Rehabilitation Strategies and Outcomes of the Sarcoma Patient

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KEYWORDS

• Sarcoma rehabilitation • Amputee rehabilitation • Cancer rehabilitation
• Desmoid rehabilitation • MPNST rehabilitation

KEY POINTS

- This familiarizes the reader with some of the sarcoma subtypes associated with loss of function, although nearly all sarcomas have deleterious potential in this regard.
- Outcomes of some of the treatment plans for lower extremity sarcoma are discussed at length; this gives an idea of the types of long-term management required, as well as what to expect from certain procedures (amputation vs limb salvage).
- Multidisciplinary approaches to rehabilitation is important, and with sarcoma it is not a "one-size-fits-all" approach due to the considerable variability in disease presentation.

INTRODUCTION

Sarcomas are tumors of mesenchymal cells that represent approximately 1% of all cancers. There are more than 70 different subtypes of this rare malignancy, each with different pathologic, molecular, and clinical features, and approximately 50% of people diagnosed with a sarcoma will die of the disease.[1] Sarcomas may arise from tissues such as bone, muscle, nerve sheaths, cartilage, or fat, making their presence potentially disruptive to the neuromusculoskeletal system and patient function. For the purposes of this article, sarcoma subtypes most likely to be associated with functional impairment are discussed, although numerous other sarcoma subtypes may have an impact on function, depending on their location, how aggressive the tumor is, and oncologic treatment rendered.

OVERVIEW

Sarcomas may manifest in different areas of the body; soft tissue sarcomas are most often located in an extremity (45%), whereas sarcomas of the bone are more likely to

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manifest in the distal femur (osteosarcoma) or the pelvis/sacrum (Ewing sarcoma).[2] The most common site of metastasis is the lung,[3] where diffuse and/or large metastatic disease may cause complications like pneumothorax or decreased volume and therefore aerobic capacity. Oncologic treatment varies depending on subtype, but typically involves a combination of surgery, chemotherapy, and radiation. Many chemotherapeutic agents used to treat sarcoma, especially bony sarcomas, are associated with increased risk of chemotherapy-induced peripheral neuropathy, such as cisplatin, which is used for osteosarcoma, and vincristine, often used for Ewing sarcoma. Doxorubicin, an anthracycline chemotherapeutic agent commonly used to treat soft tissue and bony sarcomas, does not typically cause neuropathy but is cardiotoxic and thus may have deleterious long-term effects for survivors of the disease.

Like nearly all cancers, treatment for sarcoma is determined after discussion with a multidisciplinary tumor board, in which physiatrists can play an important role. Physiatric involvement in the multidisciplinary tumor board may help with surgical decision making (amputation vs limb salvage, for example) by predicting limb and overall functional outcome with each approach. Additionally, being a part of diagnostic and treatment-planning discussions familiarizes the physiatrist with the patient; this is especially important given the considerable variation in the clinical picture of each patient with sarcoma.[4]

LOWER EXTREMITY AMPUTATION, LIMB SALVAGE, AND ROTATIONPLASTY

Sarcomas commonly affecting extremities include soft tissue sarcomas originating from skeletal muscle or fat, and bony sarcomas. Bony sarcomas are rare, but typically involve the lower extremity and include osteosarcoma and Ewing sarcoma. Chondromas require oncologic treatment similar to bony sarcomas and originate from cartilage. In the case of disease with few or no known metastases, local control with limb salvage or amputation is undertaken, each with advantages and disadvantages in terms of function and cosmesis, but with no significant differences in overall survival.[5,6] The choice of amputation versus limb salvage can be a difficult one; limb salvage is often preferred for cosmetic reasons and patients may return to independent function earlier than those undergoing amputation. Patients who opt for amputation often do so if they wish to participate in higher-impact activities including sports; patients with lower extremity limb salvage cannot participate in activities involving repetitive or heavy weightbearing or endurance exercises, such as running, whereas someone with lower extremity limb loss may be able to participate in higher-level athletic endeavors with appropriate prosthetic restoration.

Despite activity restrictions, studies have shown a benefit in function with limb salvage versus amputation. An analysis of 118 patients followed for 1 year after either lower extremity limb salvage (57%) or amputation (43%) found that patients with limb salvage had higher physical function by 1 of the 2 measurement tools used, with a more proximal amputation and presence of pain predicting lower performance. Quality of life as measured by the Short Form-36, and employment status, were equal between the groups, as was one patient-reported measure of function.[7] Another study looked at 91 adolescent and young adult patients after lower extremity sarcoma surgery, and found that patients with limb salvage again had higher Musculoskeletal Tumor Society rating scale (MSTS) scores, and that patients with rotationplasty had the overall highest function.[8] Limb salvage has also been shown to be superior to amputation specifically with regard to stair climbing.[9] Overall, limb salvage may provide a benefit in terms of everyday function, but patients who undergo amputation have similar quality of life and with prosthetic restoration have the potential to perform