

T2 transtibial amputation and gait training after lower limb prosthetization from an occupational therapeutic perspective: an experience report



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ABSTRACT

Introduction: Amputation is the traumatic or surgical removal of a limb. Assistive Technology collaborates in the process of social readaptation of the amputee through the development of prostheses. This device allows to recover the functional independence and autonomy of the patient in daily activities. **Objective:** The present study aimed to describe the gait training of a transtibial amputation patient. **Method:** It is a case report of descriptive, narrative and reflective character, coming from the clinical practice in Occupational Therapy in the Laboratory of Assistive Technology (LABTA). A literature review was performed in databases. **Results:** This study presents two phases of care for people with amputation; the pre-prosthetic and post-prosthetic phases. In the first phase there is the preparation of the stump: strengthening of the muscles, training of the bandage of the stump and others, while in the second phase, there are the training of use of the prosthesis, to provide independence in daily activities and functional mobility, especially transfer and ambulation. **Conclusion:** The amputation causes occupational limitations to the individual bringing damages to the biopsychosocial level. Therefore, a careful evaluation should be made by the Occupational Therapist considering the previous functional capacity and occupational history of the patient. Thus, programs should perceive the patient, in their goals and ambitions to better assist and benefit them.

Keywords: Amputation, orthopedic procedures, lower limb prosthesis, gait training, occupational therapy.

1 INTRODUCTION

Amputation can be defined by the traumatic or surgical removal of a limb in part or in whole (BRAZIL, 2018). In the case of Lower Limbs – LLLL. Those that are performed above the level of



the ankle, whether transtibial, transfemoral, knee disarticulations or hip disarticulations, are considered as larger, while the smallest are those restricted to the toes or at the level of the foot (whether transmetatarsal amputations, tarsometatarsal or Lisfranc disarticulations, or medium-tarsal or Chopart's disarticulations) (KOLOSSVÁRY, et. al, 2015; JESUS-SILVA, 2017).

In studies of Negretti et. al, (2019) it was emphasized that amputees increasingly rely on a diversity of Assistive Technology – AT to collaborate in the process of social readaptation, among them, we can mention the prosthesis. This device allows to recover the functional independence and autonomy of the patient, the performance of the daily activities developed before the trauma and contribute to a better social participation.

The AT service has several professionals, among them, the occupational therapist, who will give emphasis, the confection itself, functional training, automation of posture and gait, training of placement and removal of the prosthesis and orthosis, architectural adaptations and clothing, in addition, will assist in occupational performance (RODRIGUES JÚNIOR, et. al, 2018).

Amputation at a level where the skin is viable and the musculature preserved, can provide better adaptation of prostheses and rehabilitation of the patient. This is due to the independence provided by the level of amputation favorable to the muscles, which enables the development of daily activities, better gait pattern and locomotion (MATOS, 2019).

Therefore, knowing the scarcity of studies using occupational therapeutic analysis about amputation and the importance of these data for the rehabilitation process of patients, the present study aimed to describe the gait training of a transtibial amputation patient.

2 METHODOLOGIES

This study is a case report of a descriptive, narrative and reflective nature, whose data come from the clinical practice in Occupational Therapy at the Laboratory of Assistive Technology (LABTA) in the manufacture of endoskeletal prosthesis of the type Kondylen Bettung Münster (KBM) and training of Activities of Daily Living (ADL) in a patient with transtibial amputation of level T2.

Initially, a literature review was performed in reference databases such as CAPES Periodicals Portal, Scientific Electronic Library Online (SciELO), Latin American and Caribbean Literature in Health Sciences (LILACS), Medline, PubMed and Virtual Health Library (VHL). In addition to research in journals (Research, Society and Development and Occupational Therapy Notebook of UFSCar). Books on the subject and government websites were also used in order to obtain a sufficiently concrete theoretical and practical basis on the rehabilitation of amputated limbs and prosthetization. Localized articles must be in Portuguese, English and/or Spanish and have been published in the last 10 years (with the exception of classic authors).



3 CASE DESCRIPTION

The patient A.L., is 60 years old, is female, is 71 kg, measures 1.56 m in height, with a body mass index (BMI) of 29.26 Kg/m², and has a transtibial amputation of T2 level in the right lower limb due to diabetes mellitus. She arrived at the Teaching and Assistance Unit in Physical Therapy and Occupational Therapy (UEAFTO), accompanied by her sister and making use of a wheelchair for locomotion, in order to perform evaluation and Occupational Therapeutic monitoring.

4 RESULTS AND DISCUSSIONS

The rehabilitation program at UEAFTO with LABTA, for lower limb amputations is divided into two stages: pre and post-prosthetic. The pre-prosthetic phase is the period of intervention prior to prosthesis. In the first stage, emphasis is placed on the preparation and modeling of the stump, bandaging, sensory stimulation, pain relief, prevention of deformities, positioning orientations, adaptations, mobility gain, weight transfer, awareness of limb loss, reorganization of posture and body image.

