

The Perception of Transtibial Amputees Regarding the Use of Prostheses

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ABSTRACT - *This study analyzed the perceptions of transtibial amputees regarding the use of prostheses based on a descriptive, exploratory, and qualitative analysis. The study population included seven adult and senior transtibial male amputees who were participants of the Prostheses, Orthoses, and Ostomies Program of Itajubá, in the southern state of Minas Gerais in Brazil. Individual semi-structured interviews with content/speech analysis were conducted during data collection. Data heterogeneity related to cause and time of amputations was observed. According to participants, adaptation to the use of prostheses could be easier if they were made with lighter materials; these prostheses are made with heavy material, which makes fitting and use difficult and uncomfortable. Most participants regarded a decrease in prosthesis weight as a significant improvement.*

KEYWORDS: *development, technologies, amputation, public health, assistance, usability.*

I. INTRODUCTION

Amputation should be regarded within the general context of a treatment, and not as a single event, and with the purpose of improving quality of life by all owing amputees to more easily participate in society. Amputation is the term used to define total or partial removal of a limb through an indicated surgical procedure in the treatment of various diseases or accidents. According to Carvalho (2003, p. 56) [1], amputation is implicitly associated with disability and dependency and, therefore, amputees must be evaluated early for participation in rehabilitation programs. This evaluation aims to define and measure the amputee's abilities and disabilities to perform self-care and both simple and complex everyday activities. Evaluation is performed by a multidisciplinary team composed of physicians, nurses, psychologists, social workers, physiotherapists, occupational therapists, physical educators, and professionals specialized in prostheses' fitting, among others. The rehabilitation of amputees is not limited to prosthesis fitting. Using a prosthesis with full control and independence in daily, professional, and recreational activities minimally requires good muscle balance, prevention and elimination of contractures, reduction and elimination of pain, stump modelling and maturation, perfectly adjusted and aligned prosthesis placement, and gait training (Carvalho, 2003, p. 57-58) [1].

Transtibial amputation is performed between the tibiotarsal and knee disarticulations. It can be divided into three levels, namely, transtibial amputation in the proximal, middle, and distal third. The functional importance of the knee articulation in patients must be considered in these amputation levels (Carvalho, 2003, p. 58) [1]. According to Queiroz (2008, p. 35) [2], the main etiologies of lower limb amputations are derived from vascular, neuropathic, traumatic, neoplastic, infectious, congenital, and iatrogenic processes. Tavares et al. (2009, p. 827) [3] report that the incidence of amputations related to diabetes reaches 6-8/1000 diabetics per year worldwide. In Brazil, it is estimated that diabetic subjects account for 40,000 amputations per year. Transtibial amputations generally occur in individuals between 50 and 75 years, with vascular complications generally occurring in individuals over the age of 50. Transtibial amputations in young adults generally occur as the result of traumatic conditions caused by increased exposure to work and traffic (Queiroz, 2008, p. 37) [2]. Transtibial amputation is among the most common amputations affecting lower limbs. The fitting associated with the preservation of knee articulation allows these individuals a level of functionality that is close to normal. Pedrinelli, (2004, p. 92) [4], Baraúna et al. (2006, p. 86) [5], claim that transtibial amputation performed between the tibiotarsal and knee disarticulations is at least twice as common as amputations performed in other levels. In Brazil, the incidence of amputations is estimated as 13.9 per 100,000 inhabitants/year; therefore, this procedure is deemed socially important, affecting mobility and independence of patients. Hence, the goal of this study is to contribute to the knowledge related to issues involved in the fitting and usage of prostheses by transtibial amputees.

II. OBJECTIVE

To analyze the perception of transtibial amputees regarding the use of prostheses.

III. METHOD

This was a descriptive and exploratory study with a qualitative approach.

3.1. PARTICIPANTS

The studied population included seven adult and senior transtibial male amputees who were participants of the Prostheses, Orthoses, and Ostomies Program of Itajubá in the State of Minas Gerais/Brazil at the time of data collection.

3.1.1. INCLUSION/EXCLUSION CRITERIA

Amputees were selected according to the following inclusion criteria: male and female adults and seniors who had undergone amputation through surgical intervention and who voluntarily participated in the study. People born without a limb were excluded from the study.

