Clinical presentations of below knee bone metastases: a case series

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Abstract

Bone metastases are a common complication of advanced malignancy; however, presentation of below-the-knee metastases, particularly affecting the fibula and tibia, are both infrequently observed in both the clinical setting and the literature, and present a therapeutic challenge to patients and physicians alike. Due to the weight-bearing capacity of bones below-the-knee, the disruption of the structural and functional integrity of these bones can reduce mobility and thus quality of life. Treatment options for these patients include surgery, radiotherapy, and/or chemotherapy. Candidates for surgery typically have affected weight-bearing bones. For patients not suitable for surgery, radiotherapy is prescribed for pain relief and bone remineralization.

Materials & Methods

- Patients were referred to Sunnybrook Health Sciences Center, Odette Cancer Center for painful below knee metastases from May 2016 to July 2016.
- Orthopedic surgery was consulted in all cases. Two patients underwent surgical fixation followed with radiotherapy, while the other two received palliative radiotherapy alone.

Objective

Herein, we report four cases in which two female and two male patients developed painful below knee metastases.

Results

Patient 1 – unknown primary with metastases to right knee

CT scans showed 2.5 cm x 2.3 cm soft lytic mass in the proximal tibial metaphysis and pathological fracture in tibial plateau. Patient underwent open reduction internal fixation of the tibial plateau fracture and complete replacement of the right knee, and unfortunately the patient passed away on the interim in the ward

Patient 2 – primary breast cancer with metastases to bilateral fibulae

X-rays showed pathological oblique fracture of the right proximal fibula, and metastatic lesions to left tibia and fibula. Patient was given radiation therapy of 30 Gy in 10 fractions for her bilateral lesions to promote bone healing and pain palliation, reporting good pain relief and improved mobility at 1-month follow-up

Patient 3 – primary NSCLC with metastases to distal tibia epiphysis

MRI revealed soft tissue lesion in right distal tibial epiphysis (low T1 signal), and bone scan revealed increased uptake in right distal tibia and in ribs

Patient was given palliative radiotherapy with some pain relief for his right lower leg and ankle in 20 Gy of 5 fractions.

Patient 4 – primary urothellial cancer with metastases to distal tibia

X-rays revealed lytic lesions in distal tibial diametaphysis with pathological fracture in distal tibia and destruction of anterior tibial cortex, with CT showing poorly defined destructive lesion in this region.

Patient underwent open reduction with internal fixation of the left distal tibia, tumor excision, and insertion of antibiotic bone cement. Surgery was successful and patient was given radiation therapy of 20 Gy in 5 fractions in lower left leg 2-months post-surgery

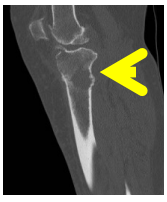

Figure 1 Sagittal CT through the tibia on bone window demonstrates a lytic destructive lesion in the proximal posterior metaphysis that expands the posterior cortex with a pathologic fracture. CT, computed tomography

Figure 2 Lateral plain radiograph view of the knee post total knee arthroplasty with long stem components demonstrates the lytic expansile lesion in the posterior tibial metaphysis with pathologic fracture and a component of healing with sclerosis of the posterior cortex. Anterior skin clips and soft tissue swelling related to the recent surgery

Figure 3 Frontal plain radiograph view of the right lower leg demonstrates diffuse lytic lesions in the fibula with a nondisplaced fracture in the proximal shaft.

Figure 4 Lateral plain radiographic view of the left lower leg demonstrates diffuse lytic lesion in the tibia and fibula that cause endosteal scalloping and an at increased risk for pathologic fracture.

Figure 5 Coronal T1 MR image through the ankle demonstrates a low T1 signal lesion in the lateral tibial plafond extending to the articular surface

Figure 6 Sagittal CT image through the tibia demonstrates a lytic destructive permeative lesion in the distal tibial diametaphysis with pathologic fracture of the anterior cortex and aggressive elevated periosteal reaction and subtle extension to the distal tibial articular surface.

Figure 7 Frontal plain radiographic view of the left ankle after open reduction and internal fixation of the distal tibia with medial buttress plate fixation, tumour excision and insertion of antibiotic bone cement in the distal tibial diametaphysis

Discussion

- Treatment options range from radiotherapy, hormonal therapy, biphosphonates, bone cement and surgical intervention
- Surgical fixation is a recommended treatment option for impending or pathological fractures for below-the-knee metastases, as it has shown to improve patient QoL and mobility
- Surgical intervention should take into consideration: metastatic size and location, patients' overall performance status and medical condition. Patients with limited survival (< 3 months) and potential long-term complications, may not benefit from surgery, such as patient 1
- Palliative radiation therapy has shown to relieve pain in 60% of patients and complete remission in 25% of patients opioid use, as well as inconsistent characterization and evaluation of pain in patients
- Radiation therapy has been shown to have the capacity to remineralize metastatic lytic lesions in both full and partial responders, addition to effective pain relief.
- In our experience, surgery augmented by palliative radiotherapy is an effective treatment option for these rare metastases affecting weight bearing bones. Patients not suitable for surgery benefit from palliative radiation therapy because of its efficacy in relieving pain and improving mobility.
- A multidisciplinary approach should continue to be used to optimize therapies in order to improve patient QoL.

Conclusion

Surgery and radiation therapy have proved to both be effective treatment methods for treating below-the-knee bone metastases, but ultimately depend on the location of the metastases and effect on patient mobility.

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