In the pre-prosthetic phase, it was observed that patient A. L. presented deformities in the lateral and medial condyle of the femur, which would imply a pressure point when performing motor training with the prosthesis. In this sense, in order to reduce these points, the technique of bandaging the stump, sensory stimulation and positioning guidelines was developed.

In the interventions of the pre-prosthetic phase, the competence of the occupational therapist is to work on the preparation of the stump: strengthening of the musculature, training of the bandage of the stump, treatment of the scar, care with the pain and sensation of the phantom limb, restructuring of the body image, etc. In order to prosthetize and perform training for independence in their occupations (BRAZIL, 2018).

According to Trombly (2013), it is the function of the occupational therapist to advise on the care of the postoperative injury, maintenance of the integrality of the skin, favor joint mobility, reduction of edema and pain control. In addition, the occupational therapist can also provide emotional support, promote desensitization of the stump, stimulate the strength and joint mobility of the remaining follow-up and the other limb to enable the subsequent prosthetization.

In the second stage of care for the person with amputation, the occupational therapist performs the training of prosthesis use from the transfer of weight on the prosthesis, sitting and lifting, going up and down stairs, etc. (BRAZIL, 2018). Also, static and dynamic balance on flat and/or unstable surfaces. In order to provide independence in ADL functional mobility, especially transfer and ambulation (AOTA, 2015; GOMES, et. al, 2021).

The use of the prosthesis can provide function of sitting symmetry, sitting balance, pressure distribution, transfers, less assistance during gait, improvement of gravitational safety, reorganization



of the body scheme, improvements in postural balance, self-esteem and well-being (VAROTO, 2021). The main outcome of functional capacity, which was found in all articles of this search, was the ability to walk with the prosthesis and independence during gait and secondary use of the prosthesis in the ability to perform ADL and IADL.

In the post-prosthetization phase, it was observed that during the swing phase of the gait A. L. performed little range of motion during knee flexion of the prosthetic limb, and on unstable surfaces such as ramp and ladder, walked with bilateral support on handrail and trunk posteriorization, pulling body with upper limbs - MMSS in the ascent and little control of knee locking. For this, gait training was performed, aiming at autonomy and independence in compromised ADLs.

Gait is a style of walking and is divided into three respective phases: support phase, balancing phase and double support phase. In gait training, the phases of the gait are developed for the body to get used to and learn to use the prosthesis without obstacles, providing an adequate ambulation (DIAS, et. al, 2014).

In the initial training, the patient performed the gait, with prosthesis and Canadian crutches and/or with walkers, presenting anterior trunk, reduced speed, variable step length and shorter support time. In addition, the training of walking using the prosthesis also aimed to develop the ability to go up and down, up and down a steep terrain, to get in and out of a car, the ability to sit and get up from a high chair and a low one.

The prosthetization became fundamental for a complete post-amputation rehabilitation, in order to favor functionality and autonomy in ADLs and Activities and Instruments of Daily Living – IADL, as well as to promote gait in a functional and adequate way (MATOS, 2019).

Varoto (2021) reports that the adaptation of the prosthesis is not the only important factor, but a favorable functional recovery after an amputation depends on the stump, postural balance, safety with the prosthesis, amputation time, comorbidities and age of patients and their engagement in gait training. Walking and climbing stairs are the most difficult ADLs for people with lower limb amputation. In this context, in the final training, one can observe improvement in gait speed, reduction in cadence, increase in stride, reduction in energy expenditure and reduction in dependence on the walker and the use of two Canadian crutches, starting to use only one.

5 CONCLUSIONS

The amputation comes to cause occupational limitations to the individual in such a way that it can bring losses of biopsychosocial level, where it is observed the need for structured public policies and qualified multidisciplinary team in order to reduce to the maximum the damages of amputation present in patients.



The indication of prosthesis for this public should not be generalized, being necessary the knowledge of the factors that interfere in the prosthesis and in the use of the prosthesis, considering cost-benefit, to carry out a rehabilitation more adequate to the subjectivity and individualities of the patients. A careful evaluation should be made by the multidisciplinary team, especially by the Occupational Therapist before starting rehabilitation taking into account previous functional capacity and occupational history, among other factors.

Rehabilitation programs for amputees are not simply prosthetic services, but must take into account the patient as a whole in their goals and ambitions. Thus, the intervention of the occupational therapist is to promote well-being and quality of life to people who have suffered lower limb amputation, through guidance, care, preparations, training and use of assistive technologies to assist in the autonomy and independence of the daily activities of amputees.



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