

Patient Expectations and Health-Related Quality of Life Outcomes Following Total Joint Replacement

Marta Gonzalez Sáenz de Tejada, BS,¹ Antonio Escobar, PhD,¹ Carmen Herrera, PhD,² Lidia García, BS,³ Felipe Aizpuru, MD,⁴ Cristina Sarasqueta, MD⁵

¹Hospital of Basurto, Bilbao, Spain; ²Hospital Virgen de las Nieves, Granada, Spain; ³Canary Islands Health Service, Santa Cruz de Tenerife, Spain; ⁴Hospital of Txagorritxu, Vitoria-Gasteiz, Spain; ⁵Hospital of Donostia, Donostia-San Sebastian, Spain

ABSTRACT

Objectives: Patient psychological factors have been linked to health-related quality of life (HRQoL) outcomes after total joint replacement (TJR). We evaluated the relationship between patient expectations before TJR, their fulfillment and HRQoL outcomes at 3 and 12 months after surgery.

Methods: Consecutive patients preparing for TJR of the knee or hip due to primary osteoarthritis in 15 hospitals in Spain were recruited for the study. Patients completed questionnaires before surgery, and 3 and 12 months afterward: five questions about expectations before surgery and their fulfillment at 3 and 12 months; three HRQoL instruments—Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), Short Form 12 (SF-12), and European Quality of Life Instrument (EQ-5D); as well as questions about sociodemographic information. Student's *t* test was used to assess the relationship between fulfillment of expectations and gains in HRQoL.

Results: A total of 881 patients took part in the study. Preintervention expectations for TJR ranged from 85% to 86% of patients, with high expectations for pain relief and ability to walk to 70% with high expectations about interacting with others. Patients who reported having fulfilled their expectations at 3 and 12 months had significantly greater gains in HRQoL than those who did not. Besides, we observed a statistically significant improvement in the percentage of patients who fulfill their expectations from 3 to 12 months.

Conclusions: Patients have high expectations for the benefits of TJR, and those who fulfill their expectations have greater gains in HRQoL assessed by SF-12, WOMAC and EQ-5D. Health-care providers should help their patients develop realistic expectations about the impact of TJR.

Keywords: health-related quality of life, osteoarthritis, patient's expectations, total joint replacement.

Introduction

Severe knee or hip osteoarthritis (OA) is an important cause of pain, disability, and loss of health-related quality of life (HRQoL) [1]. As these conditions become more common, because of the aging of the population and the growing prevalence of obesity and other risk factors [2], the demand for total joint replacement (TJR) will continue to increase [3]. In the United States, approximately 200,000 total hip replacements and 400,000 total knee replacements are currently performed each year [4]. Utilization of these procedures is projected to grow by 137% and 601%, respectively, between now and 2030 [5]. TJR is considered to be one of the most cost-effective operations performed [6–8], with well-documented improvements in HRQoL and patient benefits [9]. The increase in demand for TJR will create a growing burden in terms of work, resources, economics, time, and staffing for health services.

For any procedure and particularly for those that are widely utilized, patient outcomes should be rigorously assessed using validated tools to determine the success of the procedure from the patient's perspective. Most studies of joint replacement have traditionally done this using general HRQoL instruments such as the Medical Outcomes Study Short Form 36 (SF-36) as well as disease-specific instruments such as the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) that measure functional capacity, pain, and stiffness [1].

One variable that is gaining attention is the impact of patient expectations on HRQoL outcomes [10,11]. Patient expectations have generally been defined in terms of desires, needs, or requests

[12]. Other definitions differentiate between expectations and wants, such as the definition by Uhlmann et al. which describes patient expectations as anticipation that given events are likely to occur during, or as a result of, medical care, in contrast to patient desires, which reflect the patient's wishes that a given event occur [10,11]. One reason for the growing interest in the relationship between expectations and HRQoL outcomes after TJR is that patient psychological factors, such as expectations of outcome, have been found to be important contributors to the success of rehabilitation [13] and are linked to levels of postoperative pain and functional recovery [14,15]. Some studies have shown that expectations are related to outcomes of total joint arthroplasties [16], and that patient expectation of complete pain relief following total joint arthroplasty is an independent predictor of functional outcomes [10].

