Original paper

Subjective assessment of the quality of life of patients with osteoarthritis of the knee before and after endoprosthesoplasty

Subiektywna ocena jakości życia pacjentów z chorobą zwyrodnieniową stawu kolanowego przed operacją i po zabiegu endoprotezoplastyki

Maria Mika, Małgorzata Kołpa, Aneta Grochowska, Anna Ostręga

Department of Nursing, Faculty of Health Sciences, University of Applied Sciences, Tarnow, Poland
Head of the Department: Barbara Kubik PhD

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Key words: osteoarthritis, endoprosthesoplasty, pain, quality of life.

Słowa kluczowe: zwyrodnienie stawów, endoprotezoplastyka, ból, jakość życia.

Abstract

Introduction: Osteoarthritis is currently considered the fourth most common cause of disability in women and the eighth in men. In more than 10% of patients over 55 years of age, a long-lasting disease process leads to impairment of joint function, and in a quarter of the people in this group it can cause disability. Endoprosthesoplasty is becoming a method of treatment of osteoarthritis, considered today to be the "golden standard".
Aim of the research: Subjective assessment of the quality of life of patients with osteoarthritis of the knee before and after endoprosthesoplasty.
Material and methods: The study group consisted of 65 patients (46 women and 19 men) who were systematically treated for osteoarthritis of the knee at the Trauma and Orthopaedic Department of the Health Care Centre in Dąbrowa Tarnowska and are still under the care of the Orthopaedic Clinic of the above-mentioned hospital. The study was conducted from 1 October 2015 to 1 March 2016 with a trademark questionnaire and a Life Quality Assessment Questionnaire (SF-36).
Results: In the majority of people (64.6%), the arthroplasty improved the quality of life. After surgery, all indicators of quality of life, i.e. the assessment of physical and social functioning, general health, vitality, mental health, and emotional functioning, were clearly improved (90.8%). Physical pain after the surgery also significantly decreased.
Conclusions: Endoprosthesoplasty has had a positive effect on the quality of life in every age group. The quality of life of patients with knee osteoarthritis after endoprosthesoplasty of the knee joint significantly improved in the physical, social, and emotional aspects.

Streszczenie

Wprowadzenie: Choroba zwyrodnieniowa stawów uznawana jest obecnie za czwartą przyczynę niesprawności u kobiet i ósmą u mężczyzn. U ponad 10% pacjentów w wieku powyżej 55 lat długotrwały proces chorobowy prowadzi do upośledzenia czynności stawów, a u 1/4 osób z tej grupy może powodować kalectwo. Endoprotezoplastyka jest dziś metodą leczenia choroby zwyrodnieniowej stawów uważaną za złoty standard.
Cel pracy: Subiektywna ocena jakości życia pacjentów z chorobą zwyrodnieniową stawu kolanowego przed operacją i po zabiegu endoprotezoplastyki.
Materiał i metody: Grupę badaną stanowiło 65 pacjentów (46 kobiet i 19 mężczyzn) planowo leczonych z powodu choroby zwyrodnieniowej stawów kolanowych na Oddziale Urazowo-Ortopedycznym Zakładu Opieki Zdrowotnej w Dąbrowie Tarnowskiej i nadal będących pod opieką Poradni Ortopedycznej szpitala. Badanie przeprowadzono od 1 października 2015 do 1 marca 2016 roku za pomocą autorskiego kwestionariusza w postaci ankiety oraz Kwestionariusza Oceny Jakości Życia (SF-36).
Wyniki: U większości osób (64,6%) endoprotezoplastyka poprawiła komfort życia. Po operacji wszystkie wskaźniki jakości życia, takie jak ocena funkcjonowania fizycznego i społecznego, ogólny stan zdrowia, witalność, zdrowie psychiczne, funkcjonowanie emocjonalne, wyraźnie się poprawiły (90,8%). Istotnie zmniejszył się również ból fizyczny po zabiegu.
Wnioski: Zabieg aloplastyki kolana w każdej grupie wiekowej ma pozytywny wpływ na jakość życia. Jakość życia pacjentów z chorobą zwyrodnieniową stawów kolanowych po zastosowaniu endoprotezoplastyki stawu kolanowego poprawiła się istotnie w zakresie fizycznym, społecznym i emocjonalnym.

