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Perspective

Proximal femoral metastases surgical management

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Statistics

Figures	00
Tables	00
References	00

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Abstract

The proximal femur is a common site for bony metastatic disease to develop. In this location, metastatic bone disease can cause debilitating pain, pathologic fractures, decreased quality of life, anaemia, or hypercalcemia. To ensure an accurate diagnosis and prognosis, a thorough history, physical examination, and preoperative investigations are required. The goals of surgical management are to relieve pain and return to function with a construct that is stable enough to allow for immediate weight-bearing. Intramedullary nailing, hemiarthroplasty or total hip arthroplasty, and endoprosthetic reconstructions are currently available surgical treatments. Oligometastatic renal cell carcinoma requires special attention because tumour resection and reconstruction improve survival. Before deciding on the best surgical intervention, both tumour and patient characteristics must be considered.

Key Words: metastatic bone disease; proximal femur metastases; endoprosthesis

INTRODUCTION

As the cancer burden rises, so does the number of patients living with metastatic cancer, as systemic therapies lead to longer survival. Patients with metastatic bone disease, particularly those with breast and prostate cancer, may live for four years or more. However, metastatic bone disease can result in incapacitating pain, pathologic fractures, decreased quality of life, anaemia, or hypercalcaemia. Metastatic lesions in the proximal femur are the most common location of appendicular skeleton metastases. Because the proximal femur is a weight-bearing region, lesions in this region frequently present with functional pain or a pathologic fracture. Anatomically, 50% of lesions are found in the femoral neck, 30% in the subtrochanteric region, and 20% in the intertrochanteric region.

PREOPERATIVE ASSESSMENT

In patients with metastatic bone disease, a thorough history, physical examination, and preoperative investigations are required. Although metastatic bone disease accounts for the majority of pathologic bony lesions in patients over the age of 40, multiple myeloma and lymphoma are also common. Lung, kidney, breast, thyroid, and prostate cancer are the five most common primary malignancies that metastasize to bone. In up to 25%-30% of cases, skeletal metastases are the first clinical manifestation of malignancy. In patients who present with an unknown origin bone lesion, particularly if it is a solitary lesion, a full preoperative workup must be performed to isolate a primary malignancy. Blood work, imaging, and biopsies of the lesion are all part of the workup for an unknown primary lesion. The treating physician should correlate the clinical history with the disease presentation to ensure that a primary bone malignancy is not missed and mistakenly assumed to be a metastatic deposit. Until proven otherwise, a solitary bone lesion must be considered a primary bone tumour. A frozen section biopsy can be performed at the start of an operation to confirm that the lesion is not a primary bone tumour, and then definitive fixation can be performed to reduce the number of operative interventions. When a bone tumour cannot be ruled out because the lesion is not carcinoma or a primary, the wound should be closed and fixation or prophylactic stabilisation should be delayed until a definitive diagnosis is reached. The “whoops” operation, which involves the management of a primary bone tumour with intramedullary nail fixation, is a disaster. Intramedullary fixation contaminates the entire canal, as well as the proximal and distal locking screw tracts and the nail entry points in the proximal femur, with a tumour. The limb is frequently irreparable, and hip disarticulation may be necessary for local disease control. Patients with primary bone tumours who receive ineffective initial surgical treatment have higher rates of local recurrence and mortality, lower rates of limb salvage, and poor functional outcomes.

INDICATIONS FOR SURGICAL MANAGEMENT

The nature and location of the lesion, response to adjuvant therapy, and the patient's medical status and overall prognosis all influence how metastatic bone disease is managed. In some cases, non-surgical treatment for metastatic bone diseases, such as radiotherapy, multimodal analgesia, hormonal therapies, or bone modifying agents, may be effective. For pain control and mobilisation, lesions that progress to pathologic fractures in the proximal femur require surgical fixation. Additionally, metastatic lesions that are at high risk of progressing to fracture should be considered for prophylactic treatment. The best-known prognostic tool for predicting which lesions will fracture is the Mirel's criteria, which has a high sensitivity for predicting which lesions will fracture (88%). However, it has recently been shown to have low inter-rater reliability and specificity (38%). Multiple finite elements and related analyses have recently been proposed to help predict which patients with bone metastases will fracture. Sternheim et al. reported a sensitivity and specificity of their model of 100 and 68%, respectively, which is far better than Mirel's reported accuracy. Prophylactic treatment before a fracture can improve patient quality of life, lower pain scores, and lower the risk of death from the lesion. Phillip et al. recently demonstrated that prophylactic fixation can reduce the risk of death by up to 25%.

Prognosis Treatment decisions must take into account a patient's overall prognosis and expected survival, in addition to tumour factors. To assess patient performance status and survival, several scoring systems, including the Eastern Cooperative Oncology Group (ECOG) and Karnofsky scores, have been used. Traditional prognostic models have recently been developed to estimate survival based on patient-specific characteristics. PATHFx, for example, is a tool that uses patient-specific data to generate survival probabilities at various time points and has been validated in various populations around the world. Using sophisticated machine learning technology, other models have attempted to predict survival more accurately. Thio et al., for example, have created a machine-learning algorithm. Histology metastases, previous therapy, and a slew of patient and laboratory variables are all factored into the model. This is now free for open-access use and has recently been validated. Similarly, Sarahrudi et al. developed a model that suggested that the median survival of patients with pathologic proximal femur fractures was 2.7 months, with an additional risk of death within one month if treatment included reconstruction utilising an endoprosthesis. Aside from these models, certain clinical trials in this patient population, laboratory findings have been found to be prognostic. demonstrated that in this study, pathologically elevated CRP (1.0 mg/dL) combined with an unfavourable primary tumour diagnosis strongly predicted a 12-month survival population.