Musculoskeletal Cancers in Adolescents

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What are the most common musculoskeletal cancers in adolescents?
The most common musculoskeletal tumors in the adolescent population are osteosarcoma, Ewing’s sarcoma, and rhabdomyosarcoma.

What are the symptoms of musculoskeletal cancers in adolescents?
The most common symptom is pain. Often the pain is associated with an incidental episode of trauma. However, trauma is neither related to nor causative of the lesion. Unlike pain due to trauma (eg, fracture, muscle pull), pain due to musculoskeletal tumors does not decrease with time; rather, it increases with time. Night pain and pain at rest are also typical of pain due to a musculoskeletal tumor. As the lesion progresses and enlarges, the pain will become associated with use of the extremity or weight bearing. The development of a mass is also common.

What role does imaging play in diagnosing musculoskeletal cancers in adolescents?
Radiographs remain the gold standard. If an adolescent presents with pain in the extremity or pelvis, the first test should be a radiograph, with 2 orthogonal views of the extremity. Radiographs are readily available, fast, and inexpensive.

If the radiographs are normal but the pain persists, does not improve, or worsens, magnetic resonance imaging of the area should be obtained. Further evaluation of the adolescent with a suspected musculoskeletal tumor should be performed at the institution that ultimately will be providing multidisciplinary care for the patient. Once the lesion is identified and the diagnosis is
established, computed tomography of the chest and a bone scan will aid in appropriately staging the patient.

What nonsurgical treatment options are available for musculoskeletal cancers in adolescents?

Chemotherapy regimens are individualized for each tumor type. Local control, whether through surgery or radiation, should be coordinated with systemic therapy so that chemotherapy is not delayed. Also, because radiation treatments are based on the extent of the tumor at the time of diagnosis, it is best that radiation oncologists see patients with Ewing’s sarcoma or rhabdomyosarcoma early so appropriate baseline imaging can be obtained and plans can be expedited for the timing of simulation and radiation.

What are the surgical treatment options for musculoskeletal cancers in adolescents?

Resection of the tumor is of foremost importance. The goal of oncologic surgery is to resect the tumor with negative margins; the options of reconstruction should never compromise the proper resection of the tumor. After the tumor is resected, several reconstructive options are available, depending of the location and the size of the tumor. For extremity lesions, options include amputation, rotationplasty, and reconstruction with an allograft, prosthesis, or allograft-prosthesis composite. The reconstructive options used should be individualized for the patient and the tumor.

How do you determine whether to pursue surgical or nonsurgical treatment in adolescents?

Proper evaluation of an adolescent with a musculoskeletal tumor involves a multidisciplinary team of oncologists, surgical oncologists, and radiation oncologists. It is best that each of these individuals is involved from the point of initial diagnosis so a consensus of a unified treatment plan can be developed. In each of the musculoskeletal tumors described, optimal treatment depends on the combination of nonsurgical and surgical care. Treatment of sarcomas is multidisciplinary, consisting of a combination of chemotherapy and surgery.

What is the prognosis for adolescents with musculoskeletal cancers?

Overall, the prognosis of adolescents with musculoskeletal tumors is good. However, this prognosis has remained the same for the past 30 years. Unfortunately, metastases develop in approximately 30% of patients, and death from pulmonary metastases remains a significant problem. New treatment options are needed.

What research is currently being done for the treatment of musculoskeletal cancers in adolescents?

Research is being performed to better understand the molecular mechanisms of sarcoma growth and metastasis. This research has led to the identification of several molecular targets. Several studies are ongoing using these molecular targets alone and in combination with standard chemotherapeutic agents in an attempt to improve the prognosis of the disease and hence lead to better outcomes in the future.

What does the future hold for the treatment of musculoskeletal cancers in adolescents?

In addition to new systemic treatment options, new techniques in limb reconstruction are under investigation.