

# The Amputees and Quality of Life

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## ABSTRACT

*The application of highly sophisticated computer technology and high technology materials allows production of quality prosthetic replacements both in the functional and esthetic sense. The basic prerequisite for successful use of prostheses is an adequately shaped stump, which can be achieved using new operative technique used for extremity amputation. In this way, the possibilities of prosthetic device usage are enlarged to fulfill not only basic daily needs but also highly active work-related, sports-related or recreational needs of the modern man. However, the adequate and successfully performed operative procedure and the implementation of a quality prosthetic device do not guarantee that all patient requirements for improved quality of life are fulfilled. The aim of this study was to examine therapeutic effects of the applied method of surgical and prosthetic treatment, with a special focus on the improvement of patient's quality of life. The research was conducted in a sample of healthy and active patients with trauma-related lower extremity amputation. Following a positive objective evaluation by the physician, who stated that surgical and prosthetic treatment was satisfactory, the subjective evaluation was performed by the patient using a specially designed questionnaire. The factors possibly influencing the overall satisfaction of the patient with therapy were analyzed. The satisfaction with prosthesis function was evaluated as very good by 63.5% of the patients, excellent by 9.6% and good by 26.9% of the patients.*

**Key words:** amputees, quality of life

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## Introduction

Today's trend in the fabrication of prostheses is the application of highly sophisticated computer technology and high technology materials, which allows production of quality prosthetic replacements in the functional and esthetic sense<sup>1</sup>. The basic prerequisite for successful use of prostheses is a good stump function, which depends upon the operative technique used for extremity amputation.

However, an adequate and efficient operative procedure on the one hand and a prosthetic replacement of good quality on the other do not guarantee conditions necessary for the improvement of patient's quality of life. Evaluation of therapeutic effects as the proof of improved quality of life has become the essential factor for successful rehabilitation. Nowadays, therapeutic effects cannot be compared based only on the functional recovery resulting from the use of prosthetic devices but also

based on the fulfillment of a new and highly important criterion parameter – »quality of life« (QOL), which stands for improved quality of patient's life. The interest extends far beyond objective indicators of successful treatment because operative parameters can fully indicate the need for change or reduction of therapy, but at the same time they may not correlate with patient's subjective feelings<sup>2</sup>.

It is difficult to assess the quality of life of our patients. The feeling of life quality is not universal due to the fact that each person has another understanding of satisfaction and benefit. Personal evaluation of each patient includes a whole series of features that describe individual perception of quality life. It is not only associated with physical health. In 1993, the World Health Organization defined quality of life as individual perception of a position in everyday life in the context of

culture and system of values as well as in association with personal goals and common standards<sup>3</sup>.

According to Walker and Roser (1988), the quality of life includes a wide spectrum of physical and mental features or limitations that describe functional ability of a person and the resulting degree of satisfaction<sup>4</sup>.

Safety, emotional conflicts, individual ideals and aspirations as well as the degree of frustration tolerance, are the factors that affect the patient's perception of therapeutic effects. Two persons confronted with the same situation may react in a completely different way. At present, therapeutic effects cannot be compared based only upon medical parameters; improvements in the quality of life must be considered, too<sup>5</sup>. The opinion that each person suffering from major health and functional disorders is not satisfied with the quality of life is not true. Even persons with marked disability can report good quality of life despite difficulties they experience during daily activities if they have a satisfactory social life. The association between quality of life and health economics is reflected in the attempt to introduce an index for standardization. QALY is a year full of quality living, the index of which is analyzed not only by the health system but also by the industry of orthopedic aids and devices<sup>6</sup>. But, more important facts for defining the quality of life is the shift from the assessment based upon physician's impression to the evaluation made by the patient who can surely give the best expression of his perception of health or disease<sup>7</sup>.

The complexity of detecting quality of life is manifested by the possibility of underestimation of functional status or some physical symptoms (pain) made by the examiner but also overestimation of psychologically induced discomfort (anxiety, depression).

