

## Analysis of concomitant diseases of the transtibial amputation of lower limbs

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### Abstract

**Background:** Medical rehabilitation of persons who have undergone unilateral transtibial amputees is a complex and multidimensional process. The presence of comorbidities and their complications increase mortality levels and slow down the process of rehabilitation.

**Material and methods:** 472 medical records of patients admitted during the years 2015 to 2016 were analyzed. 142 patients were selected because of unilateral transtibial amputations of diabetic complications with analysis of clinical diagnosis and concomitant pathologies. By examining clinical and functional, were evaluated dolor syndrome and goniometric knee joint of the amputated side. All patients received medical rehabilitation and orthopedic care in the hospital. Clinical and functional status was assessed in dynamics after treatment, and at 6 months.

**Results:** of somatic pathologies, cardiovascular diseases (hypertension – 88%, ischemic heart disease – 54%) are first mentioned in the concomitant diagnosis on admission, the most frequent pathologies associated with diabetes and in recitals average age of the study group. Dolor syndrome and functional status during rehabilitation treatment, improved significantly from  $7.9 \pm 0.16$  points, to  $4.1 \pm 0.03$  points, and knee extension deficit decreased on average by 4.69 degrees. After discharge home both indices did not support essential amendments.

**Conclusions:** To streamline the process of medical rehabilitation and improvement of the prosthetics of patients with amputations of lower limbs should be considered concomitant pathologies present and their long-term monitoring.

**Key words:** transtibial amputations, concomitant pathology, medical rehabilitation.

### Introduction

Lower limb amputation is caused primarily by chronic vascular diseases, diabetes and trauma followed by installing a very high rate of disability and locomotor disabilities [1, 2, 3, 4]. The results presented by Transatlantic Inter-Society Consensus (TASC) show that the frequency of amputations of diverse etiology has increased considerably over the last 25 years and this number is expected doubling in the next 15 years [5]. For people under the age of 50 years and younger, trauma (accidents, labor etc.) is the main indication for amputation [6, 7, 8]. In Moldova in 2013, the rate of chronic conditions, complications that lead to amputations of limbs, was the following: for vascular diseases – 1560 cases, for trauma – 478 cases annually. Reported by gender (male / female) amputations are most commonly performed in men, the proportion is 3:1 [7, 8].

Personal and environmental factors are important in developing long-term functional capacity of a person who suffered amputation [9]. The goal of rehabilitation is considered reeducation mobility of people who have undergone an amputation. The study of disability by amputations of lower limb of these patients demonstrated that functional capabilities don't have a decisive role in assessing the quality of life [10].

Other factors impacting on the quality of life were proved to be high quality prosthesis, presence of comorbidities, phantom and residual pain in the stump [11,12]. The factors with the greatest impact on functional capacity demonstrated by a prospective study duration (2 weeks, 6 months and 12 months) were found to be: the duration and level of amputation, presence of concomitant pathologies and mental abilities [13].

The presence of comorbidities and their complications (e.g. kidney and cardiac failure, etc.) increases mortality and delays the rehabilitation process [13]. Of comorbidities first ranks diabetes, osteo-articular pathologies and cardiopulmonary [9].

Chronic pain can have a negative impact not only on the physical functionality, but on the emotional status, social and vocational. In a study of 437 people with amputations of lower limbs, Schans et al. [14] found that people who experienced phantom pain, and have worse quality of life than those who did not have phantom pain. Low back pain according to some studies as functional deficiencies can contribute to even more than the phantom pain or residual limb pain [15, 16].

Complex rehabilitation process of a patient with lower limb amputation should be focused both on functional recovery, as well as monitoring of concomitant diseases.

The purpose of the study: Estimating concomitant pathologies in patients with type II diabetes after unilateral transtibial amputees and their evolution in the medical rehabilitation complex.

**Material and methods**

The study was performed in Republican Experimental Centre for Prosthesis Orthopedics and Rehabilitation (CREPOR). At the first stage were analyzed 472 medical records of patients hospitalized in the Atypical Prosthetics ward and Complicated, during the years 2015-2016. There were selected records of 142 patients with unilateral transtibial amputations caused by diabetic pathology. The average age of patients was 60,31 years, 29 women and 113 men. All patients had degree of disability, confirmed by the National Council for Disability and Work Capacity determination. 60 persons received severe degree of disability, stressed (II) – 71 people and light degree (III) of disability – 11 people.

