

THE QUALITY OF LIFE OF PATIENTS AFTER TOTAL KNEE REPLACEMENT

Agnieszka Markowska^{1,A,B,D,E,F}, Krzysztof Komorowski^{2,A,B,C,D}, Małgorzata Starczewska^{1,B,E,G}, Katarzyna Augustyniuk^{1,A,B,G}, Elżbieta Grochans^{1,B,D,G}

¹Department of Nursing, Faculty of Health Sciences, Pomeranian Medical University in Szczecin, Poland

²Students Scientific Association at the Department of Nursing, Faculty of Health Sciences, Pomeranian Medical University in Szczecin, Poland

Authors' contribution:

A. Study design/planning • B. Data collection/entry • C. Data analysis/statistics • D. Data interpretation • E. Preparation of manuscript • F. Literature analysis/search • G. Funds collection

Address for correspondence:

Agnieszka Markowska, MD, PhD
Department of Nursing at Pomeranian
Medical University in Szczecin
48 Żołnierska Str.
71-210 Szczecin
phone: 091 4800910
e-mail: ammarkowska@op.pl

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ABSTRACT

Introduction: At an advanced stage of degenerative knee joint disease, when conservative treatment is no longer possible, surgical treatment is applied.

Aim of the study: To assess the quality of life of patients after total knee replacement.

Material and methods: This survey-based study was conducted in the Traumatic Surgery and Orthopaedics Ward, 107th Military Hospital in Wałcz, from June 2013 to December 2013. It involved 60 patients before and eight weeks after total knee replacement. The research instruments employed in the study were a self-developed questionnaire concerning health and sociodemographic data, and the 36-Item Short Form Health Survey (SF-36).

Results: The patients' score for general quality of life before surgery was 40.49 points, and after surgery 67.76 points. The patients who had to use crutches and walking canes after surgery scored lower for all functioning domains than those who could walk without any assistance. An analysis of the patients with concomitant diseases such as osteoporosis (38.3%), diabetes (31.7%), and hypertension (58.3%) confirmed that they had lower general quality of life. The respondents who obtained the highest score (72.68) for general quality of life were the youngest patients (44-59 years old).

Conclusions: Total knee replacement considerably improves both the general quality of life and its particular aspects. The necessity of using crutches/walking canes after total knee replacement involves lower quality of life. Concomitant diseases such as osteoporosis, hypertension, and diabetes contribute to lower quality of life of patients after total knee replacement. Quality of life is substantially influenced by sociodemographic factors such as age, sex, and marital status.

Key words: total knee replacement, quality of life, SF-36.

INTRODUCTION

Knee joints are particularly vulnerable to degenerative diseases, connective tissue diseases, and mechanical trauma [1].

Advances in modern surgical technology, medical bioengineering, and developed knee rehabilitation made it possible to apply endoprosthesis of a joint which has been destroyed by a disease of injury. The treatment consists of removing the damaged parts of a knee joint and replacing them with a prosthesis, which prevents friction between the thighbone (femur) and shinbone (tibia) and thus allows the joint to work smoothly [1-3].

Patients who decide to have their knees replaced have specified expectations about their future func-

tioning and the level of physical activity. The main aim of this treatment is to stop or alleviate pain. Thanks to restoring the aforementioned functions, patients are able to fully participate in professional, social, and personal life, and the quality and comfort of their life can increase significantly [1-3].

The aim of this study was to assess the quality of life of patients after total knee replacement.

MATERIAL AND METHODS

This survey-based study was conducted in a group of 60 patients staying on the Traumatic Surgery and Orthopaedics Ward of the 107th Military Hospital in Wałcz between June and December 2013. The patients were examined before and eight weeks after

their total knee replacement. All of them had a complete cement endoprosthesis implanted. The patients were informed about the aim and methods of the study. The patients gave their informed, oral consent to participate in the survey.