Evaluation methods have not been standardized. So far, about 500 methods for the evaluation of the quality of life have been published, evolving from the oldest methods for the assessment of subjective conditions described in 1932., through widely accepted Karnovsky Performance Status in 1948. up to the current SF-36, -12 and -8 questionnaires. SF (Short Form Health Survey) has been compiled to meet psychometric standards necessary for the comparison of various population groups independently of their age, disease or therapy. Features of disease or therapy are analyzed: function and dysfunction, indicators of distress and well-being, objective findings and subjective statements and personal evaluation of health status<sup>8</sup>.

A questionnaire is the instrument for measuring the quality of life. The questionnaire must meet a lot of criteria. Reproducibility is the stability within unaltered conditions, i.e. examination repeated after a short period of time must yield the same results within a group of same degree or condition. Discrimination means sensitivity, possibility of detecting any significant change in the quality of life. The questionnaire must be reliable, which means extensive and applied in a population as large as possible because extensive questionnaires in a large population are more reliable. The measuring of

QOL can be generic or specific with regard to the disease. A generic study assesses patient's overall physical and mental health and examines various disease types or degrees, various therapeutic methods or medical interventions within demographic and culture groups<sup>9</sup>. A specific study of a certain disease examines patients with the same diagnosis and is associated with those aspects of a disease, which are relevant for the disease in the opinion of the patient or clinician<sup>10</sup>.

The aim of this study was to define various factors affecting the degree of patient's satisfaction with the prosthetic therapy as well as examine the application of a specially designed questionnaire.

## Patients and Methods

In the period from 1995 to 2000, a total of 425 patients were examined in the Prosthetic Clinic of the Institute for Rehabilitation and Orthopedic Aids of the Zagreb University Hospital Center in Croatia. Of those 425 patients, 52 were chosen for the study. These patients had undergone primary amputation of the lower extremity at the level of the foot, lower leg or upper leg, after which reamputation of the stump was performed using myoplasty and osteomyoplasty as the method of operative reconstruction of the lower extremity stump.

The aim of this study was to examine therapeutic effects of the applied method of reamputation in patients with trauma-related amputations of the lower extremity and its effects on the quality of life in healthy and active patients with trauma-related extremity amputation as well as their satisfaction with the prosthetic device and the possibility of quality use. The patients were divided into three age groups: 23 patients aged 20–32 years, 15 patients aged 32–44 and 14 patients aged 44 to 56 years. Based on our opinion that non-parametric procedures should be applied to the obtained data, we divided patients into three age groups because the evaluation scale is an ordinary variable and it has no sense to relate it with the quantitative variable such as patient's age. Due to this, we transformed the age into the arbitrary ordinary variable, which is the usual procedure in the majority of sciences that use qualitative variables.

Common symptoms in all 52 patients were pains in the stump tip and walking with forearm crutches. Presence of bone exostosis of the tibial stump was clinically verified in 24 cases, of the fibular stump in 36 cases, neurinoma were found at the scar level in 41 cases, bone exostosis of the femur in 7 cases, scar retraction and irregular adhesion of the scar tissue to the bone base in 15 cases, excessive soft tissue in the upper leg was found in 7 cases and in the lower leg in 15 cases, whereas infection at the level of lower leg scar occurred in 8 cases. All these symptoms were a cause of patient's dissatisfaction and the inability to start prosthetic rehabilitation and use the prosthesis.

34 patients reported dissatisfaction but used their prosthetic device, 18 patients reported dissatisfaction

and did not use their prosthetic device. None of the amputees reported use and satisfaction with prosthetic devices. Therefore, reamputation of the stump was indicated in all patients and was performed using the method of osteomyoplasty and myoplasty. One lower extremity was reamputated in 47 cases (the left lower extremity 25 and the right lower extremity 22 times), and reamputation of both lower extremities was done in 5 cases.

Following reamputation the possibility of prosthesis use and degree of patient's satisfaction were assessed in relation to the condition preceding reamputation. After positive evaluation of the objective condition and the use of prosthesis by an orthopedic surgeon, all 52 patients underwent prosthetic rehabilitation and were fitted with prosthesis. After that they had to fill in a questionnaire specially designed for this study in order to complement the physician's assessment of therapeutic outcomes of the applied operative method and prosthetic rehabilitation.

