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Original article

Psychological and psychiatric factors related to health-related quality of life after total hip replacement – preliminary report

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Abstract

Abstract. – Total hip replacement is one of the most successful orthopaedic interventions in improving considerably the patients' performance, nevertheless some patients demonstrate declined functional ability following an operation. Such condition is not a consequence of medical illness or the surgery itself but might rather be associated with mental status. The authors conduct an investigation concerning the relation between some psychological and psychiatric factors and their influence on health-related quality of life in patients after total hip replacement.

Methods. – Into the study group we included 102 subjects undergoing total hip replacement (59 female, 43 male). In all subjects we measured depression (Beck Depression Inventory – BDI), anxiety (State and Trait Anxiety Inventory – STAI), sense of coherence (SOC-29), personality traits (Eysenck Personality Inventory – EPI) and health related quality of life (SF-36).

Results. – The postoperative values of the PCS and the MCS for the whole group of patients correlated negatively with the SOC values ($p = 0.04$ and $p = 0.03$ respectively). Neuroticism (EPI) and anxiety as a trait (STAI) were also associated with postoperative performance, both in mental ($p = 0.03$ and $p = 0.008$ respectively) and physical ($p = 0.005$ and $p = 0.04$ respectively terms).

Conclusion. – Total hip replacement improves significantly the patient's health-related quality of life at 6 months after surgery, what is influenced by sense of coherence, neuroticism and anxiety as a trait. Above mentioned factors should be taken into account when rehabilitation and social readaptation processes are planned.

Keywords: Anxiety; Depression; Personality trait; Sense of coherence; Health-related quality of life; Hip replacement

1. Introduction

Osteoarthritis is one of the leading causes of pain and disability in people after 50 years of age. Total hip replacement (THR) is one of the most successful orthopaedic interventions improving considerably the patients' performance. Nevertheless some patients demonstrate declined functional ability following the operation [25]. Such condition is not

Abbreviations: THR, total hip replacement; BDI, Beck Depression Inventory; STAI, State-Trait Anxiety Inventory; X1, level of anxiety as a state; X2, level of anxiety as a trait; SOC-29, sense of coherence questionnaire; SOC, sense of coherence; EPI, Eysenck Personality Inventory; E, extroversion subscale of Eysenck Personality Inventory; N, neuroticism subscale of Eysenck Personality Inventory; L, lie subscale of Eysenck Personality Inventory; HRQoL, health related quality of life; SF-36, health related quality of life questionnaire; BP, body pain; PF, physical functioning; RP, physical role limitation; RE, emotional role limitation; MH, mental health; SF, social functioning; VT, vitality; GH, general health; PCS, Physical Component Summary Scale; MCS, Mental Component Summary Scale.

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a consequence of medical illness or the surgery itself but might rather be associated with some psychological factors [26,28]. A successful surgical intervention is not a guarantee of a quick and effective recovery of the patient [35,38]. Some authors stress that negative effects like anxiety, depression and anger preceding the surgery could disturb the process of recovery. Such patients experience more pain and generally poorer performance [8,9,15,18]. It is important to recognise the influence of psychological state on preoperative and postoperative functional ability [11,12,22]. Increased awareness about unmet or unidentified psychiatric conditions could improve patient's surgical outcomes and may influence rehabilitation procedures and patient's health-related quality of life [6,8,23]. Health-related quality of life, or health status, is a broad concept representing individual responses to the physical, mental and social effects of illness on daily living, which influence the extent to which personal satisfaction with life circumstances can be achieved [4]. Disturbances in mental health may determinate physical health and social functioning and reduced health-related quality of life [12,16,35,36]. It is important in particular for those patients who need carefull care and not only surgical operation, in order to become really relieved of suffering [28]. Such patients may be characterised with specific personality traits. In many studies authors emphasise that personality traits moderate process of disease and recovery [1,10,13,19,21,24,30,37]. This process may also be moderated by some other psychological factors like sense of coherence (SOC) [17,20]. SOC is thought to be one of the active and strong individual resources in successful prevention of physical or psychological disturbances in stressful situation [2,3]. The sense of coherence is a pervasive and enduring, yet dynamic, feeling of confidence in life which in general is comprehensible, manageable and meaningful [2,3]. The increased sense of coherence would enhance a person's ability to resist physical and mental stress – factors which become particularly important during the period before and after surgery [2,3].

The aim of the study was to assess some psychological and psychiatric factors like anxiety, depression, sense of coherence and some traits of personality and the influence of those factors upon postoperative health-related quality of life in patients undergoing total hip replacement.

