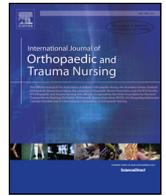




Contents lists available at ScienceDirect

International Journal of Orthopaedic and Trauma Nursing

journal homepage: www.elsevier.com/locate/ijotn

Expectations and depression in patients who have undergone total hip arthroplasty in Japan: A prospective cohort study

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ARTICLE INFO

Keywords:

Depression
Expectations
Fulfillment
Patient satisfaction
Total hip arthroplasty

ABSTRACT

Background: Patients with hip osteoarthritis may be severely depressed preoperatively due to pain and limited daily-living activities. Hence, evaluating their expectations preoperatively might underestimate their true hopes regarding the upcoming total hip arthroplasty (THA).

Aim: We aimed to assess changes in patients' level of depression, understand their expectations and fulfillment, and identify factors affecting fulfillment.

Method: We performed a longitudinal study of 366 Japanese patients who had undergone THA during 2005–2006. Those with THA of the contralateral hip were excluded. Patients' expectations, fulfillment, depression, and physical function were assessed preoperative and at 6 weeks and one year postoperatively using our own questionnaire, the Arthritis Impact Measurement Scale 2, and by the Oxford Hip Score. Logistic regression analysis was applied to identify independent predictors of expectation fulfillment.

Results: At 6 weeks, 78.1% expressed expectation fulfillment and drastic alleviation of depression. Preoperative depression and fulfillment of patient expectations at 6 weeks were significant predictors of expectation fulfillment at 1 year (95% confidence intervals: 1.01–2.48 and 2.30–9.92, respectively).

Conclusions: It is worthwhile for health providers to investigate patients' expectations early in the postoperative period by considering their preoperative depression to confirm fulfillment of expectations.

Introduction

Conservative treatments such as exercise therapy are being provided for osteoarthritis (OA) patients (Wainwright et al., 2016). When the conservative treatment is not effective total hip arthroplasty (THA), a cost-effective surgical procedure that alleviates hip joint pain and improves physical function, is performed (Räsänen et al., 2007). In previous studies, exploration of both short- and long-term recovery has been based on patient-reported outcomes using, for example, the Oxford Hip Score (OHS) and the THA patients' expressed satisfaction (Jones and Pohar, 2012; Naal et al., 2015). Despite the overall favourable results reflected in improved OHS and patient satisfaction (5), previous studies have estimated that 7%–15% of THA patients are dissatisfied postoperatively (Anakwe et al., 2011; Palazzo et al., 2014). Evidence suggests that the dissatisfaction is related to patients' expectations not being fulfilled (Harris et al., 2013). As fulfilled patient expectations lead to higher postoperative satisfaction (Palazzo et al.,

2014), it is important for healthcare providers to understand these expectations and aim to fulfill them (Ghomrawi et al., 2017).

A variety of high-level expectations, e.g., well-being, exercise, improved ability to walk, reduced pain, have been reported (Mancuso et al., 1997; Mancuso et al., 2003). Most studies have investigated total hip arthroplasty (THA) patients' expectations preoperatively. About 30% of patients with end-stage hip OA are severely depressed before their upcoming THA, with their overall mental health lower than the national standard because of chronic lower limb pain and restricted activities of daily living (Duivenvoorden et al., 2013; Lindner et al., 2018). Because depression is accompanied by loss of interest, among other symptoms (Nelson et al., 2018), evaluating the patients' expectations preoperatively might underestimate their true hopes regarding the surgical results. We found no previous studies that investigated patients' preoperative expectations while taking into consideration their preoperative symptoms of severe depression. Such a gap could preclude our understanding of the patient's real expectations.

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<https://doi.org/10.1016/j.ijotn.2019.07.004>

Received 26 March 2019; Received in revised form 24 June 2019; Accepted 8 July 2019

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Table 1
Coding for patient's preoperative expectations.

