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THE QUALITY OF LIFE IN PATIENTS AFTER HIP ENDOPROSTHESIS IMPLEMENTATION

Jakość życia pacjentów po alloplastyce stawu biodrowego

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A - Koncepcja i projekt badania, B - Gromadzenie i/lub zestawianie danych, C - Analiza i interpretacja danych, D - Napisanie artykułu, E - Krytyczne zrecenzowanie artykułu, F - Zatwierdzenie ostatecznej wersji artykułu

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Abstract (in Polish):

Cel pracy

Celem pracy była ocena jakości życia pacjentów przed i 6 tygodni po operacji wszczepienia endoprotezy stawu biodrowego.

Materiał i metody

Badaniami objęto 89 chorych w wieku 27–84 lat, zakwalifikowanych do planowego zabiegu wszczepienia endoprotezy. Uczestnicy byli hospitalizowani na Oddziale Chirurgii Urazowo-Ortopedycznej, a następnie

znajdowali się pod opieką Poradni Ortopedycznej Samodzielnego Publicznego Wojewódzkiego Szpitala Klinicznego w Szczecinie. Do przeprowadzenia analizy wykorzystano kwestionariusz SF-36 oraz kwestionariusz autorski.

Wyniki

Zarówno zmienne socjodemograficzne (wiek, płeć, poziom wykształcenia), jak i określone zmienne medyczne (Body Mass Index, ból, choroby współistniejące, leki przeciwbólowe Yesing) miały wpływ na poprawę jakości życia po operacji. Ponadto stan cywilny, miejsce zamieszkania, aktywność fizyczna oraz wcześniejsze zastosowanie endoprotez nie wpłynęły na poprawę jakości życia.

Wnioski

1. Pacjenci w badaniu wykazali znaczną poprawę jakości życia po zastosowaniu endoprotezy stawu biodrowego w porównaniu z okresem poprzedzającym operację. 2. Osoby starsze osiągnęły przede wszystkim poprawę funkcjonowania fizycznego, kobiety - lepsze zdrowie psychiczne, a osoby z niskim wykształceniem doświadczyły poprawy funkcjonowania fizycznego. 3. Udział w rehabilitacji przed zabiegiem znacząco wpłynął na poprawę ogólnego samopoczucia pacjenta po zabiegu. 4. Zastosowanie endoprotezy znacznie złagodziło ból - jakość życia pacjentów, którzy odczuwali silny ból przed zabiegiem, znacznie się poprawiła po operacji, a osoby z otyłością drugiego stopnia odnotowały znaczną poprawę w zakresie bólu.

Abstract (in English):

Aim

The aim of this study was to assess the quality of life in patients who underwent hip joint endoprosthesis implementation, prior and 6 weeks after the surgery.

Material and methods

The study included 89 patients who were qualified for the elective endoprosthesis implementation procedure, aged between 27 and 84 years. The participants were hospitalized in the Department of Trauma and Orthopaedic Surgery and afterward were under the care of the Orthopedic Outpatient Clinic of Autonomous Public Provincial Polyclinical Hospital in Szczecin. To conduct analysis, the SF-36 questionnaire and the author's own questionnaire were used.

Results

Both sociodemographic (age, sex, level of education) and certain medical variables (BMI, pain, concomitant diseases, Yesing pain medication) had an influence on improvement in the quality of life after the surgery. Marital status, place of residence, physical activity, and previous implementation of endoprostheses did not impact the quality-of-life improvement.

Conclusions

Patients in the study showed a significant improvement in the quality of life after the hip endoprosthesis implementation in comparison with the period preceding the surgery. The elderly achieved above all improved physical functioning, women - better mental health, and individuals with low-level education experienced improvements in physical functioning. Participating in rehabilitation before the surgery considerably improved patient's general perception of health after the procedure. The implementation

of endoprosthesis substantially relieved pain – the life quality of patients who experienced severe pain before the surgery greatly improved after the surgery, and individuals who suffer from second-degree obesity reported a significant improvement in terms of pain.

Keywords (in Polish): jakość życia, endoproteza, chirurgia.

Keywords (in English): quality of life, endoprosthesis, surgery.