Identification of these associations is supposed to allow patients and their doctors to overcome some difficulties (especially connected with mental status) in rehabilitation and social readaptation process, and in this way may improve health-related quality of life.

2. Subjects and methods

2.1. Subjects

The study comprised patients undergoing THR surgery in the District Hospital of Traumatology and Orthopaedics Surgery in Piekary Śląskie, who met the enrolment criteria and were admitted to the hospital throughout year of 2002–2004.

The following inclusion criteria were assumed:

1. unilateral total hip replacement due to primary osteoarthrosis;
2. no previous hip surgery;
3. free of any psychiatric history (according to patients information and results of psychological examination before surgery);
4. compliance with the study requirements;
5. informed consent.

The research staff had identified patients meeting the eligibility criteria, who were then invited to participate. Power analysis showed that 50–60 subjects were needed, however, 189 eligible patients were asked to participate in this study in order to compensate for possible drop out. Of 189 eligible patients, 156 volunteered (84 females, 72 were males).

Questionnaires were delivered to the subjects 2 weeks before the surgery and 6 months after the operation (by mail). A total of 102 participants completed the postoperative questionnaires and mailed them to the study personnel. The final sample consisted of 102 subjects (59 females, 43 males), at the age range of 54–75 years (median age: 61 years).

3. Methods

The following Polish translations of the validated and reliable questionnaires were used to assess anxiety, depression, the sense of coherence, personality types and health-related quality of life:

1. To assess anxiety, the State-Trait Anxiety Inventory (STAI). It comprises 40 items. One half of them measure anxiety as a trait, whereas the remaining refers to anxiety as a state. Half of them (STAI-XI) measure state anxiety as transitory emotional state with subjective feelings of tension and apprehension and heightened autonomic nervous system activity, whereas the remaining (STAI-X2) consider anxiety, as a relatively stable individual trait in proneness to anxiety. For each scale the maximum score is 80 points with the minimum one of 20 [33,34].
2. To assess depression, the Beck Depression Inventory (BDI). It is commonly used – 21-item self-reported measure to assess common cognitive, affective and vegetative symptoms of depression. There are four self-evaluative statements reflecting the range of severity (0 – least severe, 3 – most severe) for each item. The scale has been well-validated and a score greater then 11 is considered to represent depressive symptoms. Score of 12–26 are indicative of mild, 27–49 moderate and 49 or greater of severe depressive symptoms [29].
3. Sense of coherence (SOC) – questionnaire was created by A. Antonovsky. It includes 29 questions, which allow evaluating the total sense of coherence and three components: comprehensibility, manageability and meaningfulness [3]. The respondents are asked to select answers on a seven-point semantic differential scale with two anchoring phrases. Low rating on the scale indicates low sense of coherence. The maximum score is 203 points

with the minimum one of 29. The items are related to the patient's feelings and experience.

4. Personality dimensions were measured by Eysenck Personality Inventory (EPI), consisting of 64 items. This questionnaire allows measuring two dimensions: the degree of extroversion (E) and the degree of neuroticism (N). There is also a built-in lie subscale (L) which was a measure of described manner of response to the self-report scale. In Eysenck's theory extroversion and introversion are associated with differences in excitation and inhibition processes in the nervous system. Extroverts tend to have a nervous system inhibiting quickly the excess stimulation, which allows then to tolerate intense social activity. Introvert nervous system does not tune to the excess stimulation and thus may easily be over stimulated. Neuroticism is associated with emotional arousal. Individuals with high neuroticism tend to be more worried, are more anxious and emotionally unstable than individuals showing low neuroticism, who are calm, unemotional and controlled [5,6,7,19,31,32].
5. To assess the health-related quality of life (HRQOL), SF-36 Health Status Questionnaire was used. This generic scale enables comparison of the life quality of patients suffering from various diseases. The scale contains 36 questions pertaining to eight domains of life: body pain (BP), physical functioning (PF), physical role limitation (RP), emotional role limitation (RE), mental health (MH), social functioning (SF), vitality (VT), general health (GH) and Physical Component Summary Scale (PCS) as well as Mental Component Summary Scale (MCS). PCS is an aggregate score to quantify how patients perceive the impact of their condition on the physical aspects of their daily routines. MCS score can describe the patients' mental status. The main reason to choose PCS and MCS as a dependent measure, instead of the eight SF-36 subscales, has been substantial reduction of the number of statistical analyses, without any clinical differences missed [14,27,36].

3.1. Statistical analysis

Statistical analysis was performed with Statistica 6.0 package (Statsof Inc., USA). For comparison of preoperative and postoperative questionnaire data Wilcoxon signed rank test was used. Anxiety and depression, SOC and other personality traits and their influence on the quality of life were included in a stepwise multiple linear regression analysis. *P* values below 0.05 were considered statistically significant.