Some investigators explain the relationship between expectations and HRQoL outcomes in terms of education [17]. Others suggest that patient expectations are strongly influenced by the physician's expectations [18]. For TJR surgery, health professionals can play important roles in positively influencing patient expectations. Realistic expectations help patients develop attainable aims about their recovery and the support strategies to achieve them. Moreover, reaching realistic goals can improve self-esteem and self-efficacy, enabling the patient to achieve greater functional outcomes. A variety of studies have linked positive expectations with future good physical outcomes in populations such as students, heart surgery patients, and alcoholics. At the other end of the spectrum, patients with unrealistic expectations may become discouraged and fail to reach their maximum potential [12].

Therefore, it seems that the level of expectations that patients have about their recovery or clinical improvement can influence the reported outcomes, after receiving some type of clinical

Address correspondence to: Marta Gonzalez Sáenz de Tejada, Hospital de Basurto, Unidad de Investigación, Jado 4º Planta, Avda. Montevideo 18, 48013 Bilbao, Vizcaya, Spain. E-mail: marta.gonzalezsaenzdetejada@osakidetza.net

10.1111/j.1524-4733.2009.00685.x

intervention such as joint replacement. The goal of this study was to evaluate the relationship between patient expectations before TJR surgery, their fulfillment and patient-based HRQoL outcomes at 3 and 12 months after surgery.

Methods

This study was conducted in 15 hospitals from three regions of Spain: three in Andalusia, three in the Canary Islands, and nine in the Basque Country. The institutional review boards of each hospital approved the study.

Consecutive patients, scheduled to undergo primary TJR because of knee or hip OA in one of the participating hospitals between October 2005 and October 2006 and who received postoperative management in the hospitals, were eligible for the study. Patients with cancer or severe organic or psychiatric diseases were excluded because these conditions could prevent them from completing all the questionnaires included in the study.

All patients were sent a letter informing them about the study and asking for their voluntary participation. We mailed questionnaires to each patient three times: at baseline before surgery, 3 months after surgery, and again 12 months after surgery. Reminder letters were sent 15 days after each mailing to patients who had not replied promptly. The baseline questionnaire included items about expectations for the operation, along with the Short Form 12 (SF-12), WOMAC, and European Quality of Life (EQ-5D) questionnaires, plus questions requesting sociodemographic information like gender, age, hospital, weight and height (for the calculation of body mass index [BMI]). The 3- and 12-month mailings included the same questionnaires and instruments, but instead of asking for expectations, it included questions asking about whether the patient's expectations for the operation had been fulfilled.

The SF-12 is a generic instrument for measuring HRQoL [19]. Scores for the SF-12 scales range from 0 to 100, with a higher score indicating better health status. There are two summary scores: the physical component summary (PCS) and the mental component summary (MCS). The SF-12 has been translated and validated in Spanish populations, and the measurement properties were published elsewhere [20].

The WOMAC is a disease-specific, self-administered questionnaire developed to study patients with hip or knee OA [21]. It has a multidimensional scale made up of 24 items grouped into three dimensions: pain (5 items), stiffness (2 items), and physical function (17 items). Scores range from 0 (none) to 4 (extreme). The data were standardized to a range of values from 0 to 100, where 0 represents the best health status and 100 the worst. The WOMAC has been translated and validated in Spanish populations [22,23].

The EQ-5D is an instrument that derives a single index for HRQoL from five dimensions of health [24]. This self-administered questionnaire has two sections. The first part ("social rates") consists of five questions covering the dimensions of mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. The second part consists of a 20 cm vertical visual analog scale (VAS) ranging from 0 to 100. Two social rates derive from the five questions: temporal equivalence (TE), useful for temporal comparison; and VAS rates to transversal comparison between samples. It has been translated and validated in Spanish populations [25].