3.2. LOCATION

The study was conducted at the Dr. Gaspar Lisboa Polyclinic Health Center of the Basic Unit of Itajubá/MG where the Prostheses, Orthoses, and Ostomies Program of Itajubá operates. This program serves 15 cities in the southern region of the State of Minas Gerais. All upper and lower limb amputees from Itajubá and surrounding regions who suffered amputation through surgical intervention are referred to this program and assisted in the orthopedic rehabilitation center. Our interest focused on transtibial amputees who are residents in Itajubá/MG. Thirty amputees are registered in this program. Twelve of the thirty were transtibial amputees and were residents in the city of Itajubá; and seven agreed to participate in the study.

3.3. RESEARCH ETHICS COMMITTEE

All participants and participating institutions received both the study participant information letter and a consent form that was signed by participants as well as the participating institution. The study was approved by the Ethics in Research Committee from UNIFEI under n° 39430114.5.0000.5652.

3.4. PROCEDURE

Individual semi-structured interviews were conducted with the seven transtibial amputee patients during data collection for the content analysis procedure. Interviews were recorded and occurred over the course of approximately one hour.

The semi-structured interview was selected to allow individuals greater freedom to narrate their experiences. The major topics of the interviews include: *Cause of amputation; Time of amputation; Comfort of prosthesis; and Adaptability and Adjustment to prosthesis.*

The use of interviews, as a privileged instrument in the collection of information, was based on the assumption that the study participants could contribute in this matter if allowed to express their feelings as amputees using prostheses. Content Analysis was used to analyze the participant narratives (Bardin, 1977, p 43) [6].

Amputees were free to choose the location, date, and time for the interview. Participant identities were protected through the use of made-up names with the same initial of their first names. Six themes were established based on multiple reviews of interviews' transcripts and identification of invariant structures.

IV. RESULTS AND DISCUSSION

The sample distribution by age and gender demonstrated that the seven transtibial amputees were 39, 55, 60, 63, 63, 66, and 78 years old and all males.

The study population participating in this study is similar to that in the study by Schoeller et al. (2010, p. 448) [7] whose study population consisted of 75% males. This is possibly because males are more exposed to physical traumas resulting from accidents and/or affected with vascular complications than females.

Participant interviews indicate that the causes for amputation vary:

My accident. Then [...] one day I went horseback riding [...] I left home early in the morning, it was a Sunday and on Sundays I loved to go around, wild and free. I rode around here all day, I met a friend in a pub but I didn't drink hardly anything. When I was riding back home, I dismounted the horse and the horse showed a different stride [...] I think I scared him with something and he knocked me down. I fell in a bad way and felt a sharp pain in my leg. I thought I had broken my leg (José).

A water blister developed on the head of my big toe. It took a long time to burst and when it did it was oozing smelly pus. I felt nothing and began to lose sensation in my leg, which went up the whole leg. I went to the doctor and he said he had to amputate it about three inches below the knee. I am diabetic (Joel).

Luz et al. (2010, p. 175) [8] do not sort individuals by the etiology (trauma versus vascular problems) of amputations. However, heterogeneity of causalities was observed in that study.

In order to understand the process that amputees go through after amputation, it is necessary to know if the amputee was assisted and informed about the complex process of prosthesis fitting, and which health professional transmitted this relevant information to this physically and emotionally weakened patient.

One of the participants received initial assistance through his employer; the company facilitated the patient's referral to the AACD in São Paulo. At the AACD, health professionals informed the patient about the process of prosthesis fitting in the private sector, but not through the public health system (SUS). In this case, all expenses such as travel, lodging, and meals were paid by the company.

Some of the participants became aware of the possibility of receiving a prosthesis through informal conversations with friends who were already using a prosthetic limb.

When considering humanized practices in health care, the health care provider must not only provide information concerning the technical and specialized efficiency of prosthetic devices, but also establish a relationship with the amputee based on *embracement, intimacy, and naturalness* (Crepaldi, 1999, p. 91) [9].

In the transcript below, one can observe the presence of health professionals who provide assistance.

At the physical therapy. The doctors did not say anything. How this is. .. This is at the physical therapy, they prepare all the people there. Prepare everything. We see a nutritionist, ah ...What's the other? ... and a psychologist. First is the psychologist, then the nutritionist. Parts of what we did, all guided. I did physical therapy in Varginha. Every patient from Itajubá goes there for physical therapy. The prosthesis is made there, right. It is a contractor that makes the prosthesis (José).

