

Research Article

Distortion of Body Image Following Lower Limb Amputation: Implications for Comprehensive Rehabilitation

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Background

The amputation of a limb is a physically and psychologically traumatic event that leads to a mismatch between the physical representation of the body and the body itself. More precisely, this event is characterized by three essential steps:

- The patient begins to mourn the loss of a part of him/herself, wondering where the missing limb has gone and how to move forward. For example, it has been reported that some patients refer to be concerned about the location where the amputated limb will be placed [1]. Many patients also experience phantom limb sensations, which can complicate the grieving process.
- The rehabilitation plan leads to changes in self-image as the patient begins to accept that the missing part will not be restored, and that it will be replaced by an assistive or prosthetic device. During this stage, the patient struggles with feelings of ambivalence regarding the utility of the device and the constant reminder that the prosthesis is not his/her own limb. Throughout the rehabilitation period, the patient comes to understand the extraneous element as essential for a physically complete body image, although the reminder that a part of oneself is no longer there remains difficult to reconcile.
- The patient begins to feel betrayed by his or her body and that control of the body has been lost. During this stage, signs of this conflict become more evident.

Amputation, whether due to pathology or trauma, is a complex and stratified phenomenon that cannot be addressed by the use of prostheses alone [2]. Feeling that a part of oneself has been lost

leads to doubt regarding the ability to take on certain projects or tasks, as well as feelings of inadequacy when one can no longer fulfill specific roles. According to biblical legend, Samson the Nazirite possessed immense strength that could only be maintained by leaving his hair uncut; however, when his hair had been sheared during sleep, his strength disappeared, and he fell victim to his enemies [3]. Symbolically, patients may experience similar emotions associated with the loss of their identity and self-image following amputation. In addition, patients may feel that they have “taken their bodies for granted” in the past, and that they will no longer be strong enough to overcome an accident or recover from disease in the future [4].

Patients who undergo amputation declare that they must resolve one primary conflict: “My health is tied to the amputation, but the amputation makes me different than before. Although I am not sick anymore, I will never be the same person again”. This spiral leads to various consequences: refusing to accept the prosthesis, superficial acceptance of the prosthesis, acceptance of the prosthesis for esthetic reasons only and not for functional reasons, or full acceptance of the prosthesis. The vast difference in patient responses highlights the complexity of developing an appropriate rehabilitation plan for each patient following amputation, as well as the need to confront conflicts surrounding self-image and body image. Such steps are crucial in promoting integration of the prosthesis into the patient’s plan for the future, which he or she may perceive as limited [5].

Previous findings [6-8] studied amputees’ quality of life and supported the existence of self-identity changes related to limb loss, but most rehabilitation programs lack to adequately consider the psychological aspects of recover.

Purpose of the Study

The present study aimed to explore distortions in body image among patients who have undergone lower limb amputation, and to contribute in discussing how this distortions could contribute to non-acceptance and non-integration of the prosthesis during the rehabilitation program.

In this context, distortion in body image can be defined as an altered perception of the body characterized by the following feelings or beliefs [9]:

- Lack of identification: “That is not me”.
- Melancholic identification: “That is me, but it was different before.”

These elements exert a substantial impact on patient quality of life, emotional well-being, and the potential to set and achieve future goals. However, the patient’s beliefs regarding how he or she is perceived by others when using the prosthesis is also an important factor. In this regard, body image is associated with the desire to be accepted by others based on physical appearance (“I am as you want me.”) [10].

Materials and Methods

The present study included patients that had undergone lower limb amputation and were currently enrolled in a rehabilitation program in an Italian university hospital. The patients were consecutively recruited during a six-months period (June-December 2016). The inclusion criteria were: age > 18 years, the absence of previous psychiatric pathologies, mono-lateral lower limb amputation due to any cause. Informed consent was obtained from all patients following a full explanation of the study. All procedures of the present study conformed to the ethical principles outlined in the Declaration of Helsinki. It has been made a qualitative data analysis.

All patients underwent the following qualitative assessments:

- Measure of Body Apperception (MBA) [11]: The MBA is a psychological questionnaire designed to evaluate the importance an individual places on his or her body image. The test is comprised of two subscales: The appearance component aims to evaluate the relationship between body image and the opinions of others, while the body integrity component aims to evaluate the relationship between body image and self-esteem. The test was originally designed for use in patients who have undergone mastectomy for the treatment of breast cancer. Each item scores from 1 (total disagreement) to 4 (total agreement); score range is 4-16 for each subscale.
- Short-Form (SF-36) [12]: The SF-36 is designed to evaluate the perception of physical and mental health in relation to levels of daily activity and wellness. This questionnaire contains 36 questions associated with eight aspects of overall

health and can be used to determine whether there is a discrepancy between clinical assessments and individual perceptions of health. The score range is 0-100.