Introduction

The knee joint is the largest and the most complicated as well as the most heavily burdened joint in the human body. It is also the most frequently affected by damage and pathological processes. Diseases of the locomotor system lead to the destruction of anatomical structures of the knee joint and belong to the group of diseases commonly found in highly developed countries. According to the World Health Organisation (WHO), musculoskeletal diseases are among the most serious threats in the modern world. Osteoarthritis has been recognised as a civilisation disease due to an increase in the number of patients, caused by an increase in the life expectancy of the population, a growing number of patients with diabetes mellitus, joint overloads in people practising sports, an increase in the frequency of injuries, especially in communication, and the use of drugs affecting the blood supply of bone parts of the joints [1–3].

Osteoarthritis is a chronic non-inflammatory disease of the joints, with periods of exacerbation and remission progressing regardless of the treatment method. In the treatment of gonarthrosis, depending on the severity of degenerative changes, targeted conservative treatment is used, and in advanced stages of the disease treatment includes appropriate surgical techniques [4–6].

Endoprosthesoplasty of the knee joint – in patients with severe ailments, where conservative treatment does not give a satisfactory analgesic effect, and limitation of physical fitness is in progress – is considered the "golden standard" of the procedure [7].

Although modern implants are better and better and of very high quality, the results depend also on the severity of the disease, the experience of the operator and the entire treatment team, the general health of the patient before surgery, overall pre- and postoperative care, physical therapy, and rehabilitation.

The simultaneous increase in interest in health care costs and the need to monitor the effectiveness and efficiency of medical treatment have contributed to the increase in interest in quality of life, which consists not only of overall health and physical fitness corresponding to the patient's biological age. Equally important is the opportunity to participate in social and family life, as well as psychological and emotional well-being.

Quality of life is currently an important determinant of the effectiveness of therapy, used simultaneously with clinical and functional assessment, commonly used during the introduction of new therapeutic methods.

Aim of the research

The aim of the study was to assess the quality of life of patients with osteoarthritis of the knee during the period of conservative treatment and after comprehensive surgical treatment.

Material and methods

The study was conducted from 1 October 2015 to 1 March 2016, with the consent of the Head of the Department of Injury and Orthopaedic Surgery with the Sub-Department of General Rehabilitation of the Health Care Centre in Dąbrowa Tarnowska. The study group consisted of 65 patients (46 women and 19 men) who were systematically treated for osteoarthritis of the knee at the above-mentioned ward and remained under the care of the Orthopaedic Clinic. The criteria for inclusion in the study were as follows: total ABG endoprosthesis, access to medical records, and – in accordance with the principles of the Helsinki Declaration – conscious and voluntary consent of patients. The respondents came from nearby villages and towns, which guaranteed a wide cross-section of social and cultural origins.

Patients were examined after endoprosthesoplasty surgery. The period after the procedure was different and ranged from 4 weeks to 6 months for different patients. During the meeting, the patients were asked to assess their quality of life before and after the procedure.

In order to conduct the research, the authors' trademark questionnaire and the SF-36 Quality Life Survey Questionnaire (Short Form Health Survey) were used [8].

In order to carry out the research, the diagnostic survey method was used. A survey was used as a technique. The research tool was the author's questionnaire containing questions of single and multiple choice. All respondents were informed about the purpose and subject of the research being conducted, while having all doubts about completing the questionnaire clarified. Answering the questions was anonymous, independent, and voluntary. The questionnaire contained 26 questions regarding sociometric data, the pre-operative period, and the period after arthroplasty. There were questions about the duration of the disease and the time limitations, and therapies used in conservative treatment and their effects. Respondents were also asked also about the main reason for them undergoing arthroplasty, and whether and to what extent arthroplasty improved their quality of life.

The patients' evaluation procedure included problems doing everyday activities, difficulties occurring immediately after surgery or during convalescence, and assessment of the stiffness of the operated knee.

The SF-36 Life Survey Questionnaire (Short-Form Heath Survey) was used as the second research tool. The questionnaire is intended for subjective assessment of health. It consists of 11 questions containing 36 statements that allow the determination of eight elements, i.e. physical functioning, limitations due

