Jaundice	Liver
Neck nodules	Thyroid
Axillary nodules, breast lump, or discharge	Breast
Dull auscultation of the lungs	Lung
Splenomegaly	Lymphoma
Positive digital rectal examination	Prostate

Table 3
Laboratory orders

Lab	Possible Malignancy
CBC with Diff	Multiple myeloma, leukemias
CMP: Ca/Alk Phos	Amount of bony involvement, prognosis
U/A	Renal from hematuria
ESR/CRP	Inflammation from infection, tumor burden
PSA	Prostate
SPEP/UPEP	Multiple myeloma
PTH	Metabolic bone disease

Abbreviations: CBC, Complete Blood Count with differential; CMP, Comprehensive metabolic panel; ESR/CRP, sedimentation rate/C-Reactive Protein; PTH, Parathyroid hormone; SPEP/UPEP, Serum Protein Electrophoresis/Urine Protein Electrophoresis; U/A, urinalysis.

IMAGING WORKUP

Good radiographs, focused on the tumor in orthogonal planes, are required for proper assessment of the lesion. Axial imaging (computed tomography [CT] or magnetic resonance imaging scan) can be helpful in determining the amount of bony destruction, extent of the tumor, risk of fracture, and choice of implant. A whole body bone scan is useful for determining other sites of metastatic disease. If multiple myeloma is known or suspected, a skeletal survey is needed[6] because many of the lesions will not be osteoblastic.

If the primary is unknown, radiographs, CT scan of the chest, abdomen, and pelvis, and a whole body bone scan are recommended. Approximately 85% of primary tumors can be identified in this manner.[7] Mammography for women and thyroid ultrasound can be helpful if the physical examination findings are supportive (**Table 4**).

PATHOLOGIC WORKUP

A biopsy is recommended if the primary is unknown, or if it is a solitary lesion. This biopsy is to ensure that the tumor is not a primary bone sarcoma or that there is not a secondary primary. The biopsy can be performed using a core needle technique (with or without interventional radiology)

Table 4
Imaging orders

Imaging	Use
X-rays	Screening, surgical planning
CT or magnetic resonance imaging of bone	Risk of fracture, extent of disease, choice of implant
Whole body bone scan	Screen for other sites of bony metastatic disease
Skeletal survey	Screen for multiple myeloma
CT chest/abdomen/pelvis	Look for solid organ primary carcinoma
Mammography	Screen for breast cancer primary (if examination is suspicious)
Thyroid ultrasound	Screen for thyroid cancer primary (if examination is suspicious)