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Introduction and the aim

Due to the civilizational development and increasing longevity, joint diseases became the main concern of orthopaedics worldwide. The joint which is especially prone to degenerative-deforming changes is the hip joint [1]. Endoprosthesis (arthroplasty) is a surgery, the goal of which is to restore functioning of hip joint. Currently, it is the most commonly used method of treatment of degenerative hip joints diseases. Endoprosthesis significantly improves joint function as well as eliminates in the fastest way possible patient's disability. According to National Health Service's Central Endoprosthesis Evidence data, during the last year about 57 thousand hip endoprosthesis implementations were performed, while 10 years ago less than half the number of such procedures was carried out. Prior comprehensive rehabilitation restores motion capacity and therefore patient's autonomy from the environment which significantly improves the quality of life [2,3,4].

The purpose of this study was to establish sociodemographic and medical factors which influence the quality of life in patients after hip joint endoprosthesis implementation.

Materials and methods

The study included 89 patients who had been qualified to an elective hip endoprosthesis implementation surgery, aged between 27 and 84 years. Participants were hospitalised in in the Department of Trauma and Orthopaedic Surgery and afterwards were under the care of Orthopaedic Outpatient Clinic of Autonomous Public Provincial Polyclinical Hospital in Szczecin. The inclusion criteria comprised of the age of 18 or above, qualification to an elective procedure of hip joint endoprosthesis implementation,

and an informed consent for participation in the study. While the exclusion criteria were as follows: lack of respondent's consent and diagnosed femoral neck fracture. The study was conducted in accordance with the Declaration of Helsinki after obtaining the approval of hospital's director and of each patient participating in the study. Participation in the study was voluntary and anonymous. Respondents were informed about the objective of the study and the possibility to resign and withdrawal consent at every stage of the study. A favourable opinion of the Bioethical Commission of Pomeranian Medical University was obtained for the implementation of the study.

89 persons who filled out questionnaires twice took part in the study. First time, before the implementation of the hip joint endoprosthesis, then 6 weeks after the procedure during the follow-up examinations in the Orthopaedics inpatient clinic.

The study was conducted using diagnostic poll method via questionnaire technique. In order to carry out the analysis, questionnaire SF-36 and author's own questionnaire were used:

1. SF-36 Questionnaire (36 Item Short – Form Health Survey). This tool consists of 11 questions regarding health and well-being which allow an assessing the quality of life in 11 domains: physical functioning (PF), role limitations due to physical problems (RP), bodily pain (BP), general health perception (GH), vitality (VT), social functioning (SF), mental health (MH), role limitation due to emotional problems (RE), health transition (HT), physical component summary (PCS), mental component summary (MCS). Quality of life in each domain is expressed by a number within the range from 0 to 100. The higher the number, the better the quality of life.
2. Author's own questionnaire consists of 20 open and closed questions regarding sociodemographic data such as age, sex, weight, height, place of residence, professional status and activity, physical activity, as well as medical information (type of procedure, number of surgeries, BMI, physical activity, implementation of rehabilitation, severity of pain, using pain medication, prevalence of concomitant diseases).

Analysis of quantitative variables (i.e., expressed by a number) was conducted via calculating mean, standard deviation, median, quartiles, minimum and maximum. Qualitative variables (i.e., not expressed by a number) were analysed by calculating a number and percentage for each value. Comparison of quantitative values for two groups was carried out via Mann–Whitney U test, while comparison of quantitative values for three or more groups was conducted with the Kruskal–Wallis test. After establishing statistically relevant differences, a post-hoc analysis with Dunn test was performed in order to identify groups varying in a statistically significant way. Relationships between quantitative variables were analysed using Spearman's correlation coefficient. A significance level of 0.05 was established, thus all p values below 0.05 were interpreted as relevant. The analysis was conducted using R programme, version 3.6.3.