Category/Thematic Group	Subcategory/Patient Responses that fit Each Category (Examples)
Traveling	Traveling with husband/son/friends, going to foreign countries
Recreational activities/hobby	Hobbies, dinner parties with friends, outings with family, going to a museum
Exercise	Golfing, swimming, running, sports, dance, mountaineering, diving
Getting rid of a limp/locomotion	Being able to walk without a limp, improved locomotion, not requiring a cane
Work/employment	Going to work, normal workday, employment for monetary reimbursement
Pain-free	Pain relief, relief from nighttime pain, sleep/live without pain, eliminate the need for medications to alleviate pain
Housework	Taking care of the house, cleaning
Improved walking	Moving faster, walking straight, walking normally, walking at the same speed as my husband/friends
Care for others/social activities	Taking care of grandson/husband, participating in social activities, volunteering
Shopping	Doing my own shopping
Independence/absence of inconvenience	Being independent, do not want sympathy, self-reliance, not bothering others, I want to act alone
Driving	Driving car/riding a bicycle
Japanese lifestyle	Seiza (sitting on one's legs on the floor), sitting cross-legged, using Asian-style toilets (squat toilets)
Return to normal	Living a normal life as it was before onset of the disease
Removal of clothes	Improved ability to wear pants, improved ability to put on socks

Previous studies have assessed the fulfillment of expectations 1 year after THA (Neuprez et al., 2016; Scott et al., 2012). Pain-free and improved functioning of the lower limbs, the expectation of many patients, improved at the post-THA period of 6 weeks according to the Harris Hip Score (evaluated by health providers) and the Western Ontario and McMaster Universities Osteoarthritis Index, which is evaluated by the patients themselves (Holl et al., 2018). Because not only physical function but quality of life improves it is important to evaluate the fulfillment of expectations early postoperatively.

The Hospital for Special Surgery Hip Replacement Expectations Survey was recently developed to determine patients' expectations preoperatively (Mancuso et al., 1997, 2003). Despite abundant reports, these expectations have been studied only in Western countries, with a literature search identifying no studies in non-Western countries such as Japan. Common movements of people in Asian countries include floor-sitting and squatting, which require a greater range of motion than movements practiced commonly in Western populations (Hemmerich et al., 2006; Kobayashi et al., 2001; Mulholland and Wyss, 2001). The unique lifestyle in non-Western countries might be related to expectations and fulfillment of expectations. Because it would be difficult to measure such a parameter on existing scales, it is necessary to investigate fulfillment of expectations with open-ended questions.

Thus, we aimed to; (1) clarify the expectations of Japanese primary THA patients and compare their fulfillment at two postoperative points (6 weeks and 1 year); (2) investigate changes in symptoms of depression before and after THA; and (3) identify factors that affect fulfillment of expectation at 1 year postoperatively.

Methods

Study design and participants

We conducted a longitudinal study from January 2005 to October 2006. Patients included were; (1) those who underwent THA at the chosen study sites in Japan; (2) those who could understand and answer questions; (3) those who could consent to the study (aged ≥ 20 years). We excluded patients who had undergone THA on their contralateral hip during the study period. Patients were recruited from a university hospital in the Kyushu region. The orthopedic department of the target hospital performs > 500 THAs annually and has been using the multidisciplinary critical path for more than a decade. All surgical operations were performed by two orthopedic surgeons using a posterolateral approach.

Based on a previous study (Scott et al., 2012), a sample size of 366 was established to enable identification of statistically significant differences in the fulfillment of expectations of post-THA patients. With a sample size of 349 in each group, the power to detect type II error was

0.8, with an effect size of 0.15, at a significance level of 5% (G * Power 3.1.9.2 software, Germany).

Questionnaires

Patients were given the questionnaires approximately 2 days before the surgery and were asked to place the completed questionnaires in a collection box near the nurses' station. The postoperative questionnaires were mailed to the patients 6 weeks and 1 year after the THA.

Because the expectation was distorted by preoperative depressive symptoms, giving the possibility of underestimation, preoperative expectation was retrospectively evaluated at 6 weeks postoperatively. The fulfillment of those expectations and the patient's level of satisfaction were consequently assessed at 6 weeks and 1 year after THA. The depressive symptoms were also assessed preoperatively and at 6 weeks and 1 year postoperatively. We also assessed physical function and sociodemographic characteristics preoperatively and at 1 year. Information on the surgical procedure, diagnosis and postsurgical complications and comorbidities were obtained from the medical records.

Data collection

Expectations and fulfillment of expectations

Expectations and their fulfillment were assessed using a questionnaire developed by the authors. Patients were asked the following open-ended question regarding their expectations of the surgery: "What would you have done if your hip joint had improved before surgery?" Based on previous studies (Mancuso et al., 1997; Mancuso et al., 2003; Judge et al., 2011), patients' expectations were coded into groups with common themes (Table 1). For example, expectations expressed by a patient such as improved walking, reduced pain, and ability to do housework were counted as three different thematic expectations. Patients were also asked about the fulfillment of these expectations using the following question for each expectation: "After surgery, were your expectations fulfilled?" The patients rated their satisfaction along a six-point Likert scale (1 = extremely dissatisfied and 6 = extremely satisfied).