Questions in the baseline survey regarding patients' preoperative expectations for TJR covered five main areas: pain relief, improved ability to perform daily activities, improved ability to walk, improved ability to interact with others, and improved psychological well-being [26]. Responses were graded on a

5-point Likert scale: no expectations; few expectations; some expectations; many expectations, and very high expectations. Responses to the preintervention questions about expectations were highly skewed, so we combined the three lowest groups ("no expectations," "few expectations," and "some expectations") into a "few" expectations group. For example, the response distribution for the preintervention expectation of pain relief was 0.4% for "no expectations," 2.3% for "few expectations," 10.9% for "some expectations," 34.6% for "many expectations," and 51.8% for "very high expectations." These responses were categorized into three groups with this distribution: few expectations, 13.6%; many expectations, 34.6%; and very high expectations, 51.8%.

To assess the fulfillment of expectations following surgery, the questionnaires mailed 3 and 12 months after surgery included questions to gauge if the outcomes patients' experienced were what they expected. These questions were: "Did the treatment relieve my pain?," "Can I do more daily activities now than before surgery?," "Has my ability to walk improved since having surgery?," "Has my ability to interact with others improved since having surgery?," and "Has my psychological well-being improved since having surgery?" Responses were graded on a 5-point Likert scale (no; a little; some; many; a lot). Responses were dichotomized into "fulfilled expectations" (FE) or "unfulfilled expectations" (UFE). Depending if their responses at 3 and 12 months post surgery, were equal or higher than they expected before surgery (FE) or were lower than their expected (UFE). For instance, a patient who had "many expectations" in the baseline survey has fulfilled their expectations if he answers many or a lot in the follow-up survey, and he has not fulfilled their expectations; if he answers no, a little or some in the follow-up survey.

Statistical Analysis

Descriptive data are expressed as percentages and means with standard deviations. Analysis of variance (ANOVA) with Scheffé's test for multiple post hoc comparisons was used to assess the differences in HRQoL among the response options of the five expectation items before TJR surgery. We used the Chi-square test to compare proportions.

We used the Student's *t* test to evaluate the relationship between the fulfillment of expectations at 3 and 12 months after surgery and corresponding gains in HRQoL.

Dependent variables were changes in the three scale scores of the WOMAC (pain, stiffness, and physical function), in the two scale scores of the SF-12 (PCS and MCS), and in the two scale scores from the EQ-5D (TE and VAS). Independent variables were the five expectation items before surgery and the fulfillment of these expectations 3 and 12 months after surgery. Changes in HRQoL were calculated by the difference in the scores of the WOMAC, SF-12, and EQ-5D between baseline and 3 months and baseline and 12 months.

Effects were considered significant with $P < 0.05$. All statistical analyses were performed using SPSS (SPSS Inc., Chicago, IL) version 14.0.

Results

A total of 1658 patients on waiting lists for TJR who fulfilled the inclusion criteria and were not excluded by the exclusion criteria agreed to participate in the study and completed the baseline questionnaire before surgery. After the intervention, 896 (54%) completed the follow-up questionnaire at 3 months and 881 (53.1%) completed the follow-up questionnaire at 12 months. This sample composed by 881 patients is the sample included in this study.