Results

The study group consisted of 89 individuals before hip endoprosthesis implementation. Average age of respondents was 63 years, women prevailed in the group – 59.55%. The vast majority of persons were in a formal relationship (65.17%), lived in cities with a population between 10 and 100 thousand (31.46%), had secondary education (42.70%), and were retired or on a pension (64.04%). Understanding of the type of procedure was reported by 93.26%, 4.49% of respondents said that they do not know what kind of procedure they were waiting for or stated a different procedure. 71.91% of respondents deNod any past prostheses implementations, 22.47% underwent a prosthesis implementation in the past. Great majority of

surveyed lived with their family (67.42%), whereas 21.35% lived by themselves. However, 10.11% of those respondents admitted that even though they live alone, they are being Yesen care of. More than a half of respondents (57.30%) were equipped with orthopaedic equipment, however 37.08% was not in possession of such aids. As far as their place of residence is concerned, more than a half of respondents (56.18%) lived in blocks of flats and 43.82% lived in houses. Majority of blocks of flats in which respondents lived did not have a lift (79.78%).

Almost a half of respondents was overweight (48.31%), 25.84% were obese, weight of 13.48% of respondents was within the norm, and 12.36% suffered from second degree obesity. Majority of respondents (65.17%) described their physical activity before the procedure as little, 32.58% as moderate. More than a half of surveyed (55.06%) did not rehabilitate their hip joints before the endoprosthesis implementation considering it as unnecessary or too demanding, while 43.82% of respondents used physical therapy. Most common concomitant diseases were arterial hypertension (67.42%) and rheumatoid arthritis (17.98%).

Analysis of patient's quality of life before the hip endoprosthesis implantation and 6 weeks after the implementation of hip endoprosthesis.

Respondents declared the highest quality of life in mental health (MH), role limitation due to emotional problems (RE) and mental component summary (MCS) domains, and lowest in role limitations due to physical problems (RP), physical functioning (PF) and bodily pain (BP) domains. They functioned better in mental (MCS) than physical capacity (PCS) (Tab. 1).

Best quality of life in patients 6 weeks after the implementation of hip endoprosthesis was established in health transition (HT), mental health (MH), and role limitation due to emotional problems (RE) domains, while the worst were the following: physical component summary (PCS), bodily pain (BP), role limitation due to physical problems (RP). Surveyed functioned better in terms of mental (MCS) than physical aspects (PCS) (Tab. 1).

Quality of life in the domains such as physical functioning (PF), role restriction due to physical problems (RP), bodily pain (BP), vitality (VT), mental health (MH), health transition (HT), physical component summary (PCS) and mental component summary (MCS) were better after the surgery than prior to it.

The higher was the age, the greater was the improvement in terms of role restriction due to physical problems (RP), role limitation due to emotional problems (RE) and physical component summary (PCS) (Tab. 3). The greater was the pain before the procedure, the more significant was the improvement in bodily pain (BP), vitality (VT), mental health (MH) and mental component summary (MCS) domains (Tab. 2).

Experience of improvement in terms of mental health (MH) was greater in women than men (Tab. 3).

Improvement in physical functioning (PF) was significantly greater in individuals with elementary and vocational education than in ones with higher education (Tab. 3).

Patients with second degree obesity declared a significant improvement in bodily pain (BP) domain in comparison with other patients (Tab. 4).

Individuals who were rehabilitated prior to the surgery showed a more significant improvement in general health (GH) domain in comparison with ones who did not participate in rehabilitation before the surgery (Tab. 4).

No statistically significant correlations between the improvement of quality of life and marital status, place of residence, prior prosthesis surgery and physical activity were established.

Table 1. Analysis of the quality of life in patients before surgery and 6 weeks after the procedure according to SF-36.
Tabela 1. Analiza poziomu jakości życia badanych przed zabiegami operacyjnymi i 6 tygodni po zabiegu operacyjnym