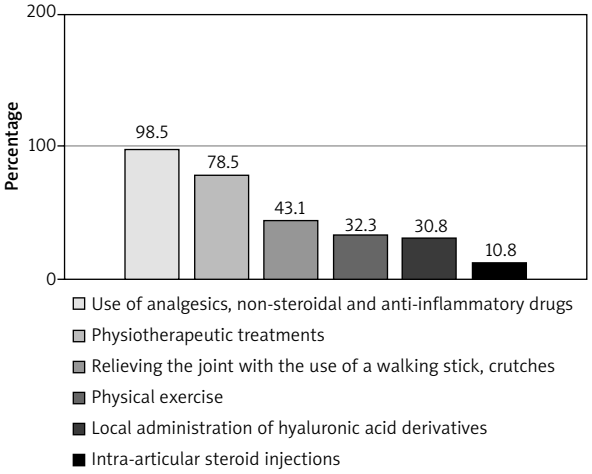

Figure 1. Treatments used during conservative therapy

to physical health, pain sensation, general sense of health, vitality, social functioning, emotional functioning, and mental health. The quality of life indicator is the sum of the score points for all eight quality of life scales and allows an overall assessment of health status. According to the Polish version of the questionnaire, the highest point value means the lowest degree in assessing quality of life, while the lowest point value means the highest level of quality of life [9].

Statistical analysis

Answering the questions was anonymous, independent, and voluntary. The results of the survey were subjected to statistical analysis. The differences between variables were verified by means of the χ^2 test of independence, Mann-Whitney test, and Kruskal-Wallis test. In addition, the *t*-test was used for one trial. The significance level $p < 0.05$ was adopted. The calculations were made with the use of SPSS software.

Results

The study group comprised 4.6% patients aged 31–40 years, and 29.2% were between 51 and 60 years of age. The most numerous group comprised patients between 61 and 70 years old (66.2%). 33.8% of the people under examination indicated a rural place of residence, whereas most of the patients (66.2%) lived in the city.

The period before endoprosthesoplasty

In 47.7% of the respondents, knee osteoarthritis was diagnosed less than five years ago. Knee osteoarthritis was diagnosed more than 5 years ago in 52.3% of respondents. The majority (78.5%) declared that they had coped with the disease well before the surgery. 21.5% of the respondents indicated that they had not coped well with the disease during this period. Slightly more than half of the respondents (53.8%) stated that the diagnosed osteoarthritis, as a progressive and incurable disease, had an impact on their emotional functioning. 46.2% of the people under examination indicated the lack of such an impact. The respondents used various forms of conservative therapy. The results did not add up to 100% (Figure 1).

A total of 7.7% of patients stated that physiotherapy and pharmacological treatments led to improvement but required self-discipline. 47.7% of the individuals felt an improvement for a short time after completing a series of treatments. 38.5% of the respondents did not feel any significant improvement, and 6.2% of them said that these treatments did not bring any positive effects. In the course of conservative treatment, 21.5% of the respondents limited their professional activity and social contacts to a small extent, 73.8% of the respondents significantly reduced them, and very few respondents (4.6%) completely restricted it as time went by. All the patients reported the occurrence of limitation of the range of movement in the affected joint before the procedure. Problems with performing daily activities during conservative treatment were assessed on a scale of 1–5 points, where 1 point meant no problems at all, and 5 points meant very serious problems. It was found that the respondents had huge problems mainly with carrying out heavy housework (95.4%), and ascending and descending stairs (76.9%). Major problems occurred when standing or bending to the floor (72.3%). An average severity of problems pertained to sitting (66.2%). A small number of the people experienced a slight increase in the problems related to everyday activities, while no one pointed to the lack of problems in everyday functioning. The vast majority of the respondents (90.8%) stated that the disease had changed their level of professional activity. No change in the level of professional activity as a result of the disease was indicated by 9.2% of the patients.

The level of independence and self-reliance before the surgery was high among 23.1% of the people under examination; an average level was declared by 67.7% of the respondents. 7.7% of the patients stated that they were independent and self-reliant to a small extent. One person (1.5%) claimed that their level of independence before the surgery was limited to a significant extent. 52.3% of the patients were willing to take advantage of the help of their family, neighbours, and friends whereas 47.7% were nor eager to take advantage of such assistance.

The period after endoprosthesoplasty

13.8% of the patients had had the surgery up to 4 weeks earlier. In the case of 15.4% of the people, this procedure was performed 1–3 months earlier. From 3 to 6 months had passed since the endoprosthesoplasty procedure was performed in 41.5% of the pa-

tients, and over 6 months in the case of 29.2% of the patients. The main reason for the patients undergoing the surgery was pain that prevented their daily functioning. All the respondents indicated it. A lack of satisfactory effects of conservative treatment was indicated by 75.4% of the people under examination. To a lesser extent, patients were guided by arguments of specialists (38.5%), their willingness to return to pre-disease professional activity (30.8%), or the willingness to become independent of the help of others (23.1%). The respondents also pointed to difficulties with performing social roles or to family pressure (18.5%) as motives for undergoing surgery. The results did not add up to 100%.