Depression

The Arthritis Impact Measurement Scales version 2 (AIMS2) is used to assess the impact of arthritis on health. In this study, the mood subscale was extracted and used. It comprises five items: "How often have you been in low or very low spirits?" or "How often did you feel that others would be better off if you were dead?" There are five possible response levels for each item (from 1 = Always to 5 = Never). The

average score of five items is then calculated. Lower mood scores indicate worse depressive symptoms. The Japanese version of the AIMS2 was validated in 2000 (Meenan et al., 1992; Sato et al., 2000).

Physical function

The Oxford Hip Score (OHS) comprises 12 items on physical function and pain. The total score ranges from 12 to 60, with higher scores indicating a lower health-related quality of life. The Japanese version of the OHS was validated in 2009 (Uesugi et al., 2009).

Sociodemographic characteristics

A preoperative questionnaire was used to obtain information about baseline demographic characteristics (e.g., sex, age, employment status, living arrangements). The surgical procedures, diagnosis, and post-surgical complications requiring treatment were obtained from the patients' medical records.

Statistical analyses

SPSS 24.0 for Windows (IBM, Armonk, NY, USA) was used for the statistical analyses. Continuous variables were presented as means ± standard deviation (SD), and categorical variables were presented as frequencies and proportions. For the univariate analysis, χ^2 and Fisher's exact were used for the comparison of categorical variables, and Wilcoxon signed-rank tests and Mann-Whitney U tests were used for the comparison of continuous variables (i.e., preoperative vs post-operative OHS and AIMS2 scores, with the medians compared). Fulfillment of expectations was dichotomized using the Likert scale scores into "Expectation unfulfilled" (1 = extremely dissatisfied to 3 = slightly dissatisfied) versus "Expectation fulfilled" (4 = slightly satisfied to 6 = extremely satisfied). Logistic regression analysis was performed to identify the independent predictors of the fulfillment of THA expectations so we could evaluate whether it is affected by pre-operative symptoms of depression. Factors to be included in the multivariate analysis were selected from the results of the univariate analysis and confirming colinearity. A significance level of 0.2 was used to include variables in the logistic regression model, and a level of 0.05 was used to determine the statistical significance in the final model (Neuprez et al., 2016).

Results

Patient characteristics

Fig. 1 shows the number of eligible patients and those who were excluded at each data collection point. The final study group included 366 patients who completed the questionnaire during each of the three periods. The patients were predominantly female (n = 317, 86.6%), and most of the patients were elderly (mean age 61.2 years). A total of 110 (30.1%) patients were employed. Most of the patients underwent THA for OA. Cementless surgery was undertaken for each THA, and major postsurgical complications were rare (Table 2).

Difference between the participants and dropouts

The baseline data for dropouts (n = 174, including the non-responders) were compared with those of the 366 participants. The mean age of dropouts was 58.9 years, which was 2 years younger than the participants (p = 0.81). The proportions of women in the two groups were comparable (85.5% of dropouts and 86.6% of participants, p = 0.73). Comorbidity rates did not differ significantly (p = 0.62). The complication rates (dislocation, deep vein thrombosis) for dropouts and participants were similar (0.6% and 1.1%, respectively; p = 1.14) (data not shown).

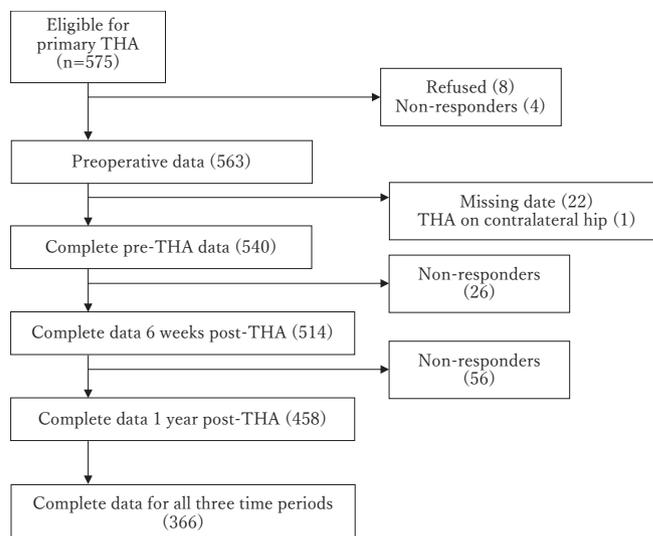


Fig. 1. Number of eligible subjects and number of subjects at each collection point.