SF 36	N	Before surgery						6 weeks after the procedure					
		M	SD	Me	Min-Max	Q1-Q3	M	SD	Me	Min-Max	Q1-Q3		
PF	89	26.29	20.32	25	0-85	10-35	50.06	19.37	50	0-100	35-65		
RP	89	31.39	24.3	25	0-100	12.5-43.8	40.8	21.51	43.75	0-100	25-50		
BP	88	25.51	17.68	22.22	0-88.9	11.1-36.1	44.95	20.9	44.44	0-100	33.33-55.56		
GH	89	45.51	15.43	45	5-85	35-55	49.03	16.62	45	20-95	35-55		
VT	89	41.43	18.85	43.75	0-81.3	25-50	50.77	17.01	50	12.5-100	37.5-62.5		
SF	89	49.86	24.39	50	0-100	37.5-62.5	53.93	21.54	50	0-100	37.5-75		
RE	89	53.93	31.76	50	0-100	25-75	59.74	25.66	58.33	0-100	41.67-75		
MH	89	54.61	17.27	55	0-85	45-65	63.09	15.33	60	20-95	55-75		
HT	89	32.3	22.36	25	0-100	25-50	67.42	26.76	75	0-100	50-75		
PCS	88	33.5	13.66	33.85	1.54-76.9	24.62-41.5	46.79	13.82	44.62	15.38-93.85	38.46-53.85		
MCS	89	50.02	17.87	50	0-82.1	37.5-62.5	57.54	14.99	55.36	32.14-98.21	46.43-66.07		

SF-36 - the quality-of-life questionnaire, N – number of individuals, M – mean, SD - standard deviation, Me -median, Min – minimum, Max - maximum, Q1-quartile 1, Q3-quartile 3, PF - physical functioning, RP - role limitations due to physical problems, BP - bodily pain, GH - general health, VT – vitality, SF - social functioning, MH - mental health, RE - role limitations due to emotional problems, HT - health transition, PCS - physical component summary, MCS - mental component summary.

Table 2. Correlation between respondent's quality of life according to the SF-36 and their age and severity of pain in surveyed**Tabela 2. Korelacja jakości życia badanych wg SF-36 oraz natężenia bólu i wieku**

SF 36	Spearman's Rank correlation coefficient			
	Age		Severity of pain	
	r	p	r	p
PF	0.162	0.13	0.202	0.058
RP	0.343	0.001 *	0.157	0.142
BP	-0.047	0.663	0.345	0.001 *
GH	-0.037	0.73	-0.097	0.367
VT	-0.009	0.93	0.273	0.01 *
SF	0.113	0.291	0.165	0.122
RE	0.308	0.003 *	0.163	0.126
MH	0.074	0.489	0.228	0.031 *
HT	0.16	0.133	0.106	0.322
PCS	0.214	0.048 *	0.205	0.059
MCS	0.123	0.251	0.266	0.012 *

* statistically significant variable (p<0,05), SF-36 - the quality-of-life questionnaire, PF - physical functioning, RP - role limitations due to physical problems, BP - bodily pain, GH - general health, VT - vitality, SF - social functioning, MH - mental health, RE - role limitations due to emotional problems, HT - health transition, PCS - physical component summary, MCS - mental component summary.

Table 3. Differences in respondent's quality of life in accordance with the SF-36 regarding their sex and level of education**Tabela 3. Różnice dotyczące poprawy jakości życia wg SF-36 wśród badanych pacjentów w zależności od płci i wykształcenia**

SF 36		Sex		Level of education			
		Women (N=53)	Men (N=36)	Primary - A (N=15)	Vocational - B (N=23)	Secondary - C (N=38)	Higher- D (N=13)
PF	Me±SD	24.25±24.56	23.06±29.38	35.67±28.46	28.91±25.67	20.26±25.39	11.15±23.55
	p	0.795		0.037; A,B>D			
RP	Me±SD	9.67±30.51	9.03±26.07	24.58±31.82	10.6±26.41	5.43±25.18	1.44±34.53
	p	0.669		0.082			
BP	Me±SD	22.22±26.68	15.87±25.03	20.63±32.57	22.22±28.07	19.01±22.65	16.24±27.07
	p	0.546		0.775			
GH	Me±SD	1.25±15.93	6.11±16.22	9±19.93	3.91±15.22	2.84±16.65	-3.46±8.75
	p	0.198		0.177			
VT	Me±SD	9.67±22.08	8.85±25.28	8.75±24.53	9.51±25.62	10.86±22.21	5.29±22.94
	p	0.505		0.944			