- Quality-of-Life Enjoyment and Satisfaction Questionnaire (Q-LES-Q) [13]: The Q-LES-Q is a self-assessment scale designed to measure levels of pleasure/satisfaction experienced by the patient in different aspects of daily life. The questionnaire includes 58 items that explore five general areas: physical health, individual feelings, hobbies, social interactions, and general activities. An additional three areas are associated with employment, school activities, and household duties. The main purpose of the Q-LES-Q is to evaluate patient satisfaction with his/her own activities and quality of life, and determined whether variations in the level of satisfaction occur in the presence of specific symptoms. A high score (percentage) is indicative of life satisfaction.
- Brief COPE [14]: This short version of the COPE test is designed to evaluate the patient’s capacity to activate coping strategies when facing a traumatic event. A reaction profile is created based on the patient’s ability to engage in 14 types of coping strategies. This measure can be used to evaluate coping ability in both ordinary and traumatic situations.
- Trinity Amputation and Prosthesis Experience Scale - Revised (TAPES-R) [15]: The TAPES-R is a multidimensional assessment tool composed of 64 elements designed to facilitate investigation of the psycho-social processes involved in adaption to the prosthesis and the specific needs of the patient. This assessment also evaluates medical problems related to the amputation, such as phantom limb pain and stump pain, as well as issues associated with medical conditions unrelated to the amputation. The TAPES-R also contains a section in which patients can provide ratings of their own health and physical capacity. A high score is indicative of positive adjustment.
- Questionnaire for persons with Trans-Femoral Amputation (Q-TFA) [16]: The Q-TFA is a self-rating assessment developed for use in patients under the age of 75 who have undergone trans-femoral amputation and use a prosthesis with a cavity or an osteo-integrated device. This assessment is used to assess the general motility and difficulties associated with the use of the prosthesis, as well as their impact on the general level of health. A high score is indicative of satisfaction.
- Body tracing [17,18]: Body tracing involves tracing the “profile” of the patient once while wearing the prosthesis and once without it. The patient is then asked to view the outlines and report his/her sensations,

perceptions, and emotions (emotional interview) (Figure 1). This imaginative technique enables the patient and clinician to evaluate a real and immediate perception of self-image to determine which elements stem from intrusive thoughts associated with trauma. The ability to view these images also enables the patient to contemplate and compare images in order to reduce the feeling of loss associated with memories of the missing limb [19].

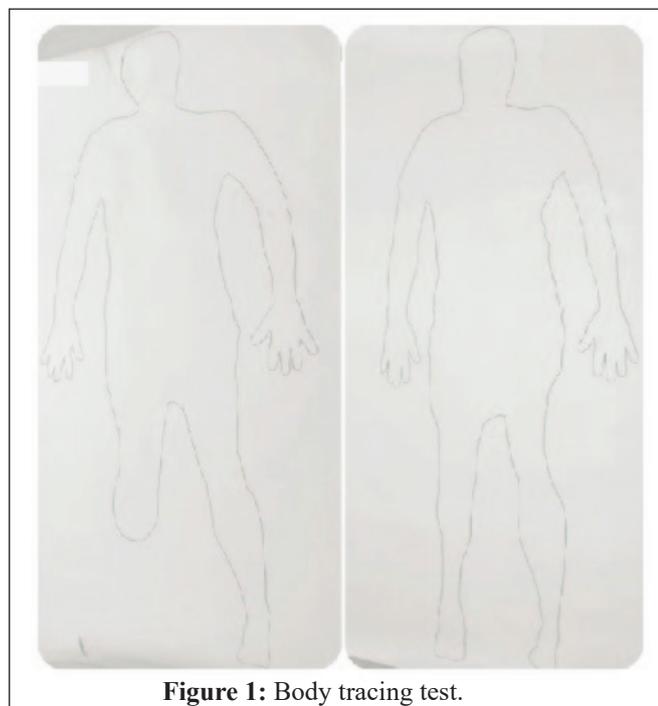


Figure 1: Body tracing test.

Without prosthesis

“It seems to me someone who is struggling... It is as if the person is panicking, is grabbing on to something to be able to stand... it’s not the missing limb to put me off, strangely enough... I feel sort of at ease, but I’m not sure...”

With prosthesis

“The effect is not as strong here ... the person seems more relaxed, it is just my feeling... I can recognize parts of myself... then I start doubting, though ... it is my leg (pointing at the not-amputated limb) but that’s basically me.”

The body tracing comments were classified using the following key words (regarding the awareness about their body):

- No recognition: the patient doesn’t show any emotional involvement about his/her body looking at the body shape with or without the prosthesis;
- Poor recognition: the patient shows slightly emotional involvement and tries to minimize the problem;
- Sadness: the patient express the feeling of sadness looking at his/her body shape in both conditions;
- Sufficient recognition: the patient shows to be emotionally involved and is able to look at his/her body shape and to make some projects about the future;
- Extraneity: the patient hardly recognizes his/her body with or without the prosthesis.