The study was carried out with the application of a diagnostic survey. A self-developed questionnaire was applied to assess the patients' health and sociodemographic condition, and the standard version of the 36-Item Short Form Health Survey (SF-36) was used to assess their quality of life during the preceding four weeks. The self-developed questionnaire consisted of nine questions referring to patients' age, gender, education, marital status, place of residence, employment status, health condition, and applied treatment. The SF-36 is aimed at assessing the indicators of quality of life. It consists of 11 questions with 36 statements, which make up nine categories defining particular dimensions of quality of life and health:

1. Physical function (PF) – health problems limiting physical activity;
2. Role limitation physical (RLP) – health problems affecting social functions because of physical limitations;
3. Role limitation mental (RLM) – emotional problems affecting social functions;
4. Social functioning (SF);
5. Mental health (MH);
6. Vitality (V) – energy/getting tired;
7. Pain (P) – suffering from pain;
8. General health (GH) – general health assessment;
9. Change in health (CIH).

Each statement has a particular score value, which is transformed into a 0-100 scale. The score refers to an individual value of the quality of life. The scores are positively oriented, which means that the higher the score, the better the quality of life.

Calculations and statistical analysis were carried out by using STATISTICA 10.0 PL software. To present the results describing quality variables their number (n) and percentage (%) were given. The distribution of examined quantity variables was evaluated by means of Shapiro-Wilk and Kolmogorow-Smirnow tests, and then equality of group variances was checked by means of Levene's test. Mann-Whitney U test was applied in order to evaluate the significance of differences between two different groups. Analysis of differences among mean values in three and more groups was conducted with the application of Kruskal-Wallis analysis of variances and appropriate post-hoc tests. In order to determine the significance of differences between compared groups in relation to quality variables, cross tables and Chi-square test (χ^2) were used. In all the analyses the findings were considered to be significant if their probability value (p) was lower than the assumed level of significance 0.05

($p < 0.05$). The research was conducted in accordance with the principles of the Declaration of Helsinki, and it was approved by Bioethics Committee of Pomeranian Medical University in Szczecin.

RESULTS

The study was conducted in a group of 60 patients (17 men and 43 women) before and after total knee replacement. The respondents' age ranged from 44 to 81 years, with the average age of 67.8 years. Table 1 presents sociodemographic data describing the group.

The most frequent concomitant diseases reported by respondents included osteoarthritis in 85% of patients (51), hypertension affecting 58.3% of respondents (35), osteoporosis – 38.3% (23), and diabetes – 31.7% (19) (Figure 1).

The average assessment of quality of life as well as the assessment of its particular components (PF, RLP, RLM, SF, MH, V, P, GH, CIH) rose significantly in the examined group of patients after total knee replacement surgery (Table 2).

Table 1. Respondents' sociodemographic data

Variables	Total		
	<i>n</i>	%	
Age	44-59	6	10
	60-69	29	48.3
	70-81	25	41.7
Place of residence	Village	14	23.3
	Town with the population below 10,000	10	16.7
	City with the population below 100,000	29	48.3
	City with the population above 100,000	7	11.7
Marital status	Married	36	60
	Widowed	21	35
	Divorced	2	3.3
	Single	1	1.7
Education	Elementary	17	28.3
	Vocational	17	28.3
	Secondary	19	31.7
	Higher	7	11.7
Employment status	Retired	52	86.7
	Employed	6	10
	Unemployed	2	3.3
Using orthopaedic equipment	Not using	33	55
	Using a crutch/walking cane	21	35
	Using 2 crutches	6	10