The questionnaire was divided into two sections. The first included patient's personal data and mental status and in the second section the patient evaluated degree of satisfaction with prosthesis and general condition in association with various factors: function, absence of pains, possibility of daily usage of the fitted prosthesis (the number of hours per day) and the cosmetic appearance of the prosthetic device. The answers in the questionnaire were coded numerically based upon the positive and negative answers (yes or no). In some answers a scale of possible changes (The Likert scale) were used. Questionnaires were distributed to patients who fill them personally.

In this research we used common sociodemographic features, such as gender, age, education level and the size of place of residence<sup>9</sup>. We also used the already evaluated instrument for the assessment of pathological character features. Modification of the Eysenck's scale EPN in this study is not quoted by items since this is not usual for diagnostic instruments.

A special attention was devoted to the assessment of pathological character features of each patient. This portion of the evaluation was performed using a questionnaire based on the Eysenck's theory of personality which differentiates three main features of personality and their combinations: extroversion-introversion, neuroticism-stability and psychoticism<sup>11,12</sup>.

A special instrument was designed to measure pathological features: it was significantly shorter than the

original Eysenck's model which consists of 26 elements (neuroticism – 10 elements, psychoticism – 9 elements, extroversion – 7 elements). Empirical evaluation conducted in a representative population sample (N=392) yielded satisfactory metric characteristics, which is supported by the fact that the Cronbach's alpha was 0.78 and the discrimination of elements varied from 0.20–0.40.

The questionnaires are complemented by clinical data. Finally when all data were collected and analyzed it was necessary to interpret the findings. The analysis of obtained data was conducted using the statistical package SPSS 11.00 (Statistical package for social sciences).

## Results

Table 1 shows the degree of patient's satisfaction with prosthesis after reamputation as compared to the condition preceding reamputation. Prior to surgery one of the patients declared that he was using the prosthesis and that he was satisfied with results. After surgery 48 out of 52 patients were using the prosthesis and were satisfied with results. Before reamputation 34 patients wore prosthesis but were not satisfied with it, and after reamputation only 4 patients stated that they were using the prosthesis but were not satisfied with it.

Figure 1 shows the diagrams of frequency for variables assessed by the patients treated by with reamputation based on the degree of satisfaction with prosthesis in general, satisfaction with the prosthesis function and satisfaction with its appearance (scores 1–5).

All in all the vast majority of reamputated patients were satisfied or very satisfied with their prosthesis (92.3%), three patients were less satisfied and only one patient was completely dissatisfied. Distribution of other results was not much different, e.g. satisfaction with the cosmetic appearance of the prosthesis. Approximately two thirds of reamputees evaluated the appearance as very good (61.5%), excellent evaluation was given by 11.5% of the patients and one fourth of the patients assessed the appearance as good. The patients evaluated prosthesis function in a similar way: very good function by 63.5% patients, excellent function by 9.6% and good function by 26.9% of the patients.

The degree of satisfaction with prosthesis in association with patient's general attitude towards prosthetic devices showed that the majority of satisfied and extremely satisfied patients (79.6%) also think that the prosthesis was the best possible solution under the

**TABLE 1**  
DEGREE OF PATIENT'S SATISFACTION WITH PROSTHESIS AFTER REAMPUTATION AS COMPARED TO THE CONDITION PRECEDING REAMPUTATION

	Satisfied and use prosthesis N (%)	Unsatisfied but use prosthesis N (%)	Unsatisfied and don't use prosthesis N (%)
Primary amputation	0 (0%)	34 (65%)	18 (35%)
Reamputation	48 (92.3%)	4 (7.7%)	0 (0%)