Phase two of the study was to assess clinically and functionally 142 diabetic patients with unilateral transtibial amputees. All patients were underwent medical rehabilitation and orthopedic care (prosthesis type PNR3-12) in the hospital. Rehabilitation treatment comprised the application of passive methods (hand massage, thermotherapy, hydrotherapy, magnetotherapy) and active through the application of kinesiology for:

- reeducation of independent and assisted transfer with training to the new static and walking conditions.
- reeducation of standing balance.
- general and special physical development.
- increase of breathing capacity.
- stump preparation for applying provisional prosthesis.
- orthostatism and balance rehabilitation with provisional prosthesis.

Through the collection of historical data on admission were identified present concomitant diseases and the re-

habilitation of functional capacity in the postoperative period (after amputation). Dolor syndrome evaluation was performed using the VAS scale and vicious stump by joint stiffness, using the goniometer. All indices were measured at admission (baseline) and after medical rehabilitation treatment at – discharge (1 month) and after 6 months. Data were analyzed by EXCEL, in calculating the coefficients Student-derived indicators.

**Results and discussion**

Of the 142 patients admitted for medical rehabilitation and primary prosthesis, all were diagnosed with type II diabetes by about 13.03 years up to amputation, average serum glucose level during the last 6 months – 12,1 mmol/l. Time from lower limb amputation, to consultation in CREPOR, constituted on average 9.38 months. Figure 1 shows that during this period only 41% of patients, who were consulted in CREPOR, underwent rehabilitation treatment. Because no patient was sent to specialized rehabilitation services, rehabilitation measures had a passive character followed by hygiene measures and local treatment of amputation stump, learning the technique of dressing. All the mentioned above measures were indicated by the surgeon.

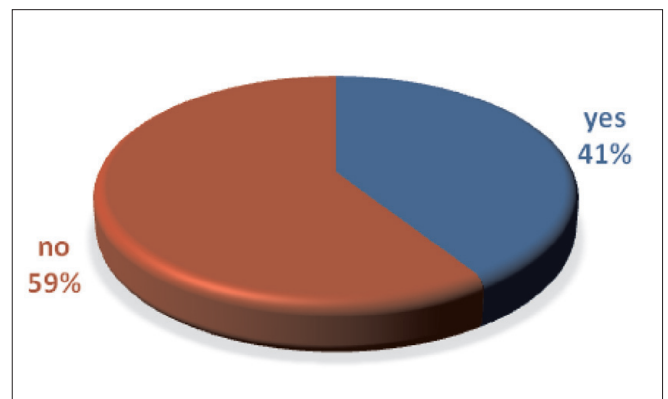


Fig. 1. Rehabilitation treatment previously conducted.

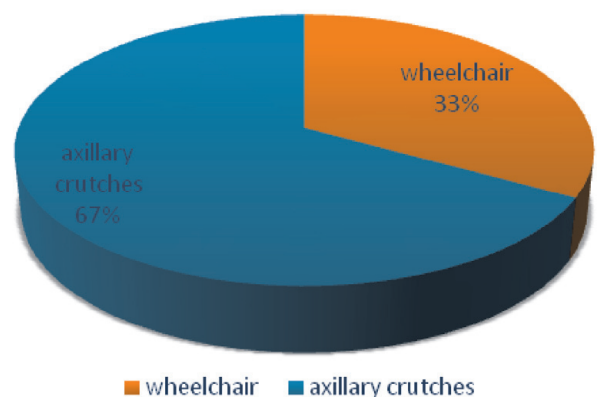


Fig. 2. Way Away.

Table 1

## Feature comorbidities in diabetic transtibial amputations

Phantom pain		Other pain		Vicious stump		Hypertension	
Abs	%	Abs	%	Abs	%	Abs	%
132	92,95	138	97,18	68	47,88	125	88,02
Ischemic Heart Disease			Obesity			Osteoarticular	
Abs		%		Abs		%	
77		54,22		52		36,51	
Abs		%		Abs		%	
77		54,22		52		36,51	
Abs		%		Abs		%	
79		55,63		79		55,63	

An important functional criterion in the rehabilitation of patients after amputation is the outpatient capacity of patient, who underwent amputation. Also in surgical departments, patients were instructed in handling bilateral axillary crutches. Though walking, after unilateral transtibial amputees, is balanced against the thigh amputations and does not involve much effort and energy expenditure, however 33% of those hospitalized were traveling in a wheelchair (fig. 2). The large number of these people is determined by the presence of concomitant decompensated pathologies (hypertension, ischemic heart disease, etc.) or a patient fears to injure himself. The most frequent concomitant diseases diagnosed in hospitalization are shown in table 1.