Table 1 Baseline characteristics of responders and nonresponders to the 12-month follow-up questionnaire

Variables	Responders (n = 881)	Nonresponders (n = 777)	P-value
Age in years: mean (SD)	68.28 (9.85)	68.72 (9.61)	0.391
Joint: hip: n (%)	359 (55.6%)	287 (44.4%)	0.068
Gender: female: n (%)	520 (51.1%)	497 (48.9%)	0.084
BMI: mean (SD)	29.34 (4.59)	29.98 (4.73)	0.010
WOMAC: mean (SD)			
Pain	55.27 (18.16)	58.59 (19.56)	<0.001
Stiffness	57.04 (24.13)	60.66 (24.48)	0.003
Function	62.64 (17.20)	66.59 (17.27)	<0.001
SF-12: mean (SD)			
PCS	28.81 (7.08)	29.66 (7.43)	0.694
MCS	43.28 (14.23)	41.20 (14.36)	0.008
EuroQol: mean (SD)			
EQ-VAS	0.439 (0.216)	0.424 (0.229)	0.185
EQ-5D	0.378 (0.341)	0.351 (0.363)	0.113
Expectation items			
Relieve Pain: n (%)			
Few	40 (4.7%)	58 (7.5%)	0.007
Many	240 (28.0%)	245 (31.7%)	
Very high	576 (67.3%)	470 (60.8%)	
Daily activities: n (%)			
Few	95 (11.0%)	112 (14.5%)	0.106
Many	396 (45.9%)	343 (44.4%)	
Very high	372 (43.1%)	318 (41.1%)	
Ability to walk: n (%)			
Few	34 (3.9%)	45 (5.8%)	0.002
Many	292 (33.7%)	311 (40.3%)	
Very high	540 (62.4%)	416 (53.9%)	
To interact with others: n (%)			
Few	162 (19.2%)	172 (22.8%)	0.030
Many	317 (37.6%)	304 (40.3%)	
Very high	363 (43.1%)	278 (36.9%)	
Psychological well-being: n (%)			
Few	108 (12.9%)	108 (14.5%)	0.651
Many	337 (40.4%)	301 (40.3%)	
Very high	389 (46.6%)	337 (45.2%)	

BMI, Body Mass Index; EQ-5D, European Quality of Life instrument; MCS, mental component summary of the SF-12; PCS, physical component summary of the SF-12; SF-12, Short Form 12; VAS rates, to transversal comparison between samples of the EQ-5D; WOMAC, Western Ontario and McMaster Universities Osteoarthritis Index.

The mean age was 68.50 years (SD = 9.74), 61.5% were women, 39.0% underwent total hip replacement and 61.0% total knee replacement, and the mean BMI was 29.63 (SD = 4.67). Other HRQoL baseline data, as well as a comparison with the data from nonresponders, are included in Table 1. Nonresponders had slightly worse scores in the three WOMAC dimensions and in the MCS of the SF-12 than responders. In the relieve pain, ability to walk, and to interact with others items, there were baseline statistically significant differences between responders and nonresponders. Responders had higher expectations than nonresponders.

Patients' preoperative expectations were quite high, as can be seen in Fig. 1. If we take into account the "many expectations" and "very high expectations," the areas in which patients had the highest expectations were pain relief and improved ability to walk after surgery, with 95.3% and 96.1%, respectively, responding that they had many or very high expectations for improvement. They were followed closely by doing more daily activities (89.0%), improved psychological well-being (87.0%), and improved capacity to interact with others (80.7%).

Association between expectations and gender, age or geographical areas was analyzed. There were statistically significant differences between expectations groups of the five items depending on the age; the lower expectations, the older they were. In the same way, patients show baseline differences depending on gender; men had higher expectations than women as for relieve pain, daily activities, and to interact with others. Lastly, depending on geographical area, it had found statistically significant differences in baseline expectations about relieve pain; in one geographical area there were higher expectations about intervention relieving their pain.