Pain of the operated knee was not felt by 18.5% of the patients. Small, sporadic pain was felt by 56.9%. Average pain was occasionally experienced by 21.5% of the respondents, and 3.1% were in constant pain. 10.8% of the patients indicated an unrestricted possibility of walking after surgery. Most of the respondents (60.0%) were able to walk over 1000 m after the surgery. 12.3% of the people were able to cover from 500 m to 1000 m, and 10.8% of the respondents managed to walk less than 500 m. A group of 6.2% of patients could only move around the house after the surgery. The occurrence of difficulties immediately after the surgery or during the convalescence period were indicated on a 1–4 point scale, where 1 point stood for "never" and 4 points stood for "all the time". Calculating the mean values of the severity of individual problems (on a scale of 1–4 points), it was found that immediately after the surgery or the convalescence period, the respondents had the greatest difficulties with knee joint oedema (2.62), and slighter difficulties related either to full flexion (1.95) or full extension (1.74) of the knee joint. Locking while bending or straightening (1.28) was found to be the least significant problem. The evaluation of the stiffness of the operated knee was assessed on a scale of 1 to 5 points, where 1 point meant lack of stiffness and 5 points stood for very high rigidity. On the scale of 1 to 5 points the degree of stiffness experienced in the morning after getting up from bed (2.02) was higher than the degree of stiffness experienced during the day (1.54). Intensification of pain problems was assessed on a scale of 1 to 5 points, where 1 point meant no pain, and 5 points meant very severe pain. It was found that (on the 1–5-point scale), the highest intensity of pain was associated with ascending and descending stairs (2.28). Less pain occurred during bending (1.98) or straightening (1.82) of the knee, while standing (1.78), standing up from a sitting position (1.60), walking on a flat surface (1.43), or lying in bed at night (1.11). While sitting, patients experienced the lowest intensity of pain (1.05).

After the endoprosthesoplasty of the knee joint, 6.2% of the patients had small, limited vitality and physical fitness. After the procedure, 32.3% of the respondents experienced average vitality and physical fitness levels, and 58.5% assessed them as high. 3.1% of the respondents had very high physical fitness. A positive impact of the performed operation on social and emotional functioning was indicated by 90.8% of the patients. According to 9.2% of the respondents, the operation did not positively affect their social and emotional functioning. The majority of the people under examination (86.2%) said that the surgery contributed to an improvement of overall health. The lack of such improvement was indicated by 13.8% of the respondents. Lack of problems with daily housework was indicated by 23.1% of the patients, 32.3% had small problems, and 35.4% of respondents had average problems. 7.7% of the people had major problems with performing daily housework, whereas one person complained of having huge problems (1.5%). Most people (64.6%) stated that the endoprosthesoplasty improved their quality of their life. There was a slight improvement in the comfort of life of 30.8% of the people, whereas in 4.6% of the respondents it did not improve at all.

The quality of life of the patients after the procedure was assessed on the basis of the SF-36 scale. Higher results of this scale corresponded to a greater severity of problems, and therefore the quality of life in a given dimension was lower (Table 1).

People who took part in physical exercise (8.00) had a significantly higher quality of life associated with vitality than those who did not receive such conservative treatment ($p = 0.0347$). Patients who had their joints relieved with the aid of a walking stick or crutches had a significantly lower overall quality of life (83.75) than patients who did not receive such conservative treatment ($p = 0.0483$).

It was found that the quality of life of the patients depended mainly on local administration of hyaluronic acid derivatives. The people undergoing this treatment had a significantly higher quality of life connected with general health, social functioning, well-being, and vitality ($p < 0.05$). These patients also showed a significantly higher overall quality of life ($p = 0.0123$), as well as quality of life in terms of mental health ($p = 0.0172$), than those who did not use local administration of hyaluronic acid derivatives. The sex and age of the patients did not significantly affect their quality of life. Along with the age of the patients, there was a significant increase in their willingness to take advantage of help from their family, neighbours, and friends before the surgery ($p = 0.0301$). Their age was not found to significantly influence the limitations in the functioning of the patients before the surgery. The effectiveness of physiotherapeutic and pharmacological treatments before the procedure was rated higher by women than by men ($p = 0.0058$). The women more often claimed that the treatments led to improvement but required self-discipline (10.9%) or they experienced improvement for a short time after

Table 1. Quality of life of the respondents (SF-36 scale)