These patients were not properly informed about the process of prosthesis fitting. Health professionals should be well trained to provide patients with information about their prosthetic devices.

According to Andrade et al. (2011, p. 152) [10], health professional are indifferent and provide misinformation; they function based on denial, and fear of identifying and preventing severe cases. Health care services are understaffed and professionals, for the most part, are isolated, feel devalued, and have heavy workloads. Nunes et al. (2006) [11] reported that surgeons must not only provide guidance to patients and establish a proper physician-patient relationship, but also provide guidance about the rehabilitation period.

Gabarra and Crepaldi (2009, p. 68) [12] note that concerns with the communication of diagnoses representing "bad news" have become increasingly important in the field of Health Psychology. Bad-news drastically and negatively changes the patient's perspective about his future; the doctor obviously has a fundamental involvement in this type of communication. For this reason, handling emotional aspects is a concern in the doctor-patient relationship.

Gabarra and Crepaldi (2009, p. 65) [12] define the following fundamental points in this process of doctor to patient communication: individualized attention from the surgeon to the patient; active listening with the ability to observe details; allowing for questions and providing honest answers to facilitate the therapeutic alliance; using accessible language, showing pictures, videos, and providing reading materials about the surgery and the subsequent rehabilitation to offer a sense of control to the patient; and encourage participation in the decision-making process.

The prerogative of choosing the prosthesis is not given to these amputees. They are usually assisted at the Rehabilitation Center by professionals who make an overall assessment of their health, take measurements for prosthesis fitting, assess the stump situation, and decide which prosthesis is best for that particular case. In this context, we highlight the following speeches:

Choose the prosthesis ... imagine! They gave me what they wanted and I accepted it. Can we choose? (Joel).

No. They, at the AACD, chose the best that was there. In mine they put foam so it is like a normal leg. I chose to put a foot because the appearance is better. It becomes more complete (Enzo).

85% of amputations resulting from diabetes could be avoided with proper health education, encouragement to self-care, and interdisciplinary assistance (Tavares et al., 2009, p 829) [3].

The following transcripts illustrate the frustrations of participants waiting for prosthesis fitting.

It has been 15 years, it was in 1999. So, I suffered an accident, and it took me nine months to recover and be ready for the prosthesis; I waited, because it takes this long, some parts need to come from abroad (Enzo).

It has been four years that I lost my leg and two years since I had two toes amputated from the other leg, the normal leg (Joel).

The accounts above show that the time between amputation and prosthesis fitting is variable among individuals. The majority of amputees do not receive correct information about the process of prosthesis placement. When subsequently contacted by the Rehabilitation Center of Varginha/MG, patients must be prepared to receive their prostheses and trained in how to use their prosthesis. We therefore asked participants about the time between amputation and prosthesis placement, which is highlighted in the following speeches:

I know it took one year more or less, I am using the prosthesis for 14 years. Since 2000. From the time it was ready and placed until it was correctly fitted, I had to go to São Paulo about four times. Even so, I immediately used it for two months and then I lost the socket part because the stump shrinks fast with the use (Enzo).

Nine months after the amputation. I had my leg amputated on October 23 and received the prosthesis on July 28 of the following year. It took a long time because my leg was not healed, the wound needed to close. The stump preparation was necessary. I was very well taken care of in Varginha, they gave me lunch, coffee, all for free. We did not spend anything there (Bento).

We also observed that these patients did not receive pre-operative rehabilitation due to the urgency in performing the amputation. However, the postoperative rehabilitation is generally regarded as satisfactory, i.e., these amputees are satisfied with the assistance received. According to Nunes et al. (2006, p. 125) [11], rehabilitation should be individualized, planned, and a continuous process from before the surgery until the definitive prosthesis placement in order to allow patients to regain normal life and perform all basic activities. However, dissatisfaction and low availability of physiotherapy and occupational therapy services have been reported, which may be related to cost, difficult access to services, lack of available services, and lack of importance given to potential services.

However, delays in referrals to rehabilitation services are inevitable and can lead to the development of joint contractures and local complications, making adaptation to prostheses more difficult (Nunes et al., 2006, p. 128) [11].