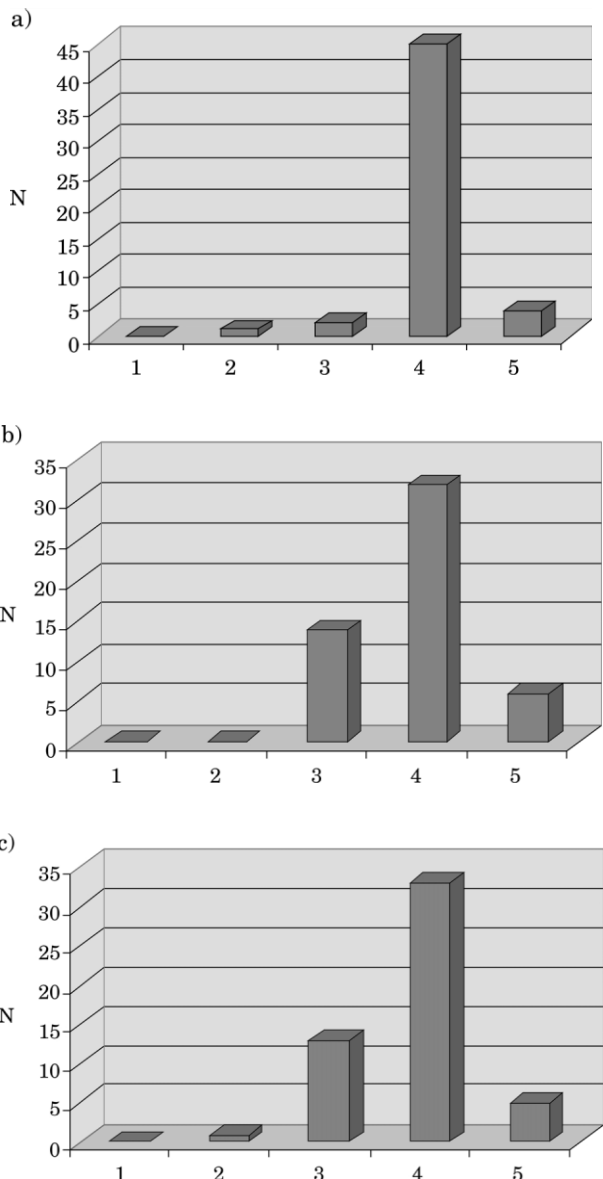


Fig. 1. Diagrams for variables assessed by orthopedic patient using the scale 1 to 5 dependent on level of their satisfaction (1 – very unsatisfied, 2 – unsatisfied, 3 – neither unsatisfied, nor satisfied, 4 – satisfied, 5 – very unsatisfied), N – number of patients. a) Grades for patients’ satisfaction in general, b) grades for patients’ satisfaction with esthetics, c) grades for patients’ satisfaction with function.

given circumstances. Only one patient was extremely dissatisfied with the prosthesis and considered it a »necessary evil«.

Table 2 presents the frequency of satisfied patients after reamputation in relation to the level of amputation, patient’s age and number of amputations. All these patients evaluated prosthesis function as very good or excellent and they use it major part of a day. Statistical data show that in the category of patients with amputations at the foot level the number of satisfied or ex-

TABLE 2  
THE FREQUENCY OF SATISFIED PATIENTS AFTER REAMPUTATION IN RELATION TO THE LEVEL OF AMPUTATION, PATIENT’S AGE AND NUMBER OF AMPUTATIONS

		N	(%)
Level of reamput.	Foot	3	100
	Below-knee	39	95
	Disart. in knee	1	100
	Above-knee	5	71
Age (years)	20–32	20	80
	32–44	14	93.3
	44–56	14	100
Number of reamputations	Unilateral reamputation	43	95.5
	Bilateral reamputation	5	71.4

tremely satisfied patients is far larger than in the categories of patients with amputations at higher levels. The higher amputation level, the lower number of satisfied patients, which means that the difference was statistically significant ( $p < 0.05$ ).

Analyses of patient’s satisfaction after reamputation in relation to the patient’s age shows that patients of younger age (20–32 yrs) are less satisfied with the prosthesis evidently than the patients from higher age groups. The degree of patient’s satisfaction in relation to the number of amputated extremities is presented to. It is obvious that the degree of satisfaction with prosthetic rehabilitation is higher than in unilateral than bilateral amputations.

With regard to the body side of amputation (left or right) statistical data show that patients with prosthesis on the right extremity are statistically more satisfied with their prosthesis ( $p < 0.05$ ), (Figure 2).