This study was approved by Ethical Commission of Medical University of Silesia in Katowice.

4. Results

4.1. Anxiety and depression

4.1.1. Depression

Before surgery the participants scored 15.86 mean depression BDI score, while after surgery the reported mean score was 10.32 (Table 1). The mean score before surgery was significantly higher than one reported after surgery ($p = 0.003$).

4.1.2. Anxiety

Significantly higher levels of anxiety as a state (mean 47.9) were observed before surgery as compared to mean values after surgery (mean 41.1) ($p = 0.010$) (Table 1). STAI as a trait is stable – we analyzed it only before surgery. The mean level of anxiety as a trait before surgery was 46.5 (Table 1).

4.2. Sense of coherence

According to Antonovsky's theory, the personal sense of coherence is considered to be relatively constant during adulthood and suggested to remain stable over time, so we measure this value only before surgery. The mean SOC value for 102 patients before surgery was 132.03 points (Table 1).

4.3. Personality trait

Before surgery the participants' mean score on the neuroticism scale (N) was 10.0, with 9.07 for extraversion (E) and 9.51 on the lie scale (L). Personality traits are stable, so we have not repeated this tests after surgery (Table 1).

Table 1
Presurgery and postsurgery scores in used questionnaires in study group

	Two weeks presurgery			Six month postsurgery			*p*-value
	M ± SD	MD	25%–75%	M ± SD	MD	25%–75%	
SOC	132.03 ± 24.4	130.0	114.0–151.0	–			–
BDI	15.86 ± 15.6	14.0	6.0–20.0	10.32 ± 8.99	8.0	3.0–16.0	0.003
X1	47.9 ± 15.04	45.0	40.0–54.0	41.1 ± 10.9	41.0	32.0–47.0	0.010
X2	46.5 ± 14.1	47.0	39.0–52.0	–			–
N	10.0 ± 17.1	8.0	4.0–10.0	–			–
E	9.07 ± 14.04	8.0	6.0–10.0	–			–
L	9.51 ± 14.1	10.0	7.0–10.0	–			–

M – mean, SD – standard deviation, MD – median, SOC – sense of coherence, BDI – Beck Depression Inventory, X1 – anxiety as a state, X2 – anxiety as a trait, E – extroversion scale, N – neuroticism scale, L – lie scale.

4.4. Improvement in functioning

Patients reported improved score at the 6 month follow up in all SF-36 subscales and also in the PCS and MCS (Table 2).

4.5. Influence of psychological and psychiatric factors on postoperative outcome

The postoperative value of PCS ($p = 0.04$) and MCS ($p = 0.03$), for the whole group of patients, correlated significantly with SOC values. Therefore, the lower the sense of coherence, the more extensive the disability. Neurotism (N) was negatively associated with postoperative functioning in mental ($p = 0.03$) and physical dimension ($p = 0.005$). There were also negative correlations between anxiety as a trait (X2) and postoperative PCS ($p = 0.04$) and postoperative MCS ($p = 0.008$).

The MCS and PSC scores showed no significant differences with regard to depression, anxiety as a state and other traits of Eysenck Personality Inventory (Table 3).

There was no statistically significant differences between the final sample and the patients who dropped out (54 patients drop out; 23 females, 31 males, mean age 62 years).

5. Discussion

In our study patients showed reduced intensity of depression as well as of anxiety as a state (X1). We also noticed a great improvement in health-related quality of life. Many authors emphasise that preoperative anxiety and depression may influence postsurgery patients medical status [15,19,26]. Intensive preoperative anxiety and depression are the risk factors of postoperative emotional disturbances and may also produce a lower level of satisfaction with the treatment and disturb recovery phase [6,8,9,38]. Nevertheless Orbel et al. [26] in their study suggest that among patients after THR, social or personal factors are more likely to determine levels of depression mood than surgery procedures. In our study we do not observe any correlation between pre- and postsurgery depression and anxiety as a state and patients' postsurgery health-related quality of life. On the other hand anxiety as a trait and neuroticism measure by Eysenck Personality Inventory correlated negatively with postsurgical health-related quality of life in physical and mental dimension [1,10,13,24,36]. Some authors hypothesised that lack of health-related quality of life improvement after total hip replacement surgery can be related to specific personality traits. Ritter et al. [30] used in their study The Minnesota Multiphasic Personality Inventory and found that the women who did not respond positively to surgery had more physical symptoms, anxiety, depression, and difficulties in relating to people. In other studies authors suggest that high neuroticism score (measured by EPI) is associated with lower score on health-related quality of life scale [1,37]. Probably neuroticism is linked with psychiatric and somatic morbidity [24]. Neurotic individuals as well as the anxious ones, may present physical complaints in the absence of physical disease, they often have low self-estimation and insufficiency coping strategy in stressful situation. This trait could influence negatively the physical functioning after surgery and reduce the health-related quality of life [1]. On the other hand sense of coherence may be considered as protecting factor in stressful situation. Strong SOC means that environmental stimuli are experienced as comprehensible, manageable, and meaningful factors, more like information rather than noise [2,3]. Apparently, SOC shows clear impact upon response to stressful situation, such as chronic pain and disability in patients suffering from osteoarthritis or operative treatment of such disease. Our results showed that SOC values correlated significantly with the postoperative values of PCS and MCS for the whole group of patients [17]. Thus, the lower is the sense of coherence, the more extensive is the disability in physical and mental dimension. In this group of patients SOC may be considered as the one of the psychological factors to describe coping and adjustment. When under physical and psychological distress, patients with lower SOC have worse coping strategies and may suffer from anxiety and depression [20]. They also may stay longer in rehabilitation and because of this may have worse quality of life.