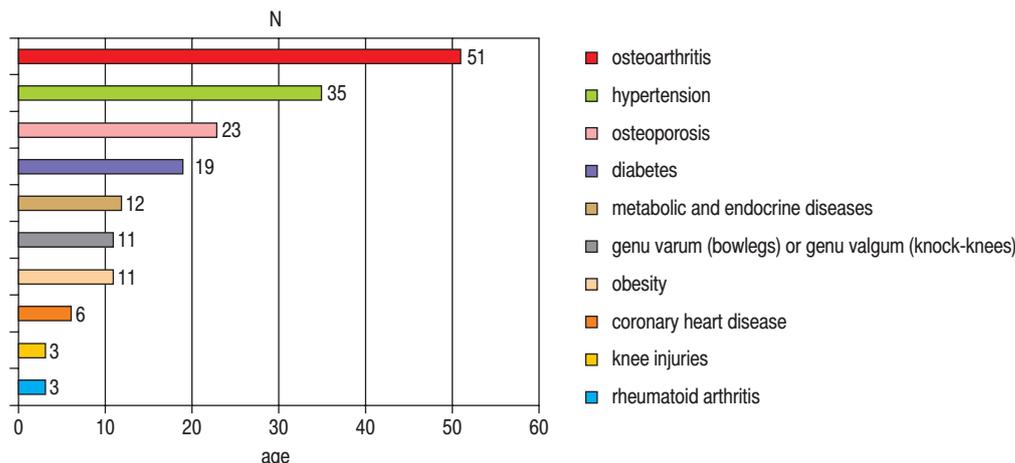


Figure 1. Concomitant diseases in the examined group

Table 2. The average score assessment of quality of life in patients before and after total knee replacement surgery

Quality of life parameters	Before knee replacement (0-100 points)	After knee replacement (0-100 points)
QL	40.49	67.76
PF	23.08	54.00
RLP	13.33	59.58
RLM	50.55	96.11
SF	65.37	79.62
MH	61.06	72.73
V	44.75	58.00
P	42.22	55.55
GH	39.10	48.41
CIH	25.00	85.83

QL – general quality of life, PF – health problems limiting physical activity, RLP – health problems affecting social functions because of physical limitations, RLM – emotional problems affecting social functions, SF – social functioning, MH – mental health, V – vitality, P – suffering from pain, GH – general health assessment, CIH – changes in health

An analysis was carried out of the impact of selected variables, such as age, gender, marital status, place of residence, employment status, concomitant diseases, and the necessity to use orthopaedic equipment, on the general quality of life in the examined group of patients after total knee replacement.

Age

The highest score of 72.68 points describing the general quality of life (QL) was obtained by the youngest patients aged between 44 and 59 years. On the other hand, the lowest score of 63.01 points was obtained by the oldest patients aged over 69 years. A statistically significant correlation was observed between the average score of the QL and patients' age. Patients aged between 60 and 69 years obtained higher scores

than patients aged over 69 years ($p = 0.006$). Another statistically significant correlation was found between health problems limiting physical activity (PF) and patients' age; patients aged over 69 years obtained significantly lower scores than patients aged between 44 and 59 years ($p = 0.024$) and those aged between 60 and 69 years ($p = 0.012$). A similar correlation was observed between vitality (V) and patients' age: respondents aged between 60 and 69 years obtained significantly higher scores than patients aged over 69 years ($p = 0.002$); and also between general health assessment (GH) and age: respondents aged between 60 and 69 years obtained higher scores than those aged over 69 years ($p = 0.001$).

Gender

The examined women obtained higher average scores than men in the following areas of quality of life assessment: emotional problems affecting social functions (RLM), mental health (MH), V, and changes in health (CIH). The only differences between sexes which turned out to be statistically significant were the ones connected with CIH ($p = 0.043$).

Education

The highest score of 73.12 points describing general quality of life was obtained by patients with higher education. The lowest score (62.86 points) was obtained by respondents with elementary education. No statistically significant differences were found between respondents' education and general quality of life.

Marital status

As far as the QL is concerned, single respondents scored the highest, obtaining the score of 75.18 points. The lowest score of 63.95 points was obtained by wid-

owed respondents. No statistically significant differences were found between respondents' marital status and general quality of life.

Place of residence

The assessment of QL was the highest, reaching 72.57 points in patients living in cities with a population above 100,000. The lowest score of 63.21 points was obtained by respondents living in small towns with a population below 10,000. No statistically significant differences were found between respondents' place of residence and general quality of life.

Employment status

The highest score of 76.71 points in the QL assessment was obtained by professionally active respondents. The lowest score (66.46 points) was found in retired patients. No statistically significant differences were found between respondents' employment status and general quality of life.

Concomitant diseases

The authors' analysis detected a negative correlation between the assessment of QL and the incidence of osteoporosis ($p = 0.03$), hypertension ($p = 0.04$), and diabetes ($p = 0.0001$). In conclusion, the lack of these diseases results in a higher level of respondents' general quality of life.