We observed that, in regard to imbalance in weight discharge associated with the time of prosthetic usage, individuals with longer prosthesis usage (32, 30, and 29 years) showed 67% imbalance of body weight in the intact limb and 33% in the amputated limb; 56% imbalance of body weight in the intact limb and 44% in the amputated limb; and 51% imbalance of body weight in the intact limb and 49% in the amputated limb, respectively (Luz et al., 2010, p. 176) [8].

Those individuals with less time of prosthetic usage, one with 5 months and two with 6 months, showed imbalance of 59% of body weight in the intact limb and 41% in the amputated limb; 60% of body weight in the intact limb and 40% in the amputated limb; and 62% of body weight in the intact limb and 30% in the amputated limb, respectively (Luz et al., 2010, p. 176) [8].

The study by Luz et al. (2010, p. 174) [8] shows that the separate analysis of each case suggests that the longer the fitting time, the lower the percentage of asymmetry between weight discharges. This result is similar to results reported by Baraúna et al. (2006, p. 89) [5] in a study of body oscillations in individuals using prostheses that demonstrated these oscillations are inversely proportional to the time in years of prostheses usage.

According to Luz et al. (2010, p. 175) [8], lower limb amputees present higher overload on the intact limb than on the amputated limb, and higher imbalance is observed in older individuals with short-term prosthetic usage. Prosthetic limb users present mild joint degeneration after the third decade of life.

Transtibial amputees also provided insights into the relative comfort of their prostheses. Comfort is obtained when the prosthesis is individually designed and customized to each patient.

It bothers. The details are important. The cast. All the details. It still bothers [...] at the end of bones, I need to observe this. It hurts [...] the person cannot change the gait. Because this is not from one day to the next to settle in place (José).

No. These days it was making noises because there was a loose screw, then I tight the screw up and it all worked out (Joel).

Yes, I feel that it bothers. When I am sitting, it's hard to feel pain under the stump. If traveling by bus, I have to keep the leg stretched, if I bend my leg, I cannot, it hurts a lot (Enzo).

We observed that the prostheses of most participants were not customized, a situation which may result in functional disability, emotional, psychological, and environmental problems.

Boone et al. (2012, p. 843) [13] determined whether people with amputated limbs were aware of problems in prostheses alignment and were able to communicate the problems effectively.

The perception was evaluated when standing up (static) and immediately after moving (dynamic) using software with a visual analog scale in each condition of alignment (Boone et al, 2012, p. 845) [13]. In the coronal plane, the Friedman test demonstrated general statistical differences between the static and dynamic positions with angular disturbances. In the sagittal plane, the Friedman test demonstrated general statistical differences in dynamic measurements with angular disturbances and on measurements of dynamic early posture of perceptions with translational disturbances. The study observed angular (3 and 6 degrees), translational (5 and 10 mm), sagittal (flexo-extension; anterior-posterior), and coronal (adduction-abduction; medial-lateral) alignment disturbances.

The use of the Fisher's exact test suggested that people with perceptions of amputation were good indicators for measurements of coronal angles but less reliable when defining other conditions of alignment (Boone et al, 2012, 845) [13]. Here are some speeches about the comfort of prostheses.

It is comfortable (Joel).

Uncomfortable. If I could use another one more comfortable, it would be better. It bothers me to bend, in the residual limb bedding, and in the weight (Enzo).

It is not comfortable. I prefer crutches because the prosthesis is not in my measurements (Heron).

Gabarra and Crepaldi (2009, p. 67) [12], observed that the younger the patient the harder the adaptation to the prosthesis, especially in relation to restriction of activities. Elderly amputees have the opportunity to gradually adjust to restriction of activities and adapt better to an amputation.

Gabarra and Crepaldi (2009, p. 67) [12], also noted that psychological factors are effective in assisting in the adaptation to the amputation: people felt well during periods of low levels of depression and showed high rates of self-esteem after the amputation. The study was conducted with 138 amputees and showed that 77% felt positive after the loss of the limb. The most relevant categories were: finding the beneficial side of the amputation (60%), redefining events, and re-evaluating life (35%). Among those who reported positive aspects, few cases of depression were observed and, when present, they represent mild states of depression.

