Rehabilitation for Patients with Bone Metastases

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Abstract

Background: Rehabilitation clinicians will treat cancer survivors. In the United States, 16.9 million people with a history of cancer were alive in 2019. (American Cancer Society) This number is expected to increase to 22.1 million by the year 2030. (American Cancer Society) This is related to two phenomena: 1) improvement in cancer survival rates due to early detection and improvement in cancer treatment, and, 2) the aging population. (De Moor) Survivors will be seen in the clinic for both related and non-related physical issues.
One complication of cancer is bone metastasis. Different cancer types have different patterns of metastasis with prostate, lung, renal, and breast having the highest incidence of metastasis to the bone. (Hernandez, Morris, Choksi) Although bone metastasis can be asymptomatic, it can also result in pain limiting quality of life or skeletal-related events such as bone fractures, hypercalcemia, and spinal cord compression. (Aielli, Fornetti, Macedo, Coleman, Jayarangaiah)

Purpose: The purpose of this poster is to address the differential diagnosis of bone involvement in the oncology population when they present to the clinic with musculoskeletal complaints when metastasis has not been diagnosed. Also, this poster will also describe the precautions to be considered and the recommendations for activity and exercise for patients who are presenting with known bone metastasis and/or related skeletal event.

Method: Current literature was reviewed to determine the physical therapist's role in differential diagnosis and treatment of patients with bone metastasis in the oncology population. Only data in the last 10 years was considered to insure relevancy and accuracy.

Results: Rehabilitation of this patient population has been noted to be appropriate and helpful. (Nadler, Weller, Galvao, Sheill) Clinical assessment is important to differentiate if the signs and symptoms that a patient presents demonstrate "red flags" or indicators for further imaging or consults before treating. Both treatment of pain related to metastasis to the bone and rehabilitation to address mobility and strength issues while recovering from a skeletal event are plans that can safely be developed by the physical therapist to improve this group's quality of life and physical function. (Campbell, Cheville, Hart, Nadler)

Conclusion: Physical therapist professionals' awareness of common patterns of specific cancers as well as "red flags" that a patient may present will help with differential diagnosis of skeletal related events that occur with bone metastasis. Knowledge of the differences in bony changes related to metastasis would be helpful in making a safe and effective plan for activity as well to help decrease pain and improve quality of life. Awareness of best treatment practices for this population is important as the number and age of survivors increases.

Key Words: bone metastasis, cancer, rehabilitation

Current United States Data:

- In a single year, 1.7 million patients are diagnosed with cancer, excluding skin cancer and the 5-year survival rate is 67.0%. (Morris)
- The number that will develop secondary osseous metastasis is 250,000 or 15% of survivors. This compares to an estimated 3200 cases of primary bone malignant cancer. (Morris)
- Bone is the 3rd most common location of metastatic disease behind the lung and liver. (Morris)
- Certain primary cancers are known to have a greater correlation with the presentation of bone metastasis. The following list demonstrates the number of each type that will be diagnosed with bone metastasis by the 5-year mark:
  - Breast: 6.0% (Hernandez)
  - Prostate: 24.5% (Hernandez)
  - Lung: 12.4% (Hernandez)
  - Renal: 8.4% (Hernandez)
  - Thyroid: 3.9% (Choksi)

Considerations for the Clinician at Evaluation

- Patients may enter the clinic with or without a diagnosis of bone metastases. The clinician must use their knowledge and skill to observe and note signs and symptoms that might indicate pathology beyond a musculoskeletal issue.
- Medical history is important. Specifically asking about the history of cancer is important as many may fail to mention their past primary cancer if treatments are complete and they have had no recent concerns.
- Warning signs include: (Randall)
  - History of cancer
  - Changes in bowel or bladder habits
  - Recent weight loss
  - Presence of fever
  - Persistent fatigue
  - Pain increasing at night or not associated with activity
  - Migrating pain or pain of insidious onset that covers large unrelated area as may have systemic or visceral origin
- Differential diagnosis as well as further clinical review and communication with the provider may be warranted before physical therapy treatments are initiated.
- Pain control is a primary goal; modification of weightbearing exercise as well as positioning recommendations may be needed.