Using orthopaedic equipment

A statistically significant correlation was observed between the necessity to use orthopaedic equipment and the quality of life and its particular aspects. Patients who used orthopaedic equipment had a lower average score as far as general quality of life was concerned, i.e. 62.76 points, whereas those who did not need such equipment scored 71.85 points. Statistically significant correlations were observed between use of orthopaedic equipment and particular aspects of quality of life, including: health problems limiting PF, RLM, SF, MH, V, suffering from pain (P), and GH. Patients using orthopaedic equipment scored lower in these aspects of quality of life.

DISCUSSION

Numerous studies confirm the high efficiency of total knee replacement, especially in the case of degenerative changes of the joints [4-7]. Most of them refer to objective results: clinical and radiological [8-11]. However, an essential aim of total knee replacement is patients' satisfaction, which should be perceived as the priority of the treatment [12-16]. The authors' own study focused on the problem of whether total knee

replacement might help to increase patients' subjective assessment of their quality of life as compared to the state preceding the surgery. The findings of the authors' own study proved that total knee replacement brings about a significant improvement both in general quality of life and in its particular aspects. The study showed an improvement of quality of life from the score of 40.49 points before the surgery to 67.76 points obtained eight weeks after the treatment, which meant an increase of 27.3 points. Lower scores were obtained in the study conducted by Lee *et al.* [17] in which the score before the surgery was 43.3 points and rose up to 59.3 points six months after the surgery and 60.7 points 12 months after the surgery. Worse results in the general assessment of health were also obtained in the study conducted by Huang *et al.* [18], in which the initial scores for patients with planned one-knee and two-knee replacement were 36.6 and 34.8 points, respectively, and thus the scores turned out to be lower than those obtained in the authors' own study. Six months after the surgery in these groups of patients the scores describing general quality of life rose only by 8.9 and 12.3 points, respectively. The findings of the authors' own research showed also a greater increase in the proportion of parameters such as reducing health problems limiting PF, which rose by 30.9 points, and improvement in MH, which rose by 11.7 points. In the study carried out by Gandek *et al.* [19] the differences in the scores were 23.9 and 6.4 points, respectively, and in the study by Lee *et al.* [17] only 10.3 and 6.8 points six months after the surgery, whereas in the study by Tsonga *et al.* [20] the increase was 19.6 and 9.2 points 12 months after the surgery. In the authors' own study higher scores were also obtained for all other aspects of quality of life. An improvement in other aspects of life was also observed in the study by Gandek *et al.* [19]; however, the values were lower than in the authors' own study. The differences may have resulted from better physical and mental condition of the patients examined in the authors' own study and their lower average age (67.8 years) as compared to the average age of 71 years in the case of patients examined by Lee *et al.* or to the average age of 73 years in the case of patients examined by Tsonga *et al.* [17, 18, 20]. They also may have been caused by the results of final examinations. Another factor responsible for the differences might be patients' postoperative treatment and postsurgical rehabilitation [5, 8]. Joint degenerative disease is one of the most dominant reasons for pain and disability. Total knee replacement is applied in the case of patients for whom other forms of treatment failed to alleviate pain, and to restore regular activities in their daily routine [6]. Taking into consideration both the authors' and other mentioned authors' studies, it can undeniably be argued that total knee replacement improves patients' quality of life very quickly

after the surgery. The improvement was observed in many spheres of patients' functioning: in the social, emotional, and vocational spheres, in the assessment of general quality of life, and physical functioning, and it was accompanied by a decrease in experienced pain and disability.

CONCLUSIONS

Total knee replacement considerably improves both general quality of life and its particular aspects.

The patients who had to use one or two crutches or walking canes after total knee replacement scored lower both in QL and some of its particular aspects (PF, RLM, SF, MH, P, GH) than patients who were able to walk without any orthopaedic assistance.

A negative correlation was found between the assessment of QL and the incidence of concomitant diseases such as osteoporosis, hypertension, and diabetes, whereas a lack of the aforementioned diseases resulted in respondents' higher assessment of their quality of life.

Quality of life is substantially influenced by patients' age; younger patients tend to declare a higher quality of life.

Disclosure

The authors declare no conflict of interest.

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