Pre- and Post-Prosthetic Physical Therapy Management for a Patient Following External Hemipelvectomy due to Spindle-cell Sarcoma: A Case Report

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Introduction

- External hemipelvectomy (EHP) is a rare surgical procedure that is most commonly indicated for bone and soft tissue sarcomas of the pelvis, which results in resection of the affected innominate, sacrum, and entire limb.
- A high percentage of individuals with EHP ambulate with the use of bilateral crutches and no prosthesis due to the required energy needed to ambulate with a prosthesis. Modern prosthetic design has decreased this burden, making prosthetics a viable option for individuals following EHP.
- The purpose of this case report is to describe the outpatient pre- and post-prosthetic physical therapy (PT) management and outcomes for a patient following EHP due to resection of undifferentiated spindle cell sarcoma of the pelvis.

Clinical Impression

- Primary impairments limiting the patient’s potential prosthesis use, ability to perform functional mobility, and activities of daily living (ADLs) included impaired sensation, pain, decreased core stability, decreased endurance, decreased muscle length, and impaired balance.
- The patient had significant residual pain, phantom limb pain, low back pain, hypersensitivity, and daily fluctuations in the volume of his residuum that were expected to limit his ability to use a prosthesis in addition to limited his ability to do a prosthesis in addition to limited his activity tolerance, endurance, and functional mobility.
- Bio-behavioral comorbidities including fear avoidance beliefs, depression, and schizoaffective schizophrenia were expected to negatively influence patient success.

Outcomes

After 40 visits of outpatient PT the patient had significant improvements in functional mobility as assessed by the Boston AM-PAC Outpatient Short Form and was able to ambulate 430 feet without an assistive device.

Pre-prosthetic Rehabilitation

- Patient History/Systems Review
  - 36 year-old male following EHP due to spindle cell sarcoma of the pelvis
  - PMH: BMI 36.6, schizoaffective schizophrenia
  - Chief complaints included pain and soreness in his residuum with change in position and during clench ambulation
  - Patient was referred to outpatient PT by his physician to begin progression toward use of a prosthesis
  - Patient presented with c/o low back pain, restrictions in movement of his unaffected lower extremity, and hypersensitivity on his residuum

- Examination
  - Pain in his residuum was rated 4/10 on a numeric pain rating scale
  - Strength testing (MMT) and muscle length testing incurred pain in his left poplinal fossa and groin
  - Core weakness was demonstrated by an inability to perform the unilateral hip bridge endurance test and performance of the planks static core test for 30 seconds
  - Patient was unable to tolerate right side lying and was hypersensitive along lateral trunk and distal-lateral residuum
  - Completed Boston AM-PAC Basic Mobility Outpatient Short Form with a score of 51.68 indicating 56.24% impairment
  - On 20th visit, patient was able to ambulate for 5 feet without an assistive device

- Pre-prosthetic Rehabilitation
  - Core stability exercises
    - Abdominal crunches
    - Bilateral Oblique crunches
    - Oblique sit-up reaching elbow to knee
    - Forearm plank on left knee and on toes
    - Seated trunk rotation
    - Diagonal sit-ups
    - Side crunches with med ball
    - Cable upper trunk rotation
    - Single leg bridge, 1 foot on stability ball
    - TA activation with 3 second hold
    - TA activation with LLE marching
  - Upper extremity exercises
    - Prone shoulder horizontal abduction
    - Prone shoulder extension
    - Prone Ws
    - Seated 3 band rhythmic stabilization (arms at 90° shoulder flexion)
    - Tricep dips and extension
    - Seated shoulder horizontal abduction
    - Seated pull downs
    - Seated rows (narrow grip)
    - Seated rows (wide grip)
  - Stretches
    - Manual hip flexor stretch (prone)
    - Manual hamstring stretch (supine)
    - Supine hamstring stretch with strap
  - Form and was able to ambulate 430 feet with no assistive device

- Post-prosthetic Rehabilitation
  - Interventions
    - Visit 12
      - Transfer training
      - Stair weight shifts
      - Stairclimbs
      - Stair climbing on stairs
      - Stair climbing with crutches
      - Stair climbing with crutches
    - Visit 25
      - Sidestands
      - Stair negotiation with crutches
      - Stair weight shifts
      - Stairclimbs
      - Stair climbing on stairs
      - Stair climbing with crutches
    - Visit 35
      - Progression of dynamic balance activities
      - Stair weight shifts
      - Stairclimbs
      - Stair climbing on stairs
      - Stair climbing with crutches
  - Functional
    - Hemiplegia
    - Pelvis
    - Stirrups
    - Proximal
    - Distal
    - Inability to perform the unilateral hip bridge endurance test
    - Pain in the left popliteal fossa
    - Hip flexor spasm
    - Lower extremity
      - Pain
      - Hypersensitivity
      - Sensory function
      - Circulation
      - Sensation to light touch
      - Movement
      - Strength testing
      - Sensation to light touch
      - Sensory function
      - Circulation
      - Sensation to light touch
      - Sensory function
      - Circulation
    - Functional
      - Ambulation
      - Endurance
      - Sensory function
      - Circulation
    - Sensory function
      - Circulation
    - Sensory function
      - Circulation
    - Sensory function
      - Circulation
    - Sensory function
      - Circulation

- Clinical Implications
  - High-level amputation has both a complex physical and psychological impact on individuals with lower limb amputation
  - Increased prosthetic use is associated with increased quality of life, lower levels of general psychosocial symptoms, and improved health outcomes in individuals with amputation
  - High quality and intensive rehabilitation has been shown to improve health outcomes for individuals post-amputation in both the acute and sub-acute settings
  - This patient received an extensive amount of physical therapy, including 12 visits of pre-prosthetic rehabilitation and 28 visits of post-prosthetic rehabilitation that spanned over one year
  - The patient provides an interesting case given his bio-behavioral comorbidities and established good prognosis for successful prosthetic use following a high-level amputation
  - The patient presented with unique challenges including significant post-amputation pain issues with prosthetic fit in addition to his psychosocial comorbidities.
  - More research is needed in this population to:
    - Provide support for the use of extended PT management past that of normal orthopedic and post-surgical conditions
    - Look at the long-term effects of PT on functional mobility
    - Indicate the most effective interventions for pre- and post-prosthetic training

References: See Handout with Reference List