SF	Me±SD	5.66±28.65	1.74±26.42	10±28.82	-3.8±23.67	8.22±28.81	-0.96±28.62
	p	0.651		0.328			
RE	Me±SD	9.12±33.3	0.93±33.08	13.33±32.24	1.81±38.02	9.43±33.73	-6.41±21.01
	p	0.168		0.199			
MH	Me±SD	11.32±20.9	4.31±22.24	10.33±23.18	8.48±16.2	10.79±23.98	-0.38±20.86
	p	0.02 *		0.497			
HT	Me±SD	40.57±31.48	27.08±32.94	50±40.09	33.7±24.55	35.53±31.1	19.23±35.58
	p	0.078		0.105			
PCS	Me±SD	13.15±17.11	13.01±18.81	22.2±21.18	15.24±17.05	11.23±15.33	4.97±18.29
	p	0.738		0.114			
MCS	Me±SD	9.57±19.54	4.51±22.54	10.48±21.91	5.59±18.72	10.15±22.63	-0.14±17.26
	p	0.161		0.545			

p - Manna-Whitney U test * statistically significant variable (p<0,05)

Me±SD -mean and standard deviation, N -number of individuals, SF-36 - the quality-of-life questionnaire, PF - physical functioning, RP - role limitations due to physical problems, BP - bodily pain, GH - general health, VT - vitality, SF - social functioning, MH - mental health, RE - role limitations due to emotional problems, HT - health transition, PCS - physical component summary, MCS - mental component summary.

Table 4. Differences in quality of life according to the SF-36 in surveyed with regard to their BMI and with regard to prior rehabilitation of hip joints

Tabela 4. Różnice dotyczące poprawy jakości życia wg SF-36 wśród badanych pacjentów w zależności od BMI

SF 36		Hip joint rehabilitation prior to the surgery		BMI			
		Yes (N=39)	No (N=49)	Weight within the norm - (N=12)	Overweight - B (N=43)	Obesity - C (N=23)	II-degree obesity - D (N=11)
PF	Me±SD	25.77±30.9	23.16±21.79	26.25±18.6	20.47±25.63	21.09±30.52	39.55±25.05
	p	0.602		0.245			
RP	Me±SD	9.13±32.34	10.71±24.8	14.06±14.38	9.01±25.42	1.63±35.37	22.16±34.39
	p	0.807		0.126			
BP	Me±SD	24.92±29.56	15.42±22.77	12.04±19.8	16.53±27.12	18.36±25.43	42.42±19.13
	p	0.152		0.008 *, D>C,B,A			
GH	Me±SD	0.13±15.79	5.94±16.23	-5.42±12.15	7.74±14.74	1.74±19.05	-1.36±14.51
	p	0.013 *		0.083			
VT	Me±SD	8.33±26.84	9.57±20.18	4.17±14.19	8.28±24.31	12.23±28.17	13.07±15.92
	p	0.97		0.532			
SF	Me±SD	5.13±29.21	3.32±26.98	-3.12±16.96	2.03±27.27	3.26±32.9	21.59±22.42
	p	0.674		0.109			

RE	Me±SD	4.91±36.01	7.82±30.21	11.11±18.23	5.04±33.39	3.26±36.3	8.33±41.67
	p	0.557		0.682			
MH	Me±SD	6.67±23.82	9.8±20.02	2.5±17.25	8.26±23.04	10.22±22.44	12.27±19.41
	p	0.407		0.7			
HT	Me±SD	31.41±29.65	37.24±34.66	37.5±27.18	33.14±33.95	35.87±36.01	38.64±28.2
	p	0.439		0.939			
PCS	Me±SD	12.85±21.44	13.88±14.05	11.54±6.28	12.62±16.89	9.97±22.77	23.08±15.31
	p	0.555		0.115			
MCS	Me±SD	6.55±22.91	8.38±19.45	4.02±11.4	6.69±22.2	8.31±24.38	12.99±15.69
	p	0.715		0.607			

p - Manna-Whitney U test * statistically significant variable (p<0,05)

Me±SD -mean and standard deviation, N -number of individuals, SF-36 - the quality-of-life questionnaire, PF - physical functioning, RP - role limitations due to physical problems, BP - bodily pain, GH - general health, VT - vitality, SF - social functioning, MH - mental health, RE - role limitations due to emotional problems, HT - health transition, PCS - physical component summary, MCS - mental component summary.