Table 2 Demographic characteristics prior to total hip arthroplasty (N = 366).

Characteristic	Number	%
Gender		
Female	317	86.6
Mean age (SD, range)	61.2 years (9.7, 34–84)	
Diagnosis		
Osteoarthritis	355	97.0
Rheumatoid arthritis	6	1.6
Avascular necrosis	5	1.4
Postsurgical complication		
Dislocation	3	0.8
Deep vein thrombosis	1	0.3
Comorbidity		
Hypertension	58	15.8
Diabetes mellitus	13	3.6
Heart disease	12	3.3
Family living together		
Not alone	314	85.8
Employed		
Yes	110	30.1

SD, standard deviation.

Questionnaires

Expectations

Based on the common themes, patient expectations were grouped into 15 categories (Table 1). A high proportion of patients expected to participate in "traveling," "recreational activities/hobbies," and "exercise". Although the proportions were small, other categories included; "Japanese lifestyle" - items such as "seiza" (sitting on one's legs on the floor). The content of expectations varied. Expectations of the ability to participate in high-level activities were expressed — e.g., "traveling" and "exercises" to improve leg symptoms, including an improved ability to walk and reduced pain.

The average age of the participants was 61 years, which was used as the cutoff for "old." The numbers of expectations were compared in terms of age (Fig. 2). Older patients were more likely to expect to be able to "travel," participate in "recreational activities/hobbies", and experience "independence/absence of inconvenience" (P < 0.01, P < 0.01, and P = 0.03, respectively). Younger patients were more likely to expect to; "get rid of a limp/have improved locomotion" and "improved walking" (P < 0.01 and P = 0.03, respectively). A higher proportion of women than men expected to be able to "travel"

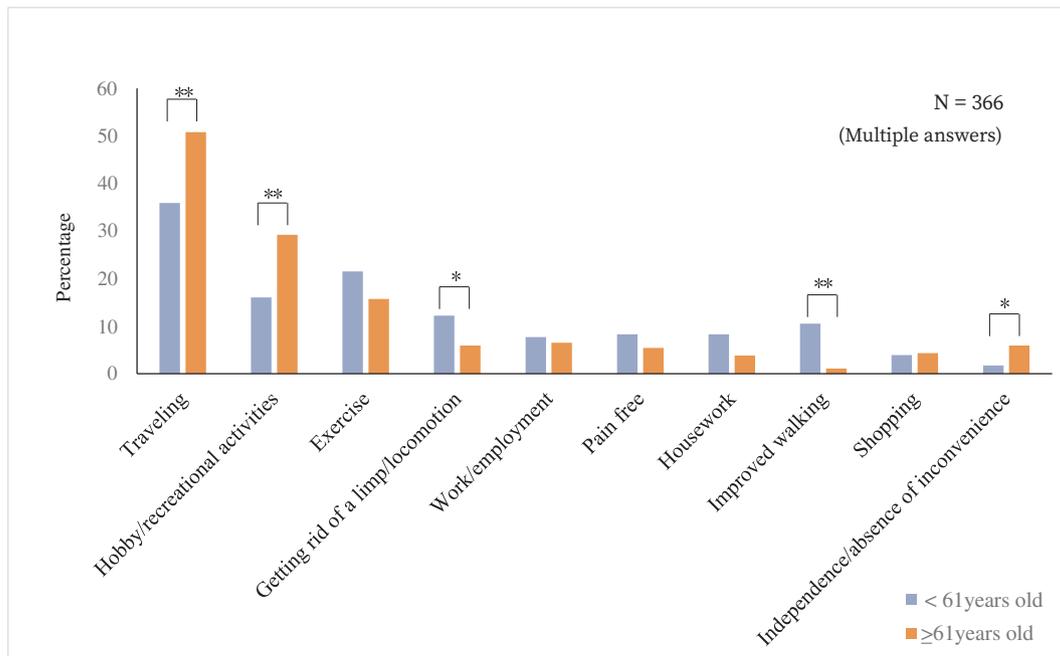


Fig. 2. Expectations stratified by age. *P < 0.05. **P < 0.01.