We conclude that total hip replacement improves significantly the patient health-related quality of life at 6 months after surgery, what is influenced by sense of coherence, neuroticism and anxiety as a trait. Above mentioned factors

Table 2
Presurgery and postsurgery SF-36 scores in study group

SF-36	Two weeks presurgery			Six month postsurgery			p-value
	M ± SD	MD	25%–75%	M ± SD	MD	25%–75%	
GH	48.1 ± 17.2	49.0	36.0–57.0	51.1 ± 19.9	54.0	40.0–60.0	0.041
PF	28.9 ± 18.5	27.0	12.0–39.5	52.3 ± 27.1	52.0	25.0–72.0	<0.001
RP	15.4 ± 28.6	0.00	0.00–00.0	44.2 ± 40.3	41.00	0.0–100.0	0.001
RE	40.1 ± 44.3	33.3	0.00–100	58.5 ± 44.7	42.3	0.00–100	0.04
SF	52.5 ± 23.7	50.0	37.5–75.0	69.7 ± 26.3	75.0	37. 5–87.5	<0.001
BP	20.1 ± 21.3	23.0	12.0–33.5	56.8 ± 26.5	58.0	41.0–74.0	<0.001
VT	48.8 ± 17.2	51.0	41.0–60.0	59.5 ± 17.2	62.0	44.0–70.0	<0.001
MH	59.1 ± 20.3	57.0	43.0–74.0	66.8 ± 18.1	69.0	53.0–84.0	0.002
PCS	28.7 ± 5.79	26.3	21.7–33.4	42.9 ± 8.6	39.9	31.7–49.8	<0.001
MCS	47.1 ± 10.4	44.0	37.0–56.6	53.1 ± 12.4	50.2	39.3–64.9	0.03

M – mean, SD – standard deviation, MD – median BP – body pain, PF – physical functioning, RP – physical role limitation, RE – emotional role limitation, MH – mental health, SF – social functioning, VT – vitality, GH – general health, PCS – Component Summary Scale, MCS – Mental Component Summary Scale.

Table 3
Regression equations at presurgery and postsurgery period in study group

	Two weeks presurgery				Six month postsurgery			
	PCS		MCS		PCS		MCS	
	$r^2 = 0.34$		$r^2 = 0.60$		$r^2 = 0.54$		$r^2 = 0.80$	
	p	*Beta*	*p*	*Beta*	*p*	*Beta*	*p*	*Beta*
SOC	ns	0.232	ns	0.397	0.04	−0.06	0.03	−0.127
STAI-X1	ns	0.393	ns	−0.173	ns	−0.326	ns	−0.273
STAI-X2	ns	−0.376	ns	0.007	0.04	0.345	0.008	−0.611
BDI	ns	−0.018	ns	−0.332	ns	0.061	ns	−0.151
N	ns	0.664	ns	−0.491	0.005	−0.731	0.03	−0.094
E	ns	−1.084	ns	0.495	ns	−0.413	ns	−0.159
L	ns	0.477	ns	0.150	ns	−0.241	ns	−0.235

PCS – Physical Component Summary Scale of SF-36, MCS – Mental Component Summary Scale of SF-36, SOC – sense of coherence, BDI – Beck Depression Inventory, X1 – anxiety as a state of STAI, X2 – anxiety as a trait of STAI, E – extroversion scale, N – neuroticism scale, L – lie scale of EPI, ns – statistically non-significant.

should be taken into account when rehabilitation and social readaptation processes are planned.

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