Variable	Mean	SD	Min.	Max.	*t*	*P*-value
Overall health (H)	2.95	1.51	1	8	–5.57	< 0.0001
Physical well-being (F)	20.94	9.92	0	46	–3.30	0.0016
Role restriction – physical problems (R)	10.15	7.65	0	20	0.16	0.8718
Role restriction – emotional problems (E)	5.77	5.81	0	15	–2.40	0.0193
Social functioning (S)	5.46	2.59	0	13	–3.24	0.0019
Pain (P)	1.51	1.03	0	4	–3.84	0.0003
Well-being (W)	18.05	7.54	7	37	–4.76	< 0.0001
Vitality (V)	9.11	3.09	3	15	2.89	0.0052
Overall quality of life	73.94	32.63	18	157	–2.86	0.0058
Physical health dimension (PCS)	35.55	18.24	1	78	–2.41	0.0189
Mental health dimension (MCS)	38.38	16.79	15	79	–2.94	0.0046

the procedure (52.2%). The men more often claimed that they did not feel a definite improvement (42.1%) or any positive effects (21.1%). Sex was not found to significantly differentiate other aspects of the functioning of the patients before the procedure.

After the procedure, people aged 41–40 years (66.7%) and 51–60 years (42.1%) significantly more frequently experienced no problems with walking over a flat surface than those aged 61–70 years (27.9%) ($p = 0.0215$). It was not found that the level of functioning after the surgery depended in other respects on the age of the respondents. After the procedure, men (57.9%) were more likely to indicate no problems when getting up from a sitting position than women (54.3%), who had minor problems in this area ($p = 0.0062$). The sex of the patients was not found to significantly differentiate other aspects of the patients' functioning after the procedure.

Discussion

Launched by the World Health Organisation and the United Nations in 2000, the Bone and Joint Decade testifies to the nature of the problem of osteoarthritis [10, 11]. Gonarthrosis is found in 5% of the population, and in terms of prevalence it comes third after degenerative changes of the spine and hip joints. Osteoarthritis of the knee is common in middle-aged and elderly people as well as in those who are obese [12]. There is no single standard procedure for the management of patients with degenerative joint changes. Many authors and researchers approve of the legitimacy of use of exercise in the treatment. Physiotherapy is also indicated as an integral part of the gonarthrosis treatment programme, underlying, however, the lack of well-planned studies that would be able to resolve the issue of its effectiveness [12]. Our own research showed that people who had had physical exercise administered (8.00) had a significantly higher quality of life than those who did not use such conservative treatment. At the same time, the effectiveness of the physiotherapeutic procedures prior to the surgery was rated higher by women, even though they claimed that it required self-discipline and shared responsibility for their own health. Men more often believed that after completing a series of physiotherapeutic treatments they did not feel any significant improvement or any positive effects of treatment.

Osteoarthritis of the knee is a problem of socio-economic, social, and medical dimensions. This is particularly true of the elderly [13]. Patients aged between 61 and 70 years were the most numerous age group among the respondents. Our own research showed that along with the age of the respondents, there was a significant increase in the willingness to take advantage of the help of family, neighbours, and friends before the surgery.

According to the literature, degenerative changes occur more frequently in women than in men [14]. In the group of patients under examination, women constituted a much larger group (70.8%). A similar percentage of women (81.5%) was described by Wojciechowski *et al*. in studies based on a 3-year observation [15]. It is assumed that an increased percentage of women, especially those in the post-menopausal period, may indicate the effect of hormonal disorders on the occurrence of degenerative changes [14].

Reduction of pain intensity is a reference point in the assessment of the efficacy of the endoprosthesoplasty performed. Pain, which makes everyday life extremely difficult, was indicated by all the respondents as the main motivation for surgery. The occurrence of pain decreases the quality of life and dictates whether or not it is necessary to withdraw from life activities or change interpersonal relations in one's closest surroundings [10]. Significant limitation of

professional activity and social contact as a result of symptom progression was demonstrated by 73.8% of the respondents. As time went by, a small group (4.6%) completely limited their professional activity and social contact as a result of the disease. The analysis of the severity of pain in the group of patients under examination shows that after the procedure the vast majority of them declared slight or no pain, which in turn resulted in better quality of daytime functioning. A lot of pain was felt by individual people.