A positive adaptation occurs when the individual places his values in non-physical qualities and his sense of intrinsic values. These amputees attribute humor, social support, and affective relations as important to their positive adaptation. Gabarra and Crepaldi (2009, p. 67) [12], note that there are few studies that focus on the perspective of positive adaptation, and that research on the negative aspects prevails. Personality factors and *copping* strategies are fundamental to understanding the process of adaptation to amputation (Gabarra and Crepaldi, 2009, p. 68) [12].

We observed that the adaptation to the prosthesis was directly related to its fitting. Therefore, we sought to learn what the participants think of the prosthetic socket:

For me, the socket fits well. I got used to the prosthesis and the socket. When I have a little problem with the screws, I fix it myself and it is alright (Joel).

The socket is uncomfortable. I know through the internet that the current prosthetics have the socket changed, they use a silicone sock in the socket, which is much better (Enzo).

The socket is not comfortable. It needed to be softer, it is hard[...].very hard. They need to make it better, lighter. It is very heavy. In my case, the foot is wrong, the height is wrong (Heron).

Nunes et al. (2006, p. 127) [11], observed a prevalence of adaptation to lower limb prosthesis of 38%. Patients with a low level of schooling had less adjustment time to the prosthesis. Patients can recover functions and quality of life after the amputation through improved self-care, less dependence, a greater variety of social interactions, less isolation, and through the promotion of preventive actions.

The study of Lass et al (2013, p. 839) [14] demonstrates the advantages of using a flexible pylon system, resulting in a positive effect on achieving gait in geriatric patients.

The advantages of the dynamic pylon can improve clinical rehabilitation, especially for geriatric patients with vascular disorders, because it provides comfort and better prosthesis performance during gait as a short-term benefit in addition to providing improved long-term quality of life (Lass et al., 2013, p. 842) [14].

Transtibial amputees were asked to describe what prosthesis attributes contribute to ease of adaptability. The amputee's adaptation to the prosthesis is achieved in shorter time and with greater functionality if some procedures, such as preparing the stump and functional training are performed. Participant reports include:

It is difficult, it takes one year or more, it depends on the socket [...] I do not use it all day. The greatest difficulty is to accommodate the bones, because the flesh [...] is very hot inside the socket. The socks sweat. It is the same as using dentures. It makes you want to get a drill and make holes in the socket for ventilation, to allow the air to enter, breathe (José).

It was smooth. I do not know how long it took. Because my prosthesis is made of carbon fiber, it is lightweight. Sometimes I feel a little pain, especially on the front part [...] it hurts more in the front. Once the screw got loose, the socket got loose in mine. The socket hurts if it is loose or tight (Enzo).

The stump is the residual limb, responsible for controlling the prosthesis when the amputee stands up and walks. Some complications such as flexion deformity, bony irregularities, and excess of soft tissues, are common after amputation and can lead to disability and reduced quality of life.

The physiotherapist plays a fundamental role in functional re-education, assisting the patient at all stages during the rehabilitation program, participating in the multidisciplinary team, overseeing and treating from the pre-to the post-operative stages, and educating about pre-and post-prosthetic mobility. The physiotherapist also massages the stump and desensitizes it. Patient comments regarding massage and desensitizing include:

Yes, before I could go home with the prosthesis I stayed in Varginha for four months. The massage was performed and I spent time with many professionals [...]physiotherapist [...]psychologist (Joel).

Yes. It is to decrease the swelling. I did it in Itajubá. But the correct physiotherapy was not done here. Only bandaging, they did not massage and did not perform muscle strengthening (Enzo).

Massage at the stump, no! I used a bandage to shrink the stump. Then, I got tired and stopped using it. I have not tried again(Heron).

Schoeller et al (2010, p. 446) [7], believe the possibilities for re-adaptation of an amputated person increase when rehabilitation is started even before the amputation. This process includes preparing the stump, stump cutting site, and dressings for modeling the stump after surgery.

Okamoto et al (2000, p. 123) [15], noted that changes concerning the amputated stump are the most common reasons for patients to seek medical treatment after the prosthesis adjustment. However, patients with transtibial prosthesis usually return to the everyday life and rarely attend follow-up consultations. Okamoto et al (2000, p. 123) [15], observed that the stump goes through progressive changes with skin lesions and muscular atrophy, and that amputation results in chronic pain due to the posterior fibula position in relation to the tibia. The distal stump migration inside the socket occurs because of the retraction of the interosseous membrane and compression of the socket lateral walls, and therefore supports the weight of the body on its distal end.