Analyzing medical records, 97% of patients with diabetes after transtibial amputation, had different genesis pain (osteo-articular, muscular, neuropathic) caused by biomechanical disorders due to the absence of a segment. By the same cause, osteo-articular manifestations occur confirmed by X-rays. In reality these nosologies number is much higher, but it is not confirmed by laboratory tests to be established as a clinical diagnosis. Phantom pain present in 97.1% cases, confirming data from the literature showing installation phantom pain immediately after surgery, with their evolution throughout their lives. In most cases patients have both kinds of pain. No patients in the study group follow spec (Hypertension – 88%; Ischemic Heart Disease – 54%) are first mentioned in the concomitant diagnosis while on admission, the most frequent pathologies associated with Diabetes and in recitals average age of the study group. Not every patient has a Body Mass Index calculated, so diagnosis of Obesity is determined in only 36% of cases, which also does not represent the real situation.

Of all presented comorbidities on admission, vicious abutments and dolor syndrome by joint stiffness, proved to be influenced during medical rehabilitation. Dolor syndrome caused by local changes of the stump of another genesis during the implementation of means of medical rehabilitation in complex drug therapy (NSAIDs parenteral), yielded much from an average of  $7.9 \pm 0.16$  points to  $4.1 \pm 0.03$  (tab. 2). Over six months this metric has not changed much, modifying only 0.3 points after VAS. This stagnation is explained by the fact that patients at home,

have not received supportive treatment and NSAIDs were administered on single occurrence of pain episodes. The intensity dolor syndrome that carries a moderate character and, in many cases, patients experienced pain without taking any action. On the other hand local dolor syndrome caused by prosthesis was declined by removing the causal factor (decreased prosthesis wearing time).

Table 2

## Evolution of dolor syndrome in complex rehabilitation process by VAS

	Initial	1 month	6 months
Phantom pain	$4,25 \pm 0,29$	$3,7 \pm 0,03$	$3,567 \pm 0,31$
Other pain	$5,905 \pm 0,16$	$4,155 \pm 0,03$	$3,805 \pm 0,33$

Phantom pain patients originally presented with rather mild  $7.9 \pm 0.16$  points. There is a positive trend during medical rehabilitation, averaging 3.8 points. From discharge to 6 months, patients have not received specific phantom pain and do not maintain the results that were obtained at discharge. Dynamic results are insignificant, from  $4.1 \pm 0.03$  points to  $3.8 \pm 0.33$  points. The presence of joint stiffness vicious stump, was present in 68 people, which also represents 47.8% of all patients with unilateral transtibial amputees on admission (tab. 3).

Table 3

## Evolution of goniometric measurements of the knee joint in the rehabilitation complex

	Initial	1 month	6 months
Flexion	$96,58 \pm 0,05$	$103,67 \pm 0,03$	$106,76 \pm 0,07$
Extension	$10,38 \pm 0,39$	$5,69 \pm 0,16$	$4,52 \pm 0,52$

Table 3 data show an increase in Angle indices, originally made for flexion from  $96.58 \pm 0.05$  degrees to  $103.67 \pm 0.03$  degrees recorded at discharge. More significantly changed goniometric data for knee extension, from  $10.38 \pm 0.39$  degrees to  $5.69 \pm 0.16^\circ$  after treatment. The results obtained for the extension deficit reduction are explained by the fact that the focus was on reeducation recovering knee exten-

sion. The prosthetic leg is influenced much more by scarcity extension, than limited knee flexion. Over the next five months this index practically has not changed for both flexion and extension, because all measures under home care were limited to hygienic care and not to increase functional capabilities.

### Conclusions

1. Following evaluation and examination of the medical records of 142 patients with type II diabetes, after unilateral transtibial amputation, the most frequent comorbidities present at the primary consultation, proved to be dolor syndrome and joint stiffness vicious stump.

2. The first place of concomitant pathologies determined at admission, take cardiovascular pathologies (hypertension – 88%, Ischemic heart – 54.2%).

3. Reduced outpatient ability and vicious stump presence, is due to inadequate treatment of postoperative rehabilitation.

4. Insignificant evolution of Angle indices and dolor syndrome (assessed by VAS) in home conditions, is determined by the occasional administration of NSAIDs and absence of preventive rehabilitation programs.

5. To streamline the process of medical rehabilitation and improvement of the prosthetics of patients with amputations of lower limbs should be considered present concomitant pathologies and their long-term monitoring.

6. The rehabilitation care of persons who have undergone amputations of limbs, should be a continuous process with postoperative initiation, and continued after discharge in specialized departments, with secondary prevention programs.

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