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A Geriatric Amputee's Journey: Case Study of Shloka and Rehabilitation Challenges

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ABSTRACT: A case review of a geriatric amputee with consideration of comorbidities and functional abilities during rehabilitation goal-setting.

KEY WORDS: Geriatric, transtibial, function, goal-setting

I. INTRODUCTION

The journey of a geriatric amputee through rehabilitation presents unique challenges that require a tailored approach, particularly when considering the patient's comorbidities and functional abilities. This case study focuses on Shloka, a 92-year-old woman who underwent a transtibial amputation due to a non-healing gangrenous heel ulcer complicated by osteomyelitis. The complexity of her medical history, including conditions such as peripheral vascular disease, type 2 diabetes mellitus, and chronic obstructive pulmonary disease (COPD), highlights the multifaceted nature of rehabilitation in older adults. As the geriatric population continues to grow, understanding the implications of amputation and the subsequent rehabilitation process becomes increasingly important. The loss of a limb significantly impacts mobility and the ability to perform daily activities, which in turn affects social integration and overall quality of life. Effective rehabilitation aims not only to facilitate ambulation with a prosthesis but also to enhance the patient's physical function and psychosocial well-being. In this context, the rehabilitation process must be approached with sensitivity to the individual needs of geriatric patients. This includes recognizing the importance of pre-morbid functional abilities during goal-setting and the necessity of modifying therapy programs to accommodate the unique challenges faced by older amputees. By examining Shloka's case, this study aims to provide insights into the rehabilitation challenges encountered by geriatric amputees and to emphasize the importance of a comprehensive, interdisciplinary approach to their care.

II. PATIENT CHARACTERISTICS

Shloka is a spry 92 year old woman with right side transtibial amputation. Her surgery was in March 2015, secondary to non-healing, gangrenous heel ulcer, complicated by osteomyelitis. Co-morbidities include: peripheral vascular disease, type 2 diabetes mellitus, COPD, hypertension, dyslipidemia, osteoarthritis of knees and shoulders, rheumatoid arthritis in hands and sound foot, history of chronic urinary tract infections, history of cellulitis and wounds to bilateral lower extremity for which she had received treatment in outpatient wound clinic. Cellulitis and left leg wounds have resolved, however remains at risk for re-ulceration. Following surgery, Shloka was admitted to inpatient care for post-surgical management and rehabilitation for amputation. She was taught how to care for her stump, how to shape it with appropriate use of tensor bandaging, and she participated in an exercise program to maximize her function in daily tasks with one leg. Exercises included strengthening and range of motion for her residual limb, strengthening of her sound leg, safe transfer technique and hopping very short distances with soft steps and a walking frame. She was educated on the importance of maintaining full range of motion in her knees and hips and she was fitted with a manual wheelchair for mobility until she was able to receive her prosthesis.

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III. EXAMINATION FINDINGS

Shloka was reviewed in the interdisciplinary Amputee Clinic for eligibility for a prosthesis. Shloka reports her goal is to obtain a prosthesis and walk again. Her activity level before surgery included walking with a rollator walker. She enjoyed gardening and gardening in a walking group at the local Community Centre. She and her son report that they hope she can return to these activities. Shloka reports she is consistently completing her exercises at home and her son confirms that although she forgets some of the exercises, she is motivated to progress.

Self-report: 2/10 VAS pain scale at residual limb, 4/10 phantom pain VAS – however she reports phantom pain occurs only occasionally at night.

Physical Performance: Shloka can transfer independently from her wheelchair to other surfaces and can independently stand on her rollator walker. Standing endurance on a single leg is 5 minutes. She has a 5/5 manual muscle test grade for bilateral knee extension and flexion, 4+/5 hip flexion and extension and 4/5 hip abduction. She has limited ROM in her shoulders and hands due to arthritis but it is noted that they are still functional for her. The amputation scar is healed and not adhered. ICF: Body structure/function impairments include limitations in ROM and, decrease in strength and pain. Activity limitations include inability to ambulate, difficulty using hands for fine motor tasks Participation restrictions include the inability to part-take in social walking groups or to access the garden.

IV. CLINICAL HYPOTHESIS

Though Shloka is advanced in age, it is not reason enough to deny eligibility for a prosthesis. In clinical evaluation of her abilities prior to amputation, her current physical ability and motivation, as well as her ability to learn new information it is decided that she will move on to prosthetic rehabilitation. Prosthesis componentry and rehabilitation programming will need to consider her body structure/function impairments and activity limitations. Goals will be set with participation restrictions in mind.