Discussion

Improvement of quality of life understood as well-being, life satisfaction and contentment from daily functioning, which is a subjective assessment within cultural, social, and environmental contexts, is a difficult challenge which is taken up by therapeutic team [6, 7].

Author's own studies showed that higher education was completed by the least numerous group of surveyed (14.61%) while 42.7% had secondary education and 16.85% had primary education. Surprising as it may be, in individuals with higher education physical functioning (PF) improvement was substantially smaller than in ones with primary and secondary education. Studies of Majda A. et al. did not indicate the influence of level of education on patient's quality of life improvement after the procedure [9].

Majority of respondents described severity of experienced pain within the range from 7 to 10 which means that pain significantly affected their everyday life and well-being causing a deterioration in the quality of life. 76.40% of respondents used pain medication before the procedure; in Stanek J. et al. studies 73.3% of respondents used analgesia before the surgery, and after the procedure this percentage was reduced to 20.8% [2].

Author's own studies did not demonstrate a relationship between quality-of-life improvement and marital status, place of residence, prior prosthesis implementation and physical activity. Cukras et al. studies showed that recreational physical activity among patients after hip joint endoprosthesis was moderate [11]. While Majda A. et al. studies demonstrated that place of residence did not influence quality of life after the surgery [9]. Badura-Brzoza K. et al. in their studies did not demonstrate a link between quality of life and sociodemographic data such as sex, marital status, profession, concomitant diseases, level of education [12].

According to author's own studies quality of life in domains: physical functioning (PF), role limitation due to physical problems (RP), bodily pain (BP), vitality (VT), mental health (MH), health transition (HT), physical component summary (PCS) and mental component summary (MCS) was better after the surgery than prior to it. Similar results were obtained by Majda A. et al - comparison of the group before and after the endoprosthesis implementation indicated an improved quality of life in physical activity, vital energy, pain, and physical functioning spheres [9].

Quality of life improved both in women and men, however in the group of women to a greater extent. Similar results were obtained by Kunikowska B. et al. in their studies – patients after endoprosthesis implementation were surveyed and men rated their general condition as worse in comparison with women [14]. Łapaj Ł. et al. established that reduction of pain and increased level of independence were essential for quality-of-life improvement [15].

Greater improvement of mental health was noted among women than in case of men which might be caused by a worse evaluation of their disability status after the surgery. It was confirmed by Kunikowska B. et al. studies [16].

Author's own studies may lead to a conclusion that the surveyed functioned better after than prior to the surgery, both in mental (MCS) and physical capacity (PCS). Studies of Badura-Brzoza K. et al., conducted on a group of patients after hip joint endoprosthesis implementation, showed that patients experienced an improvement both in physical (PCS) and mental (MCS) functioning [12].

Majority of respondents were either overweight or obese which is an additional liability for the organism which might increase pain. It is a major issue because a tiniest movement might cause a paralyzing pain in the hip area which prevents day-to-day functioning. Author's own studies indicate that patients with second degree obesity improved in terms of bodily pain (BP) in comparison with other patients. However, Pop T. et al. established in their studies on patients after hip joint endoprosthesis implementation that high BMI did not influence return to professional and sports activities [17].

Conclusions

1. Patients showed an improvement in quality of life after endoprosthesis implementation compared to the period prior to the operation.
2. Significant influence on the surveyed' quality of life had the following sociodemographic factors: sex, age, and level of education. Older individuals achieved an improvement in physical functioning, women – in mental health, while ones with primary education – in the physical functioning domain.
3. Medical factors which influenced patient's quality of life after the hip joint endoprosthesis implementation were the severity of pain and BMI.
4. Patient's implementation of rehabilitation prior to the procedure significantly improved general health after the surgery.
5. The endoprosthesis implementation significantly improved pain in patients who experienced severe pain before the procedure – after the surgery they declared better quality of life, while individuals with second degree of obesity declared a significant improvement in bodily pain domain.

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