Presentation of Bone Metastases:

- Common sites of metastasis are bone rich in marrow and trabecular bone, such as vertebrae, ribs, pelvis, and ends of long bones. (Fornetti)
- Metastasis may be osteosclerotic (prostate, small cell lung) or osteolytic (breast, renal, thyroid, non-small cell lung). (Macedo)
- Features may be bone pain and/or skeletal related events.
  - **Bone Pain**:
    - May not always be present (Coleman)
    - Generally poorly localized when present and worse at night; may not get relief with position change
    - May be inflammatory in nature resulting in pain at periosteum or intraosseous nerve (Macedo, Aielli)
    - May be mechanical in nature with direct pressure of the metastases within the bone (Macedo, Aielli)
  - **Skeletal Related Events**:
    - <u>Pathologic fractures</u>:
      - Weight-bearing bones are a greater risk for fracture. (Coleman)
      - Qualities that predict fracture are size (large is more likely), mostly lytic in nature, presence of erosion at the cortex. (Coleman)
      - Mirels classification system classifies metastatic lesions by site, nature, size, and symptoms and gives a more objective prediction of fracture and helps guide activity. (Jawad)
      - Stabilization at fracture sites may be needed to allow safe mobility. Coleman 2006)
    - <u>Hypercalcemia</u> (high levels of calcium in the blood):
      - Bloodwork will indicate this abnormality and is generally a sign of osteolytic metastases (Coleman)
      - This elevation presents with fatigue, anorexia, and constipation. (Coleman)
      - Over time, a decline in renal function and mental status will be seen. (Coleman)
    - <u>Spinal cord compression</u>
      - The is a oncologic medical emergency. (Coleman)
      - Compression may be the result of pathological vertebral collapse of direct extension of the tumor into the spinal cord space. (Jayarangaiah)
      - Symptoms could be pain, weakness, paresthesia, and/or autonomic dysfunction. (Jayarangaiah)

Guidelines for Physical Activity

- Exercise is recommended for patients with bone metastasis. (Bunting, Hart, Campbell, Colo, Galvao, Guinan, Weller) Generally, the recommendation for this population is to follow the ACSM Guideline for 90 minutes of moderate-to-vigorous intensity aerobic exercise and two days of resistance exercise per week. (Campbell, Weller, Guinan)
- Consultation with other medical professionals is advised to determine any restrictions that should be followed. (Campbell, Weller, Hart, Macmillan) Specifically, guidance is recommended to determine stability of any known lesions as well as weightbearing recommendations, both surgical and nonsurgical. (Campbell, Hart)
- Avoiding torsional stress to weightbearing limbs that are compromised might be a consideration as this might add unnecessary stress to the bone. (Macmillan) Bracing may also be helpful, specifically for the spine, to help limit movement and, therefore, pain. (Bunting)
- Recommendations for assistive devices is important. (Bunting) Caution regarding integrity of upper extremities must also be considered. Advice on home modification may be necessary.
- Aquatic therapy for some may be an option to allow for activity with decreased loading on bone. (Sheill)
- The recommended approach for exercise is to individualize the activities to avoid mechanical forces to the site of metastasis. (Galvao, Sheill, Macmillan) Emphasis should also be placed on postural alignment, controlled movement, and proper technique. (Hart)
- Due to the possibility of changes in bone integrity or patient health status, most recommend that patients have supervision with their exercise program. (Weller, Campbell, Nadler) Even with exercise or activity performed at home, patients should be advised on changes that warrant the cessation of the activity and/or communication with their health care provider. This would include changes in pain as well as signs/symptoms consistent with a skeletal related event.
- Even with restrictions, exercise remains important. (Campbell, Cheville, Hart, Guinan). Improvement in pain, physical function, and quality of life are all areas that may improve.

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