ANOVA was used to assess the baseline differences in HRQoL among the three response categories (few, many, very high) of the five expectation items before the intervention (Table 2). For expectations about pain relief and daily activities, this analysis showed statistically significant differences in MCS (SF-12) dimension. With regard to the expectation about the

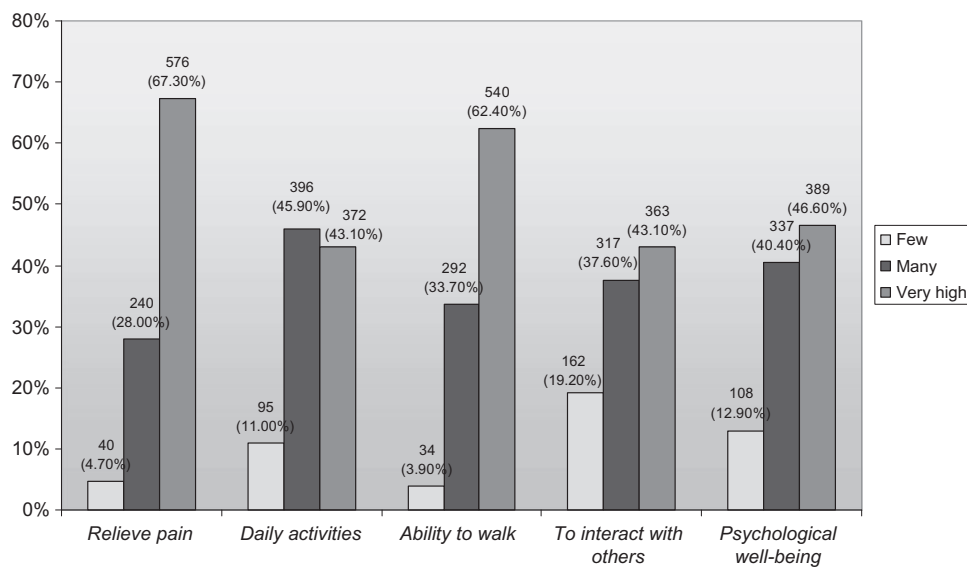


Figure 1 Preintervention expectations about the benefits of total joint replacement (N = 881). The sample size used to generate this figure was N = 881.

Table 2 Baseline mean (SD) HRQoL scores among the three categories of preintervention level of expectations

Expectations items	WOMAC			Function	PCS	SF-12	MCS	VAS	EQ-5D	TE
	Pain	Stiffness	Function							
Relieve pain: mean (SD)										
Few, n = 40 (a)	56.58 (20.58)	59.18 (26.53)	65.78 (18.91)	31.14 (7.19)	40.58 (14.17)	0.454 (0.248)	0.395 (0.377)			
Many, n = 240 (b)	56.08 (18.21)	56.72 (24.00)	64.51 (15.72)	29.78 (7.24)	40.87 (13.38) c	0.436 (0.222)	0.375 (0.347)			
Very high, n = 407 (c)	57.41 (18.97)	59.95 (24.24)	64.75 (17.69)	29.56 (7.24)	43.08 (14.68) b	0.425 (0.219)	0.354 (0.349)			
P-value	0.430	0.054	0.801	0.195	0.022	0.364	0.363			
Daily activities: mean (SD)										
Few, n = 95 (a)	55.59 (19.99)	57.59 (26.38)	64.18 (18.62)	30.34 (7.35)	38.58 (13.64) bc	0.430 (0.241)	0.356 (0.382)			
Many, n = 396 (b)	56.99 (18.28)	59.05 (23.51)	64.55 (16.13)	29.79 (7.32)	42.18 (13.79) a	0.443 (0.222)	0.383 (0.344)			
Very high, n = 372 (c)	57.27 (19.19)	59.27 (24.54)	65.00 (18.00)	29.46 (7.12)	43.37 (14.93) a	0.417 (0.215)	0.343 (0.348)			
P-value	0.529	0.678	0.799	0.382	0.001	0.097	0.101			
Ability to walk: mean (SD)										
Few, n = 34 (a)	59.62 (22.28)	57.44 (26.52)	66.50 (22.16)	30.68 (7.31)	38.18 (13.55)	0.427 (0.258)	0.347 (0.393)			
Many, n = 292 (b)	54.96 (18.04) c	57.32 (24.01)	63.11 (16.52) c	29.93 (7.46)	41.82 (13.81)	0.442 (0.220)	0.383 (0.346)			
Very high, n = 540 (c)	57.78 (19.04) b	59.98 (24.41)	65.36 (17.30) b	29.50 (7.08)	42.92 (14.65)	0.424 (0.218)	0.352 (0.348)			
P-value	0.007	0.097	0.027	0.343	0.035	0.278	0.233			
To interact with others: mean (SD)										
Few, n = 162 (a)	54.74 (18.81) c	56.96 (23.87) c	63.99 (17.55)	30.71 (7.64) c	39.98 (13.75)	0.440 (0.232)	0.380 (0.365)			
Many, n = 317 (b)	57.09 (18.04)	57.44 (24.16) c	64.29 (15.99)	29.50 (7.16)	42.49 (13.88)	0.440 (0.216) c	0.379 (0.338) c			
Very high, n = 363 (c)	57.93 (19.73) a	61.70 (24.25) ab	65.51 (18.24)	29.21 (6.89) a	42.54 (14.81)	0.409 (0.218) b	0.328 (0.353) b			
P-value	0.042	0.002	0.314	0.017	0.033	0.024	0.016			
Psychological well-being: mean (SD)										
Few, n = 108 (a)	53.51 (18.46) c	58.62 (23.63)	62.59 (18.12) c	30.73 (7.66)	43.09 (14.59)	0.462 (0.243) c	0.405 (0.379) c			
Many, n = 337 (b)	56.28 (18.37) c	56.29 (23.97) c	63.25 (16.18) c	29.61 (7.18)	42.42 (13.61)	0.442 (0.215) c	0.385 (0.338) c			
Very high, n = 389 (c)	58.96 (19.18) ab	61.81 (24.55) b	66.79 (17.71) ab	29.39 (6.95)	41.35 (14.69)	0.399 (0.214) ab	0.313 (0.348) ab			
P-value	<0.001	<0.001	<0.001	0.092	0.255	<0.001	<0.001			