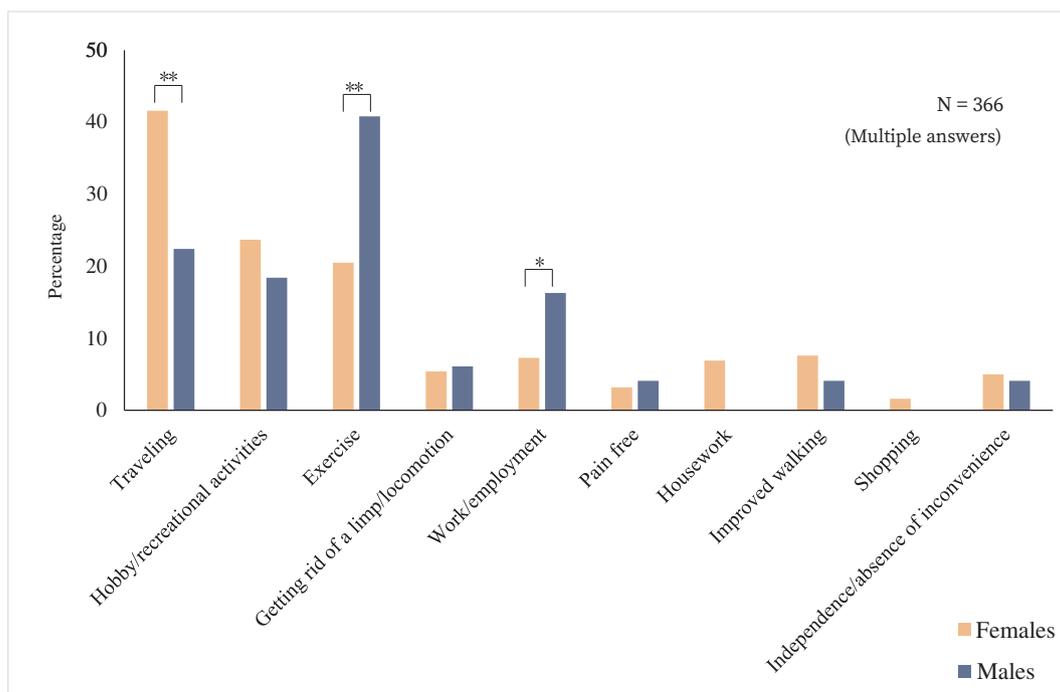


Fig. 3. Expectations stratified by sex. *P < 0.05. **P < 0.01.

(P = 0.01), and a higher proportion of men expected to be able to “exercise” and “work/be employed” (P = 0.02 and P = 0.05, respectively). None of the male patients expected to be able to do “housework” (Fig. 3).

Fulfillment of expectations

Altogether, 78.1% (n = 286) patients had their expectations fulfilled at postoperative week 6, indicating satisfaction at an early postoperative point. At 1 year after THA, 90.2% (n = 330) of patients had their expectations fulfilled. Both percentages are significantly high (P < 0.01) (Fig. 4).

Depression and physical function

The depression score was 3.2 ± 0.8 preoperatively but significantly improved to 4.1 ± 0.7 at 6 weeks and 4.4 ± 0.6 at 1 year after THA (P < 0.01). Using the average scores of the AIMS2 mood subscales, 36.3% (n = 133) of patients had depressive symptoms “very often” to “always” preoperatively. These numbers collectively decreased drastically to 3.8% (n = 14) at 6 weeks post-THA (Fig. 5). The OHS scores, reflecting the physical function of the hip joint, were 32.8 ± 8.6 preoperatively and 16.8 ± 5.2 at 1 year postoperatively, showing continuous improvement from preoperatively to 1 year postoperatively (P < 0.01).