All test were applied by researchers.

Results

Fourteen subjects were recruited. The baseline characteristics of patients are shown in table 1, while the results of each assessment are shown in table 2. Two females and twelve males were recruited. The age ranged from 18 to 81 years old. Eight patients had gone through amputation for vascular causes, three patients for traumatic causes, one patients for osteomyelitis and two patients for neoplasia.

Subject	Sex	Age (yr)	Amputation date	Level of amputation	Etiology
DP	m	63	02-07-2015	TT right	vascular
AR	f	50	14-01-2015	TT left	vascular
CC	m	43	18-02-2015	TT right	vascular
PF	m	18	01-03-2015	TF right	traumatic
DAP	m	52	06-09-2012	TF left	vascular
SB	m	71	13-12-2013	TF right	vascular
ZM	f	57	29-05-2014	TF left	neoplastic
PF	m	53	17-04-2014	TT right	osteomyelitis
BS	m	67	28-05-2007	TF right	vascular
PR	m	60	05-01-2013	TF left	vascular
LR	m	78	07-07-2015	TF right	neoplastic
BF	m	81	01-08-2016	TT left	vascular
CF	m	56	07-11-2016	TF left	traumatic
PV	m	43	16-05-2013	TF left	traumatic

Table 1: Baseline characteristics of included patients.

Legend: TF=transfemoral; TT=transtibial

At the recruitment the time of amputation ranged from nine years to one year.

Patient	Q-TFA difficulty %	TAPES Aesthetic Satisfaction Functional Satisfaction	TAPES Psychosocial Adjustment	MBA body integrity body-image	COPE positive strategies	Q-LES-Q physical health %	SF-36 General health %	Body tracing comment
DP	58.33*	5/9 9/15	2,8	11/16 12/16	2/13	97%	40%	No recognition
AR	50*	6/9 9/15	4	11/16 12/16	2/13	97%	40%	Poor recognition
CC	50*	6/9 10/15	2,8	7/16 6/16	3/13	94%	50%	Sufficient recognition
PF	41,67	5/9 7/15	3,2	11/16 15/16	6/13	87%	40%	No recognition
DAP	62,5	6/9 14/15	3,2	11/16 12/16	3/13	85%	50%	Sadness
SB	72,67	6/9 9/15	3,2	8/16 12/16	2/13	97%	45%	Extraneity
ZM	58,33	6/9 9/15	3,00	6/16 9/16	5/13	80%	10%	Poor recognition
PF	75,59*	4/9 14/15	3,6	9/16 10/16	2/13	98%	15%	Poor recognition
BS	37,23	6/9 9/15	2,6	10/16 13/16	2/13	99%	70%	Poor recognition
PR	41,67	6/9 13/15	3,4	10/16 13/16	2/13	60%	30%	Sadness
LR	40,57	5/9 7/15	3,5	5/16 8/16	1/13	100%	54%	Sufficient recognition
BF	58,2	6/9 10/15	3,6	13/16 13/16	1/13	100%	54%	sadness
CF	35,5	5/9 9/15	2,6	13/16 13/16	1/13	87%	60%	Poor recognition
PV	58,34	6/9 9/15	3,2	10/16 12/16	2/13	94%	80%	Sufficient recognition

Table 2: Testing battery results.

Legend: Q-TFA=Questionnaire for Persons with Trans-femoral Amputation; TAPES-R=Trinity Amputation and Prosthesis Experience Scale - Revised; MBA=Measure of Body Apperception; SF-36=SF-36 Short-Form

We decided to perform only a qualitative analysis of tests results to more fully understand the results of each test in relation to body image in patients who had undergone lower limb amputation, and to determine whether patients were aware of distortions in body image.

The results of the testing battery showed:

- The Q-TFA scores ranged from 35,5 to 75,59% indicating a low or mean difficulty with prosthesis, TAPES aesthetic satisfaction ranged from 4 to 14 and functional satisfaction from 9 to 15 indicating a low aesthetic satisfaction.
- The TAPES psychosocial adjustment ranged from 2,6/5 to 4/5 indicating a medium adjustment value.
- MBA/ body integrity subscale scored from 5/16 to 13/16 and the body image ones from 6/15 from 15/15. COPE positive strategies were scored from 1/13 to 6/13.

The Q-LES-Q physical health ranged from 60 to 97%, whereas the SF-36 general health ranged from 10 to 80%.

Discussion

We speculate that many patients would not have fully integrated the prosthesis into their body image, and that many used the devices only while in public for esthetic purposes. Indeed, MBA test results indicated that 13 of the 14 included patients exhibited higher scores on the body image subtest than on the body integrity subtest. This finding suggests that most patients in the present study based their body image on feedback provided by others.