Note: Boldfaced letters indicate statistically significant differences among the marked groups. For example, (ab) in group (c) means that group (c) is different from groups (a) and (b). EQ-5D, European Quality of Life instrument; HRQoL, health-related quality of life; MCS, mental component summary of the SF-12; PCS, physical component summary of the SF-12; SF-12, Short Form 12; WOMAC, Western Ontario and McMaster Universities Osteoarthritis Index.

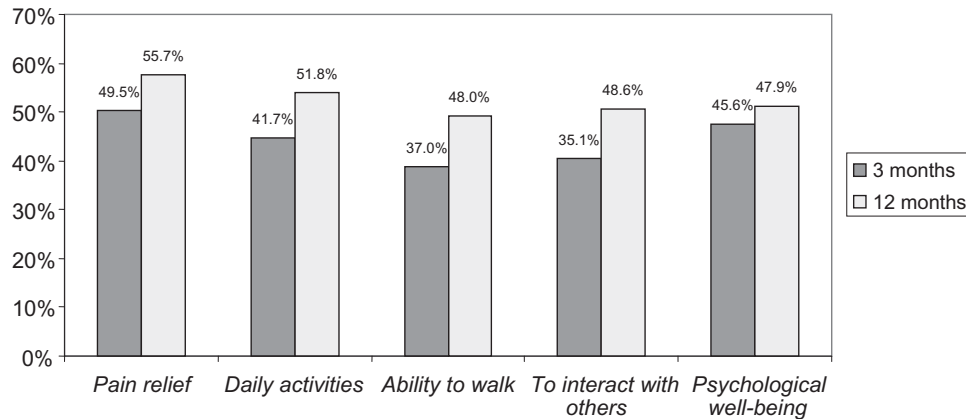


Figure 2 Percentage of patients who reported that total joint replacement had fulfilled their expectations at 3 and 12 months after surgery. Differences between 3 and 12 months in all expectations were statistically significant ($P < 0.001$).

ability to walk, there were statistically significant differences in three dimensions: pain, function (WOMAC), and MCS (SF-12). Finally, for expectations about to interact with other and psychological well-being, nearly all HRQoL dimensions were statistically significant different, apart from functional dimension (WOMAC) for to interact with others and the two dimensions of the SF-12 for expectations about psychological well-being. In general, for these two questions, the higher the expectations, the worse the HRQoL scores.