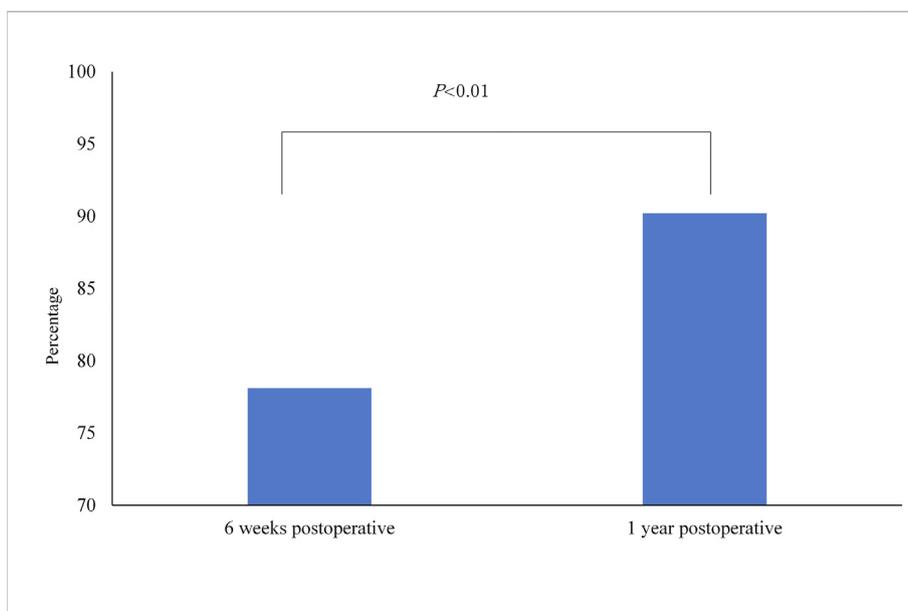


Fig. 4. Percentages of fulfilled expectations at 6 weeks and 1 year postoperatively.

Factors affecting the fulfillment of expectations

Independent variables were determined based on a univariate analysis (Table 3) and were then entered in a multivariate model (Table 4). For significant preoperative predictors, the odds ratios suggest that, for each point of improvement in the preoperative depressive symptoms scale, there was a 58% increase in the likelihood of fulfillment of expectations at 1 year postoperatively (confidence interval 1.01–2.48, $P = 0.04$). For significant preoperative and postoperative predictors, patients who had their expectations fulfilled at 6 weeks after surgery were four times more likely to have their expectations fulfilled at 1 year compared with patients with unfulfilled expectations at 6 weeks postoperatively (confidence interval 2.30–9.92, $P < 0.01$).

Discussion

The patients in this study had varying expectations, many of which were fulfilled at 6 weeks after THA. Preoperative depressive symptoms

and fulfillment of expectations at 6 weeks postoperatively were significant predictors affecting the fulfillment of expectations at 1 year after THA. The most important findings were that patients experiencing preoperative depressive symptoms had the expectation of being able to enjoy leisure time early postoperatively, and fulfilled it early postoperatively. The fulfillment expectations in the early postoperative period was useful for predicting fulfillment expectations at one year postoperative period.

Preoperatively, patients experienced depressive symptoms such as loss of interest, anxiety, and despair, according to the AIMS2 scale (Nelson et al., 2018). In such patients, it may be difficult to evaluate expectations preoperatively. Considering these preoperative depressive symptom, it was appropriate to evaluate the preoperative expectations retrospectively at 6 weeks postoperatively when symptoms had drastically decreased. The finding that 36% of patients had depressive symptoms preoperatively was similar to previous studies (Duivenvoorden et al., 2013). Patients might not be able to properly

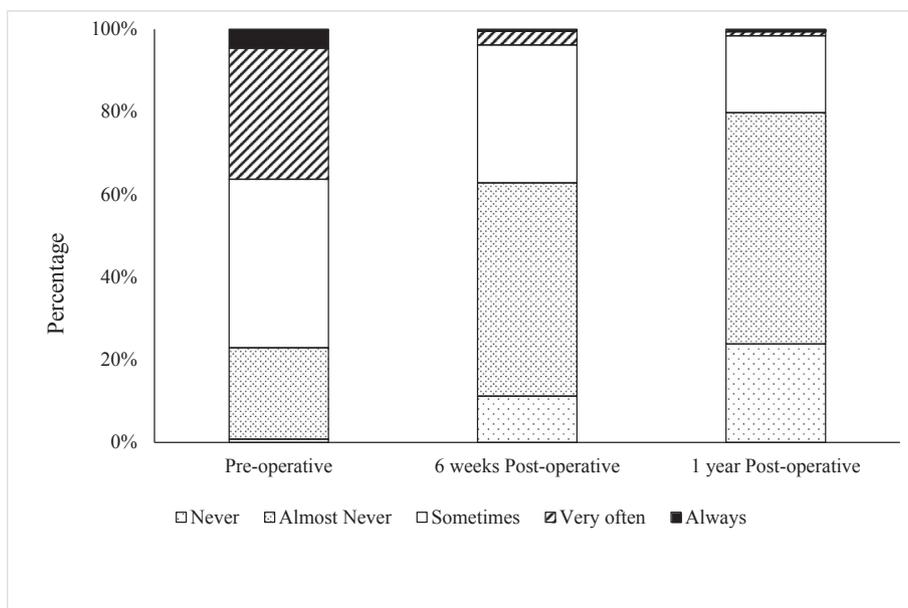


Fig. 5. Percentages of preoperative, 6-week, and 1-year-postoperative scores of the Arthritis Impact Measurement Scales version 2 (AIMS2) mood subscale.