The degree of satisfaction with regard to objective characteristics of the patients (education level, age, economic status and the size of their place of residence) resulted in the coefficient of multiple correlation of 0.275, which proved to be statistically insignificant ( $p < 0.438$ ),

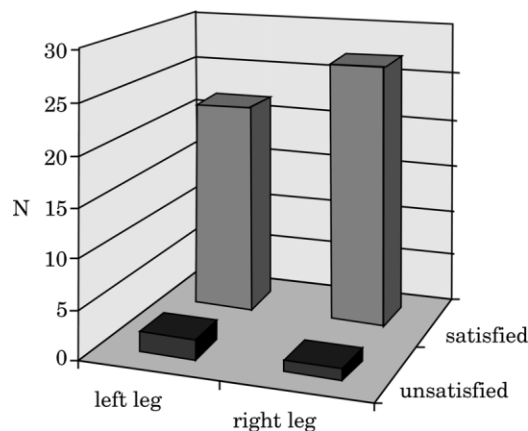


Fig. 2. Patient satisfaction with regard to the body side of amputation (left or right), N – number of patients.

**TABLE 3**  
THE DEGREE OF SATISFACTION WITH REGARD TO OBJECTIVE CHARACTERISTICS OF THE PATIENTS (EDUCATION LEVEL, ECONOMIC STATUS AND THE SIZE OF THEIR PLACE OF RESIDENCE)

	Standardized coefficients ( $\beta$ ponderers)	t-value	p
(Constant)		8.138	0.000
Age	0.060	0.405	0.687
Type of settlement	-0.174	-1.147	0.257
Income	-0.153	-1.007	0.319
Education	0.075	0.509	0.613

\*dependent variable: patients' satisfaction in general

\*independent variable: age, type of settlement, income, education

(Table 3). Based on this, it may be concluded that patients assess the quality of their prosthetic device independently of the mentioned characteristics.

Neither regional affiliation nor marital status was related to the degree of satisfaction. None of the single patients was dissatisfied with the prosthesis and there were only a few dissatisfied patients in other patient categories (7.7%) (Tables 4a and 4b).

### Discussion

Patient's satisfaction with prosthetic therapy is multidimensional. It depends on the general health condition, psychological status, degree of independency in the activities of daily living, social circumstances (lack of social support upon returning to the community) and pos-

**TABLE 4a**  
REGIONAL AFFILIATION AND SATISFACTION WITH PROSTHETICS THERAPY

Districts		Patients' satisfaction in general		Total
		Unsatisfied	Satisfied	
Zagreb	Number of patients		6	6
	% within Districts		100.0%	100.0%
	% within Patients' satisfaction in general		12.2%	11.5%
Northern Croatia	Number of patients	1	14	15
	% within Districts	6.7%	93.3%	100.0%
	% within Patients' satisfaction in general	33.3%	28.6%	28.8%
Middle Croatia	Number of patients		11	11
	% within Districts		100.0%	100.0%
	% within Patients' satisfaction in general		22.4%	21.2%
Southern Croatia	Number of patients	1	8	9
	% within Districts	11.1%	88.9%	100.0%
	% within Patients' satisfaction in general	33.3%	16.4%	17.3%
Other countries	Number of patients	1	10	11
	% within Districts	9.1%	90.9%	100.0%
	% within Patients' satisfaction in general	33.3%	20.4%	21.2%
Total	Number of patients	3	49	52
	% within Districts	5.8%	94.2%	100.0%
	% within Patients' satisfaction in general	100.0%	100.0%	100.0%

**TABLE 4b**  
MARITAL STATUS AND SATISFACTION WITH PROSTHETICS THERAPY

Marital status		Patients' satisfaction in general		Total
		Unsatisfied	Satisfied	
Unmarried	Number of patients		10	10
	% within Marital status		100.0%	100.0%
	% within Patients' satisfaction in general		20.4%	19.2%
Married	Number of patients	2	35	37
	% within Marital status	5.4%	94.6%	100.0%
	% within Patients' satisfaction in general	66.7%	71.4%	71.2%
Separated	Number of patients	1	4	5
	% within Marital status	20.0%	80.0%	100.0%
	% within Patients' satisfaction in general	33.3%	8.2%	9.6%
Total	Number of patients	3	49	52
	% within Marital status	5.8%	94.2%	100.0%
	% within Patients' satisfaction in general	100.0%	100.0%	100.0%

sibilities of realizing personal goals and patient's motivation<sup>13</sup>. Health status is only a portion of things belonging to the category of satisfaction with treatment and it describes not only physical but also psychological and emotional aspects. Therefore, today it is not possible to compare therapeutic effects based only upon medical parameters but patient's satisfaction must be taken into consideration, too<sup>14,15</sup>.