The percentages of patients who fulfilled their expectations by item and period of time are shown in Fig. 2. At 3 months, less than 50% of patients overall had fulfilled their expectations: 49.5% for pain relief, 45.6% for improved psychological well-being, 41.7% for improved daily activities, 37.0% for improved ability to walk, and 35.1% for improved interactions with others. These increased slightly at 12 months: 55.7% for pain relief, 51.8% for improved daily activities, 47.9% for improved psychological well-being, 48.6% for improved interactions with

others, and 48.0% for improved ability to walk. Although the increases were not large, the differences between 3 and 12 months were statistically significant in all the expectation items ($P < 0.001$). When the percentage of patients with FE at 3 and 12 months was analyzed, statistically significant differences by joint in all of the expectation items could be observed at 3 months, except for ability to walk; however, at 12 months, it could only see statistically significant differences by joint about psychological well-being.

Patients whose preintervention expectations were fulfilled experienced significantly greater gains in HRQoL 3 months after surgery in virtually every domain in four of the five items than those who did not fulfill their expectations (Table 3). The only item where there were no significant differences in the pain ($P = 0.502$), VAS ($P = 0.727$), and TE ($P = 0.466$) dimensions was in the item to interact with others.

At 12 months after surgery, the differences in HRQoL among patients with FE and UFE had been largely sustained, and in

Table 3 Gains in HRQoL 3 months after surgery by fulfillment of preintervention expectations

Expectations items	WOMAC: mean (SD)			SF-12: mean (SD)		EQ-5D: mean (SD)	
	Pain	Stiffness	Function	PCS	MCS	VAS	TE
Pain Relief							
FE, n = 400	37.53 (22.35)	34.33 (29.35)	37.44 (21.17)	9.11 (11.13)	7.25 (15.72)	0.288 (0.263)	0.386 (0.376)
UFE, n = 438	26.65 (22.37)	19.66 (30.07)	25.23 (21.82)	3.65 (9.50)	3.10 (15.20)	0.166 (0.260)	0.247 (0.381)
P-value	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001
Daily Activities							
FE, n = 324	35.67 (21.89)	33.23 (29.46)	35.91 (21.80)	9.89 (11.76)	7.06 (15.99)	0.286 (0.263)	0.372 (0.367)
UFE, n = 492	30.06 (22.84)	23.31 (30.93)	28.55 (21.58)	4.27 (9.14)	4.05 (15.14)	0.198 (0.251)	0.293 (0.374)
P-value	0.001	<0.001	<0.001	<0.001	0.025	<0.001	0.003
Ability to walk							
FE, n = 296	36.56 (22.39)	33.14 (30.16)	37.56 (21.14)	10.83 (11.10)	7.73 (16.69)	0.304 (0.251)	0.395 (0.350)
UFE, n = 538	29.74 (22.57)	24.13 (30.06)	27.94 (21.64)	4.27 (9.21)	3.73 (14.62)	0.189 (0.260)	0.280 (0.383)
P-value	<0.001	<0.001	<0.001	<0.001	0.003	<0.001	<0.001
Interact with others							
FE, n = 269	33.38 (21.37)	30.64 (28.38)	33.58 (21.17)	8.04 (11.51)	7.94 (14.66)	0.243 (0.267)	0.318 (0.367)
UFE, n = 475	32.23 (22.99)	25.85 (32.37)	30.15 (22.55)	5.93 (9.66)	4.78 (15.73)	0.236 (0.258)	0.339 (0.379)
P-value	0.502	0.044	0.043	0.026	0.025	0.727	0.466
Psychological well-being							
FE, n = 343	36.01 (22.27)	31.95 (29.79)	36.38 (21.22)	8.69 (11.54)	8.27 (15.21)	0.284 (0.262)	0.373 (0.368)
UFE, n = 443	29.75 (22.43)	24.32 (30.74)	27.60 (21.90)	4.84 (9.04)	3.66 (15.56)	0.200 (0.254)	0.297 (0.377)
P-value	<0.001	0.001	<0.001	<0.001	0.001	<0.001	0.005

