# Rehabilitation in Advanced Cancer

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Advanced cancer patients are a diverse group and may be distinguished based on different factors such as disease factors, treatment considerations, or performance status. Despite the forbidding disease prognosis, functional improvements such as enhanced mobility and self-care are still achievable with cancer rehabilitation. “Cancer rehabilitation aims to allow the patient to achieve optimal physical, social, physiological, and vocational functioning within the limits imposed by the disease and its treatment”. Patients with advanced cancer and their families highly value symptom control and optimization of functional status and quality of life (QOL). Moreover, among their most distressing concerns are threat of progressive debility and caregiver dependency. However, these issues are often inadequately addressed due to several barriers that hinder the delivery of cancer rehabilitation, including lack of knowledge, limited access, and poor adherence. Bone metastasis and neurologic compromise are common complications of cancer, which have a tremendous functional impact that may be addressed by rehabilitation programs.

## Rehabilitation in patients with bone metastases

The bone is one of the most common sites of metastasis in advanced cancer, secondary to the lung and liver. Being physically active is vital in advanced cancer patients. However, there is uncertainty and concerns about provoking or aggravating skeletal-related events (SREs), such as bone pain, pathologic fracture, and spinal cord compression, which could lead to serious clinical complications. Special consideration to this patient population included careful pre-exercise assessment of bony lesions, exercise modifications, and/or providing supervision for safety. Consequently, participants in studies have shown an overall tendency to improve physical function and muscle strength, with no reported negative effects. Importantly, none of the interventions reviewed resulted in aggravation of bone pain and occurrence of SREs. CT is useful for assessing the bone stability and differentiating between the osteoblastic (deposition of new bone), osteolytic (destruction of normal bone), or mixed metastatic lesions. Lytic metastases are more likely to lead to fracture than osteoblastic metastases. Mirels’ classification for predicting the risk of pathologic fracture of long bones can provide a useful information for patient selection and exercise prescription. Spine Instability Neoplastic Score (SINS), proposed by Fisher et al., is a comprehensive

classification system that helps predict the spinal stability of tumor lesions based on patients' symptoms and radiographic criteria. Bone pain, the most common symptom of bone metastases, is an important clinical factor causing considerable interference in activity. Importantly, development of activity-related pain is associated with a greater risk of pathologic fracture. Therefore, patients who experienced abrupt aggravation of pain, especially activity-related pain, require careful evaluation before an exercise is prescribed. Although there are still uncertainties about acceptable levels of weight bearing at the metastasis site, medical professionals need to encourage patients not to avoid physical activities to maintain their optimal functional status. Patients with bone metastases also need guidance in modifying exercise programs according to the site and stability of their bony lesions. Instead of avoiding resistance exercise, several studies have assessed the application of isometric paravertebral muscle training in patients with spinal metastases. Studies have shown improvement in mobility, pain level, and QOL in patients with stable spine metastases without an increase in pathologic fracture rates. Moreover, it has also been reported that isometric paravertebral muscle training is potentially feasible for high-risk individuals with unstable metastases or bone pain, for whom resistance exercise is generally not recommended. The main function of the brace is to stabilize the affected weakened bone and promote healing by restricting motion and reducing the load. In a guideline for management of patients with metastatic spinal cord compression (MSCC), use of spinal orthoses is recommended if patients have severe mechanical pain and/or imaging evidence of spinal instability. Prolonged use of brace reduces mechanical loading to the trunk muscle and may result in paraspinal muscle weakness and atrophy. Medical professionals should consider patients' comfort and preferences as well as the functionality and suitability of the brace.

**Rehabilitation in patients with neural compromise**

Approximately 25% of all cancer patients experience metastasis in the central and peripheral nervous systems. Metastatic spinal cord compression(MSCC) is one of the most devastating neurologic effects of cancer. Targeted physical and occupational therapies may be prescribed to improve patients' strength and ability to ambulate, transfer, and perform activities of daily living. Some patients may need lower extremity orthosis or assistive devices such as canes or walkers. Bladder and bowel dysfunction is a common complication which need rehabilitation management. Goals of rehabilitation in patients with MSCC include symptom relief, enhancement of functional independence, prevention of complications, and improvement of QOL. Patients with MSCC may benefit from acute inpatient rehabilitation despite their compromised life expectancy. In the field of rehabilitation of patients with spinal cord dysfunction due to tumors, the neurologic, oncologic, medical, pain and social

(NOMPS) criteria have been endorsed by a panel of experts for guiding decisions regarding rehabilitation of patients with spinal cord dysfunction due to tumors. The NOMPS criteria has recently been modified to include a new category—rehabilitation-specific issues

Metastatic brachial plexopathy may occur due to the lymphatic spread or direct invasion of the plexus by metastatic disease. It often presents with severe pain (75%), followed by sensory changes and arm weakness. However, a study by Kim et al. found weakness as the most common presenting symptom in breast cancer patients with metastatic brachial plexopathy. This study also discovered that a majority exhibited limitations in shoulder range of motion and malignant lymphedema; Low-resistance weight exercises and range of motion programs should be initiated once acute inflammation and pain subside to avoid functionally devastating contractures. A sling can be applied to retard glenohumeral subluxation.

**Role of rehabilitation in a multidisciplinary team approach**

Recently, the multidisciplinary team approach for management of cancer patients with bone metastases has been emphasized. As treatment strategies, including systemic therapy, radiotherapy, and/or surgery, should be planned comprehensively, considering the status of the primary cancer, patient's performance status, and prognosis, communication between specialists in each field is essential. Rehabilitation should be considered part of the cancer treatment continuum to obtain the highest possible functional ability. Detecting functional morbidity in early, readily treatable stages or further preventing it is a critical therapeutic goal.

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