From the results of this study it is visible that patient's subjective evaluation of the satisfaction with prosthesis (marks 1–5) shows a marked asymmetry in the distribution of date with regard to highest values, i.e. the highest percentage of patients (92.35%) gave highest marks (4 and 5) for overall satisfaction with the prosthesis. Satisfaction with prosthesis function and appearance was similar (73,4% of the patients rated it with marks 4 and 5), which corresponds to the results obtained by other authors<sup>16,17</sup>.

Patients of younger age (20–32 yrs) are less satisfied with the prosthesis than the patients from higher age groups, what could be result of higher needs for more activities in daily living and realizing personal goals than older patients.

None of the factors, such as marital status, education, economic status, size of residence place or regional affiliation correlated significantly with patient's satisfaction ( $p > 0.05$ ). It can be only noted that the number of single persons with lower education degree and from smaller communities was greater in the group of satisfied patients, but it was statistically not significant. Statistically significant differences were noted in the degree of

patient's satisfaction with the prosthesis depending upon the patient's age and in favor of older examinees, which corresponds to the results by other authors<sup>18,19</sup>.

The level of amputation produces statistically significant differences with regard to the degree of patient's satisfaction with the instituted therapy. The highest degree of satisfaction is found in patients with the smallest disability (amputations at the foot level)<sup>20–24</sup>, and the lowest in the patients with the greatest disability (above knee amputations on both sides)<sup>25</sup>. This was confirmed by the results of this study. Patients with prosthesis on the right extremity were significantly more satisfied than those with the prosthesis on the left extremity ( $p > 0.05$ ). Right-handed patients were more numerous in our study and they got used to the use of prosthesis on their right extremity more easily<sup>26–28</sup>.

In patients who did not wear prosthesis or wore it for short periods of time but in whom physicians found no objective causes for not using the prosthesis, we assumed that reasons would be of psychological nature. It was noted that patients who were dissatisfied with prosthetic rehabilitation of objectively good quality had higher scores in psychopathological tests on the neuroticism and even psychoticism scale<sup>29–31</sup>.

The modified instrument EPN (extroversion, psychoticism and neuroticism) proved to have good metric features (Cronbach's  $\alpha = 0.78$ ) and that it actually measures three quoted dimensions. This was tested using the relevant Component Factor Analysis by GK-criterion for establishing of factor extraction and varimax transformation of basic solution.

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## **OSOBE SA AMPUTIRANIM EKSTREMITETOM I KVALITETA ŽIVOTA**

### **S A Ž E T A K**

Primjena sofisticirane kompjutorske tehnologije i upotreba suvremenih materijala omogućuje izradu kvalitetnog protetičkog nadomjeska u funkcionalnom i estetskom smislu. Da bi bolesnik mogao uspješno koristiti takvu protezu, osnovni je preduvjet adekvatno oblikovan bataljak što se postiže novim operacijskim metodama pri amputaciji ekstremiteta. Time se proširuje mogućnost korištenja proteze od svakodnevnih potreba do visoko-aktivnog korištenja sa mogućnostima savladavanja svih radnih, sportskih i rekreativnih zahtjeva suvremenog čovjeka. No adekvatan i uspješno izveden kirurški zahvat i kvalitetno izrađen protetički nadomjestak nisu garancija da su zadovoljeni uvjeti pacijenta za poboljšanje njihove kvalitete života. Cilj ovog rada bio je odrediti ukupan terapijski učinak nakon primjene adekvatne kirurške i protetske terapije, s posebnim osvrtom na poboljšanje kvalitete života pacijenta. Istraživanja su izvršena na uzorku zdrave, aktivne populacije sa primarnom traumatskom amputacijom donjeg ekstremiteta. Nakon pozitivne objektivne ocjene liječnika da je kirurška i protetska opskrba pacijenta izvedena zadovoljavajuće, analiziran je subjektivan dojam pacijenta terapijom putem specijalno izrađenog upitnika. Analizirani su čimbenici koji bi mogli imati utjecaj na ukupno zadovoljstvo pacijenta terapijom. Zadovoljstvo funkcijom proteze ocjenom vrlo dobar ocjenjuje 63.5% pacijenata, odličan 9.6% i dobar 26.9% pacijenata.