V. INTERVENTION

Shloka was fitted with a patellar tendon-bearing supracondylar socket with gel suspension sleeve, worn with a gel liner for increased area pressure distribution. The rehabilitation program included gait re-education, strengthening and endurance exercises, and functional movements for daily activities. We also focused on education with a lot of repetition and written reminders (such as a written note hung on her rollator walker to remember to check her sock ply).

The suspension sleeve needed modification to an “Easy Sleeve” system in order for Shloka to be able to don it independently because of arthritis in her hands. Gait training focused on trusting the prosthesis and practising full weight bearing through it, achieved by practising slowly stepping up onto stairs with a sound leg and kicking a ball with a sound leg while in the parallel bars. Heel strike and equal step length were also practised and Shloka advanced from ambulating in the parallel bars to a rollator walker. Her endurance was progressed by practising ambulation, as well as exercising with Nu-Step (a sitting ski machine to work both upper and lower extremity). Functional tasks included learning how to dress with the prosthetic leg by threading the leg through a pant leg first and then donning the prosthesis, and dynamic balance exercises that mimic functional tasks. These included side-stepping, cross-overs, picking items up off of the floor, making quick turns and backwards walking, and walking on uneven surfaces

VI. OUTCOME

Shloka completed the rehabilitation program with the ability to don and doff her prosthesis independently with the modified suspension system. She knew how to manage her stump and the prosthesis and had her written

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reminders to also assist in this management. This outcome was successful because her body structure/function impairments of arthritis were considered when fitting the prosthetic. The second successful outcome was that she was able to ambulate independently with her rollator walker, which is comparative to her previous level of mobility. Ambulation endurance was >500m with an efficient gait (equal step lengths with good heel strike bilaterally). This addressed the activity limitations identified in the initial examination.
A third successful outcome was Shloka's ability to part-take in her walking group again and also was able to walk out in her yard. Her son plans to make raised garden beds so that she will be able to sit on the edge and get her hands back into the earth. These outcomes address the participation restrictions identified and allow Shloka to participate in the activities that are meaningful to her.

Other outcomes included an improvement in her Clinical Outcome Variable Scale (COVs) from 56/92 to 82/91 and a Locomotor Capabilities Index-5 (LCI-5) score of 42/56.

VII. DISCUSSION

Geriatric patients who participate in prosthetic rehabilitation may require modifications to their therapy and consideration of their pre-morbid functional ability during goal-setting. Modifications may be made to therapy programming dependent on comorbidities, though Engstrom, 1999 [1] notes that a daily exercise program can minimize the effects of issues such as ROM, vascular and cardiorespiratory limitations. Modifications to strengthening, balance and endurance exercises should be made to ensure safety of the patient and be tolerable if the patient has frailty. The patient's pre-morbid level of activity, health and function must also be considered[2] . Eijk et. al, 2012 [3]found that pre-operative functional ability can predict rehabilitation outcome. When designing the rehabilitation program it is important to remain realistic and discuss goal-setting as an interdisciplinary team, including the patient. It may not be realistic, for example, for a patient to have a goal of ambulating independently and barrier-free if her premorbid activity included walking with a rollator walker. [4] Eijk et al, 2012 suggested notes that improving a patient's physical condition prior to amputation could lead to better rehabilitation outcomes, however, this is often not possible (though would be ideal). The team should remain realistic in goal setting and allow modifications to programming to make it feasible, the patient can have the best chance to return to pre-morbid function

VIII. CONCLUSION

The rehabilitation of geriatric patients undergoing prosthetic therapy necessitates a comprehensive and individualized approach that considers their unique pre-morbid functional abilities and existing comorbidities. The literature emphasizes the importance of modifying therapy programs to enhance safety and ensure exercises are appropriate for patients experiencing frailty. Engstrom (1999) highlights that a consistent exercise regimen can effectively address limitations in range of motion, vascular health, and cardiorespiratory function, which are critical for optimizing rehabilitation outcomes. Moreover, Eijk et al. (2012) provide evidence that pre-operative functional ability is a significant predictor of rehabilitation success, underscoring the need for realistic goal-setting in collaboration with interdisciplinary teams and the patients themselves. Recognizing that not all patients can achieve the same level of independence, the rehabilitation team must focus on feasible goals that align with the patient's capabilities and health status.Ultimately, fostering an adaptable and patient-centered rehabilitation framework can significantly enhance the likelihood of geriatric patients returning to their pre-morbid functional levels. This approach not only improves rehabilitation outcomes but also contributes to the overall quality of life for elderly individuals navigating the challenges of prosthetic use.

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