Many patients recognized the utility of the prosthesis, although prosthetic use was limited, and patients did not perceive their prostheses as parts of themselves. A substantial number of patients reported feeling “sadness” during the emotional interview component of the body tracing experiment (Table 2) when asked to recall the amputation event. Only 3 of 14 patients stated that they recognized the body shape as their own both with and without the prosthesis, while the remaining patients found it difficult to accept their body shape in both conditions. Previous studies have reported a correlation between distorted perceptions of self-image and general/social adaptation to the prosthesis among amputees, and that this relationship exerts a significant impact on quality of life, particularly with regard to limitations in physical and mental activities [18].

Although various aspects of daily life and health are evaluated by the questionnaires used in the present study, we chose to evaluate the most substantial responses during our analysis, which were associated with “general health” on the SF-36 and “general activities” on the Q-LES-Q. General health data obtained via the SF-36 revealed an average satisfaction of 50%, which reached the level of 80% in only one patient. However, Q-LES-Q scores for satisfaction with general activities were somewhat better than SF-36 scores, suggesting that patient satisfaction following amputation is based on the extent to which the prosthesis allows participants to engage in their preferred activities. Findings on these measures were also in accordance with those of the Q-TFA, which is used to assess the degree of satisfaction with use of the prosthesis. Based on these findings, we speculate that such measures may be useful in determining the most appropriate rehabilitation plan for each patient following amputation.

Our findings also indicated that patients were unable to reconcile

awareness of the prosthesis with their own body image, and that they viewed their prostheses as functional or esthetic tools rather than components of themselves. Although TAPES scores regarding the functionality of the prosthesis were significantly higher than scores for other sections, average scores on the TAPES-which measures psycho-social adaptation-were very low, suggesting that patients experienced difficulty overcoming traumatic memories and attaining the desired quality of life. Patients unable to develop a coherent self-image/body image may tend to avoid relationships in attempt to escape memories of the traumatic experience. Our findings highlight that overcoming the traumatic experience of losing a limb and attaining an acceptable standard of living are part of a complex journey that does not end with simple replacement of the limb with a prosthesis. We mean to underline the importance of considering the aspects related to the traumatic event and difficulties met during the rehabilitation program with the attempt to match the previous and the actual body image.

In addition, brief COPE results indicated that patients exhibited an average of one to two positive active coping strategies, which were primarily associated with two typologies: “operationally face up” and “using the instrumental support”. These findings indicate that patients relied on coping strategies associated with functionality, rather than emotional coping mechanisms.

For improving this last aspect some strategies can be suggested similarly to the one used in other neurological disorders to obtain a better work-life balance [20].

The features here described can be considered part of the Post-Traumatic Stress Disorder (PTSD) [21]. In fact the person suffered of a severe trauma involving his/her safety; Often during the clinical interview the patients report bad and intrusive memories about the trauma and the amputation event; It can also be noted an introverted behavior respect to the relationship with others in order to avoid situation that are related to the traumatic event. The PTSD in amputees is described in many studies regarding veterans [22] and people who suffered of an orthopedic trauma [23], but it has never been considered inside the rehabilitation program.

Following amputation, prosthetic devices are introduced during the period in which patients are simultaneously undergoing physical rehabilitation and mourning the loss of the limb [24]. While it is important to support the patient in his or her efforts to overcome the traumatic event during this stage, it is also important to respect the time required for each individual to accomplish this task, but not forgetting to respect his/her timing. During this stage, patients may also be faced with conflicting thoughts: “If I go through rehabilitation, I accept the loss of my limb; if I don't, I will have to live in pain/suffering, but at least I will not have betrayed my body.” Thus, patients risk becoming stuck in this cycle of believing that they are somehow lacking based on their need for the prosthesis.

Conclusion

Our findings indicate that an appropriate, comprehensive rehabilitation program should consider all physical and

psychological components associated with amputation and the use of prostheses. Such programs are expected to assist patients in rebuilding an integrated self-image and overcome feelings of loss/bodily betrayal associated with wearing a prosthesis, and to resolve conflicting emotions regarding the acceptance of extraneous device as a part of one's own body.

This study has many limitations: - the sample size of the study was rather small, and statistical analysis couldn't typically be drawn; Some aspects as existential spirituality, anxiety and depression had not been examined. The positive role of spirituality has been recently highlighted for the female gender in particular [25]. Levels of anxiety and depression have been extensively studied, being significantly higher than in the general population and also influencing quality of life [26,27].

The emotional interview needs to be structured in order to obtain quantitative scores.

Furthermore, this experience suggests to assess the patient not only at the beginning of the rehabilitation program but also at the end to evaluate the progression of the psychological process.

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