Role of physiotherapy and rehabilitation following lower limb amputation - Case study.

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Abstract - Amputation of the limbs is an extreme, irreversible operation generally resorted to when other treatments have failed. Following the healing of the incision wounds, the patient is fitted with a prosthetic limb. However, adjusting to normal life with a prosthesis requires extensive care through physiotherapy and rehabilitation, which aims for the restoration of physical, mental, social, and vocational fullness. The main aim of this study was to manage lower limb amputations by physiotherapy and rehabilitation. An experimental study was carried out over five months, focusing on the physiotherapy management and rehabilitation of male patients with transtibial and transfemoral amputations. The rehabilitation program spanned the preoperative, pre prosthetic, and prosthetic stages, involving residual limb conditioning, stump strengthening, balance training, and gait training progressing to activities like stair climbing. The results of the five case studies demonstrated a successful improvement in functional levels. For instance, two patients with K level 2 functional status improved to K level 4 with comprehensive gait training, and a pre-existing prosthetic user improved to functional level 4, able to overcome obstacles independently. It is concluded that rehabilitation following amputation is the responsibility of a multidisciplinary team, with the physiotherapist playing a crucial role from the preoperative phase through prosthetic training, with the ultimate goal of achieving a comfortable and independent life for the patient.

Keywords - Amputation, Physiotherapy, Rehabilitation, Lower Limb Amputation, Prosthesis, Gait Training, Case Study.

I. INTRODUCTION

Amputation is considered an extreme step and an irreversible operation that is typically performed as a last resort when other medical treatments have been unsuccessful. Once the patient's general condition is stable and the incision wounds have healed, they are prepared for a prosthetic fitting. Adapting to a normal environment with a prosthetic limb necessitates extensive care in the form of physiotherapy and rehabilitation. Rehabilitation is defined as the process of restoring individuals to the physical, mental, social, and vocational fullness of which they are capable. The earlier the onset of rehabilitation, the greater the likelihood of a successful outcome. The primary aim of this project was to study and manage lower limb amputations through physiotherapy and rehabilitation interventions.

II. MATERIALS AND METHODOLOGY

The study employed an experimental design focusing on the physiotherapy management and rehabilitation of transtibial and transfemoral amputations. The study was conducted over a duration of five months at the Government Institute of Rehabilitation Medicine (GIRM), K.K. Nagar.

Inclusion Criteria: Male patients with transfemoral and transtibial amputation were included in the study.

Exclusion Criteria: Patients with SYME'S amputation, upper limb amputation, and children were excluded.

Intervention: The rehabilitation program was divided into the preoperative period, and the postoperative period, which included the pre prosthetic and prosthetic stages. Key physiotherapy management steps included:

Pre prosthetic Stage: Measures like stimulation with limb elevation, resistive exercises to the stump, and stump bandaging were utilized. Bandaging was intended to maintain stump shape, reduce edema, and accustom the stump to pressure.

Prosthetic Stage/Mobility Stage: This stage focused on mobilization and functional independence. Mobility exercises included full Range of Motion (ROM) exercises, Proprioceptive Neuromuscular Facilitation (PNF) techniques, Progressive Resisted Exercises, and strong endurance exercises. Patients were taught stump strengthening, balance training inside the parallel bars, and gait training progressing to stair climbing.

III. RESULTS

Five case studies of patients with lower limb amputations (four transtibial, one bilateral transfemoral) were analyzed. The application of the multidisciplinary physiotherapy and rehabilitation protocol led to significant improvements in functional status, as measured by the Medicare Functional Classification Level (K level)

Case 1 (Rt Transtibial Amputation) - Functional level improved from K level 2 to K level 4.

Case 2 (Lt Transfemoral Amputation) - Functional level improved from K level 2 to K level 4.

Case 3 (Rt Transtibial Amputation, pre-existing prosthetic user) - Functional level improved to level 4, able to overcome obstacles independently.

Case 4 (Lt Transtibial Amputation) - Functional classification was K level 2, ambulatory without any mobility aid.

Case 5 (Bilateral Transfemoral Amputation) - Functional level improved from K level 1 to K level 2.

IV. DISCUSSION

The results from the case studies strongly affirm the efficacy of a comprehensive, staged physiotherapy and rehabilitation program following lower limb amputation. The structured protocol, which incorporates preoperative preparation, meticulous stump conditioning, and progressive prosthetic training, was instrumental in improving patient outcomes. The successful progression of patients to higher K levels (up to K level 4), indicating the ability to ambulate beyond simple straight-line walking and navigate environmental barriers, highlights the positive impact of focused gait and balance training on uneven surfaces, ramps, and stairs. Even the bilateral amputee, a K level 1 patient, achieved a functional K level 2, demonstrating the ability to use a prosthesis for low-level activities within the home environment. Effective rehabilitation hinges on an intensive, tailored approach that builds muscle strength and enhances postural control, ultimately enabling the patient to maximize the functional potential of the fitted prosthesis.

V. CONCLUSION

Rehabilitation following amputation is fundamentally the responsibility of a multidisciplinary team approach. The physiotherapist is a vital member of this team, playing an important role involved at all stages of the process, from the preoperative phase, through amputation, into prosthetic training, and in life thereafter. Patients must first be physically and mentally prepared for prosthetic gait training and educated on residual limb care prior to the commencement of training. Subsequently, the patient must learn how to correctly use and care for their prosthesis. Finally, the patient is successfully advanced to a higher level of activity beyond merely learning to walk, thereby enabling them to live a comfortable and independent life as soon as possible.

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