Table 3
Univariate analysis of the factors associated with the fulfillment of expectations 1 year postoperatively.

Factor	Unfulfilled expectations		Fulfilled expectations		P
Sex ^b	No.	%	No.	%	
Female	28	(8.8)	289	(91.2)	0.12
Male	8	(16.3)	41	(83.7)	
Age (years) ^a					0.09
< 61	13	(7.2)	168	(92.8)	
≥ 61	23	(12.4)	162	(87.6)	
Diagnosis ^b					0.14
Osteoarthritis	32	(9.3)	313	(90.7)	
Other	4	(19.0)	17	(81.0)	
Comorbidities ^a					0.98
Yes	8	(9.8)	74	(90.2)	
No	28	(9.9)	256	(90.1)	
Living arrangements ^a					0.20
Not alone	28	(8.9)	286	(91.1)	
Alone	8	(15.4)	44	(84.6)	
Expectations fulfillment at 6 weeks ^a					< 0.01
Yes	17	(5.9)	269	(94.1)	
No	19	(23.8)	61	(76.3)	
Pre-Depression ^c	3.0	0.8	3.3	0.8	0.03
Pre-OHS ^c	34.1	1.40	32.6	0.47	0.31

OHS = Oxford Hip Score.

Results are given as the number (%) or the mean (SD).

Oxford hip score: higher scores indicate worse health.

Depression Questionnaire: lower scores indicate depressed mood.

^a X² test.

^b Fisher's exact test.

^c Mann-Whitney U test.

assess their expectations if they have mental health problems. Under-estimated expectations may impact on the outcomes of surgery due to low motivation in post-operative rehabilitation (Iversen et al., 1998). Healthcare professionals need to provide substantial education about the postoperative recovery process so that patients have realistic expectations before surgery.

The most frequently reported expectations included the ability to enjoy leisure activities, such as “traveling,” “recreational activities/hobbies”, and “exercise”. These expectations were more common than “improved walking” and “being pain-free.” Such findings are different from those reported in previous studies (Mancuso et al., 2009; Mancuso et al., 2003; Neuprez et al., 2016; Scott et al., 2012). Unlike primary OA, a diagnosis that calls for THA in Western countries (Khurana et al., 2015), in Japan, 80% of THAs are performed because of secondary OA due to congenital dislocation of the hip or developmental dysplasia of the hip (Hisatome et al., 2005; Jingushi et al., 2010). Such conditions result in long-term distress, inability to walk, and suffering (Roidis et al., 2013). The participants in this study reported moderate depressive symptoms prior to THA, which could have made it impossible for them to experience leisure for any length of time, so they had higher expectations of enjoying leisure activities postoperatively. The proportion of patients with expectations for “improved walking,” “being pain-free” and “getting rid of a limp/improved locomotion” in this

study was less than 10%. According to Holl et al., 6 weeks after THA is the time at which physical function improves and lower limb pain is reduced (Holl et al., 2018). We investigated preoperative expectations, but retrospectively surveyed these expectations at a time (6 weeks after THA) when physical function had already improved. The patients may have been unable to recall accurately their preoperative expectations, such as “I want to be pain-free.” It is, therefore, possible that the expectation of enjoying leisure was more important to them than that of greater walking ability or pain disappearance. In other words, it led to the expectation of advanced activities of daily living, which are more sophisticated activities beyond those necessary to live independently, not basic expectations such as walking ability and pain free (De Vriendt, Gorus, Cornelis et al., 2013).