Another relevant question directly related to the safety provided by the prosthesis is if the amputee feels imbalance and instability when going up or down stairs with the prosthesis. In this respect, safety is synonymous with confidence and steadiness.

We noted in our study that the majority of participants did not feel safe and need the aid of a handrail, an observation consistent with the study of Raddatz, Roveda, Lorenzett (2012, p. 8) [16], where only 11% of patients consider their prosthesis safe. The safety issue is a concern because it may hinder activities of daily living and functionality. Participant comments on prosthesis safety follow.

The prosthesis is a little harsh, I do not have the normal leg balance when going up or down stairs. If I had that balance it would be very good [...] it would be perfect (Joel).

To go up and down stairs is easy with a handrail. Without a handrail I have to go very slowly. Climbing stairs is worse than going down (Enzo).

I feel going down the stairs [...] it is not fear, but I have to be careful to not miss the gait and fall (Joaquim).

Most amputees report that they feel instability and imbalance when using the prosthesis. Therefore, we wondered if the prosthesis limits their movement. Participant comments include:

No. The prosthesis has helped in the movement. I do quite a lot with it now(José).

No. It greatly improved my life. I cannot even imagine what it would be without the prosthesis (Joel).

Yes, it limits the movement. It is not like a normal leg. You feel weariness. It does not give the necessary balance, it is not very flexible (Enzo).

Amputee accounts showed that adaptability to the prostheses is not based on only one factor, but that several variables are involved and their interactions affect adaptability. In these reports, it was noted that problems related to the alignment of the foot resulted in instability and imbalance in the use of prostheses and difficulty in adapting. Svoboda et al. (2012, p. 227) [17], considers variability as a useful indicator of the physiological system with its presence usually being regarded as a negative phenomenon. However, if one considers variability as a result of multiple controls that interact, variability may be considered a necessary component in the aid for adaptability to the system. For instance, variability in the amputee's locomotion can be influenced by two components: the body of the patient and the prosthesis; the body must accommodate biological and mechanical components for successful movement. This is in agreement with our observations described in the preceding paragraph. Most of the alterations in the variation observed by Svoboda and colleagues were influenced by prosthetic legs or problems related to the alignment of the foot. We found that the most significant divergences occurred between prosthetic and intact limbs for the SACH foot, which showed greater variability mainly in the total charge of the foot (impulse).

The last studied theme was the adjustment of prostheses. We asked the participants if their prostheses were adjustable. Participant comments follow:

It has a little screw on the side that I tight and loose when I think it is loose .It has worked. I keep trying ... fixing it until it gets good (José).

Mine does not adjust, I have to take it to technicians to have it regulated. I have to take it to the AACD in São Paulo. I think it is important to have the alignment. If you have the key, you can fix it. I do not have the key, I depend on going to São Paulo (Enzo).

Most amputees consider the ability to adjust their prosthesis as important. Furthermore, they also believed that continuing instruction and training on how to use the prosthesis is essential. Participant comments include:

Yes. It is a problem when that little screw gets loose (Joel). It is very important. If my prosthesis had an adjustment, I would not have to go to São Paulo to have it adjusted. It would facilitate my life (Enzo).

When questioned about their opinion regarding improvements or enhancements to their prostheses, the participants stated:

Two things. The first is with respect to the weight. My prosthesis is lighter compared to the prosthesis from SUS. The second thing is the socket, which for me, must be better, more comfortable (Enzo).

Weight. It is not light. The material should be lighter (Heron).

Look! ... first place ... it could be lighter, and then it would be good. I have no more complains (Joaquim).

These interviews show that the many variables, situations, and conditions should be improved for specific populations, such as amputees, to receive favorable treatments, especially when it comes to technology, humanity, and usability. The limitation of this study was the difficulty in achieving adherence to participation in the study and difficulties in finding the eligible amputees because many had changed address and phone, hindering the contacting process. New studies must be performed because there are few Brazilian publications in this area of study.

V. CONCLUSION

The study provided insight into improvements in transtibial prostheses. The majority of amputees stated that they would improve the weight aspect of prostheses because they are made with heavy material, making fitting difficult and the prosthesis uncomfortable.

Based on the perception of transtibial amputees in this study, we conclude that prostheses could be significantly improved by decreasing weight.

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