As time progresses, increasing pain leads to a gradual increase in the amount of painkillers taken and, frequently, to their abuse [13]. The struggle with pain in almost all the patients (98.5%) was based mainly on the use of painkillers and anti-inflammatory drugs. Alternatives to oral medications include intra-articular injections of drugs such as hyaluronan or corticosteroids. In clinical trials, hyaluronan intra-articular formulas, as compared to placebo, significantly reduced pain in patients who had completed the examination, to the same extent as oral nonsteroidal anti-inflammatory drugs. In addition, the analgesic effect of hyaluronan injections was comparable to or greater than intra-articular injections of corticosteroids, and although it developed more slowly, it was of much longer duration [16]. These data are consistent with the group of patients under study, of whom 32.3% opted for local administration of hyaluronic acid derivatives. Our own research has shown that the quality of life related to general health, social functioning, well-being, and vitality depended to a large extent on the intra-articular delivery of hyaluronan. They also had a significantly higher overall quality of life and quality of life in terms of mental health than those who did not receive this element of treatment.

A study by Baker *et al.* showed that after arthroscopy patients experienced greater satisfaction and less pain than before surgery [17].

The results of our own research indicate that the rehabilitation performed in patients with osteoarthritis of the knee significantly reduces painful discomfort in both patients treated conservatively and in patients after endoprosthesoplasty of the knee joint.

Contemporary medicine has at its disposal a physiotherapy that can minimise or even prevent complications. The results of the study are consistent with other studies that also showed an improvement in the subjective quality of life owing to professionally conducted physiotherapy. In their research on the influence of cryotherapy on the functioning of the musculoskeletal system of people with osteoarthritis of the knee joint, Skrzek and Zagrobelny observed a marked reduction in pain and improvement of joint mobility [18]. Gachewicz's research also demonstrated a clear improvement in patients undergoing cryotherapy [19]. The results of the study do not match the above because the vast majority of respondents (81.5%) had had rehabilitation procedures performed, but only 7.7% of subjects confirmed the effectiveness of the physiotherapeutic procedures. A total of 6.2% did not experience any positive effects of their physiotherapeutic treatment. The thesis put forward by the respondents, that physiotherapeutic treatments are effective but require regularity and time, can be explained by insufficient motivation, lack of control over their own lives and illness, and insufficient knowledge about the nature of the disease and rehabilitation.

The results of the study are consistent with other works that also showed an improvement in the subjective quality of life [20]. It should be emphasised, however, that our own research was conducted among patients in the first weeks or months after the surgery, when the process of a producing full integration of bone tissue with the contact surfaces of the prosthesis was not yet completed. New stereotypes of movement have not been established yet. The first few months after the surgery is the period when the most important rehabilitation takes place, and yet a positive effect of the surgery on the assessment of social and emotional functioning was observed (90.8%). Patients evaluated the overall assessment of performance as well as physical fitness as significantly higher. As pain decreases, the motivation to regain control over one's own life and illness increases, which has a positive impact on the overall health, restores the ability to fulfil the previous roles in the family, and the return to professional and social activity.

The results obtained by Hawker *et al.* from their research lead to the conclusion that endoprosthesoplasty of the knee joint and immediately applied rehabilitation is an effective way to relieve pain and, above all, has a great impact on improving the quality of life in patients with severe degenerative changes. Post-operative rehabilitation resulted in a significant reduction of pain sensations and, in some patients, even in its complete elimination [20]. Also, a literature review by Ethgen *et al.* confirmed the improvement of quality of life after knee arthroscopy [21].

The results of the work of the mentioned researchers are to a large extent consistent with the results of our own research. This applies mainly to the age of patients, the motives that induced them to undergo surgery, and the results translating into the overall quality of life. Subjective assessment of the quality of life is increasingly important not only in medical practice, but also in a holistic, overall approach to the patient.

Conclusions

A chronic and progressive disease, gonarthrosis, along with the progression of symptoms, significantly limits, and sometimes completely enforces, reduction of professional activity and social contacts. Chronic

pain associated with gonarthrosis leads to a significant reduction in efficiency and independence, which, in consequence, significantly modifies the assessment of the subjective quality of life and general health condition. The use of complex physical therapy and pharmacotherapy among the group of patients under study did not bring about a statistically significant improvement in the reduction of pain. The quality of life of patients with knee osteoarthritis after endoprosthesoplasty has significantly improved in the physical, social, and emotional aspects.

Conflict of interest

The authors declare no conflict of interest.

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Address for correspondence:

Dr. **Aneta Grochowska**
Department of Nursing
Faculty of Health Sciences
University of Applied Sciences
ul. Mickiewicza 8, 33-100 Tarnów, Poland
E-mail: apea1@op.pl