Older patients were more likely to expect “independence/absence of inconvenience.” Elderly people in Japan have a strong desire to avoid being an annoyance to their families and others (Kayoko Furuta and Itoh, 2008). In this study, 85.8% of the patients were living with their families, and they worried about being a burden to the family because of their caretaking needs. This expectation represents the cultural characteristics of Japanese patients. A larger number of women had the expectation of performing “housework,” whereas a greater number of men had the expectation of “work/employment”, indicating their perceptions of the importance of fulfilling social roles. This reflects the traditional role division of labor in Japan. The employment rate of married women in Japan is extremely low (Gender Equality Bureau is a Cabinet Office in Japan), and women's social advancement in Japan is lower than that in other countries. Thus, women tend to take on traditional roles related to housework. Although low in number, the expectations included those pertaining to the “Japanese lifestyle”. These activities increase the risk of dislocation and other major complications in THA patients (Enocson et al., 2009; Fujita et al., 2014; Mulholland and Wyss, 2001; Satoh et al., 2009). Despite these risks, Japanese people commonly sit on the floor (Fujita et al., 2016). In China, patients rank squatting as one of the most important physical functions (Tang et al., 2014). Thus, the expectations of patients differ based on their lifestyle and culture. This suggests the need to develop useful measures to meet the expectations of THA patients in non-Western countries.

Our study showed that expectations were fulfilled at 6 weeks postoperatively in 78.1% of the THA patients. Mancuso et al. reported that 75% of patients had their expectations fulfilled at 4 years after surgery (Mancuso et al., 2009), and Scott et al. reported that 94% of patients had their expectations fulfilled at 1 year postoperatively (Scott et al., 2012). Thus, compared with the results of those previous studies, a higher proportion of our patients experienced fulfilled expectations at an earlier postoperative stage.

Preoperative depressive symptoms affected the fulfillment of expectations 1 year postoperatively, consistent with the findings of previous studies (Palazzo et al., 2014; Scott et al., 2012). Because the fulfillment of expectations at 1 year after THA is predicted by preoperative depressive symptoms, healthcare providers should not only provide interventions for physical symptoms, but monitor the patient's preoperative mental state as well.

The fulfillment of expectations at 6 weeks postoperatively is a

Table 4
Multivariate logistic regression analysis of the factors associated with the fulfillment of expectations at 1 year postoperatively.

Factor	Preoperatively		Preoperatively and postoperatively	
	OR (95% CI)	P	OR (95% CI)	P
Female sex	2.20 (0.90–5.34)	0.08	2.35 (0.92–6.01)	0.07
Age ≥ 61 years	0.72 (0.34–1.51)	0.38	0.74 (0.34–1.61)	0.44
Not alone	1.70 (0.70–4.20)	0.24	1.83 (0.72–4.64)	0.21
Pre-depression	1.58 (1.01–2.48)	0.04	1.42 (0.89–2.26)	0.14
Fulfillment of expectations at 6 weeks	–	–	4.78 (2.30–9.92)	< 0.01

CI, confidence interval; OR, odds ratio.

predictor of the further fulfillment of expectations at 1 year post-operatively. It is also well to note that the patient's postoperative satisfaction is associated with the fulfillment of expectations (Dorr and Chao, 2007). Thus, rather than waiting to assess the fulfillment of expectations at 1 year post-THA, the health provider should assess this outcome earlier during the postoperative period. If it is a case of unfulfilled expectations, the patient could be introduced to assistive devices and walking training, thereby at least partially fulfilling expectations.

The loss of participants in this study was 4.8% at the 6-week post-operative follow-up and 15.2% at 1 year, so the number of subjects was small (Hofstede et al., 2016). Because the study participants were selected from one institution, however, the study's external validity and generalizability could be questioned, which means that its applicability to other settings should be considered with caution. Therefore, non-Western countries should conduct more surveys of THA expectations, including preoperative ones.

Conclusion

While recognizing that patients with depressive symptoms may underestimate their expectations for the THA outcome, the patients of this study had preoperative expectations that included being able to enjoy leisure time postoperatively. Some aspects of the expectations of our Japanese patients for THA reflected the differing etiologies of hip OA in Japan compared with those of Western patients as well as differences in lifestyles and cultures. This study clarified that most of the patients' expectations were fulfilled early postoperatively, which was useful for predicting the same parameters 1 year postoperatively. Finally, our study suggests the need to; (1) assess patients' expectations while taking into consideration the influence of their preoperative depressive symptoms; (2) evaluate the fulfillment of expectations early during the postoperative period; and (3) develop a useful measure of this parameter for use in non-Western countries.

Conflicts of interest

There are no conflicts of interest to declare.

Funding

This work was supported by JSPS KAKENHI Grant-in-Aid for Scientific Research (C) 15K11756.

Ethics in publishing

The study design and procedures were approved by the ethics committee of Saga University (*Approval number*: No 17-30).

Acknowledgments

The authors are grateful to the THA patients and the healthcare providers at Saga University Hospital for their cooperation.

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