EQ-5D, European Quality of Life instrument; FE, fulfilled expectations; HRQoL, health-related quality of life; MCS, mental component summary of the SF-12; PCS, physical component summary of the SF-12; SF-12, Short Form 12; TE, temporal equivalence of the EQ-5D; UFE, unfulfilled expectations; VAS rates, to transversal comparison between samples of in the EQ-5D; WOMAC, Western Ontario and McMaster Universities Osteoarthritis Index.

Table 4 Gains in HRQoL 12 months after surgery by fulfillment of preintervention expectations

Expectations items	WOMAC: mean (SD)			SF-12: mean (SD)		EQ-5D: mean (SD)	
	Pain	Stiffness	Function	PCS	MCS	VAS	TE
Pain relief							
FE, n = 461	42.52 (21.81)	41.05 (28.41)	43.09 (20.90)	13.79 (12.07)	7.22 (14.57)	0.351 (0.259)	0.437 (0.360)
UFE, n = 366	30.21 (22.79)	26.89 (30.33)	28.91 (22.53)	6.04 (10.08)	4.41 (15.24)	0.217 (0.254)	0.311 (0.375)
P-value	<0.001	<0.001	<0.001	<0.001	0.033	<0.001	<0.001
Daily activities							
FE, n = 426	41.32 (21.81)	40.32 (29.04)	42.88 (21.11)	13.74 (12.12)	8.08 (14.76)	0.348 (0.257)	0.437 (0.355)
UFE, n = 397	33.28 (22.95)	29.51 (30.15)	30.97 (22.28)	7.65 (10.67)	4.10 (14.85)	0.237 (0.261)	0.327 (0.380)
P-value	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001
Ability to walk							
FE, n = 395	41.51 (21.29)	40.42 (27.15)	42.43 (19.45)	14.58 (11.75)	7.32 (14.72)	0.346 (0.254)	0.420 (0.346)
UFE, n = 428	33.00 (23.51)	29.68 (31.68)	31.58 (23.93)	7.50 (10.97)	5.33 (15.05)	0.244 (0.268)	0.346 (0.391)
P-value	<0.001	<0.001	<0.001	<0.001	0.128	<0.001	0.004
To interact with others							
FE, n = 391	41.07 (22.22)	38.82 (29.34)	40.95 (21.69)	12.78 (12.57)	7.65 (14.49)	0.325 (0.272)	0.406 (0.376)
UFE, n = 384	33.97 (22.22)	31.68 (30.09)	33.14 (22.92)	9.51 (11.09)	5.62 (15.03)	0.273 (0.260)	0.370 (0.370)
P-value	<0.001	0.001	<0.001	0.002	0.125	0.007	0.185
Psychological well-being							
FE, n = 375	41.98 (21.42)	40.95 (26.95)	42.40 (20.12)	13.84 (12.39)	7.61 (14.10)	0.337 (0.258)	0.425 (0.352)
UFE, n = 397	33.28 (23.17)	29.90 (31.25)	32.08 (23.57)	8.01 (10.79)	5.50 (15.66)	0.265 (0.266)	0.363 (0.385)
P-value	<0.001	<0.001	<0.001	<0.001	0.114	<0.001	<0.001

EQ-5D, European Quality of Life instrument; FE, fulfilled expectations; HRQoL, health-related quality of life; MCS, mental component summary of the SF-12; PCS, physical component summary of the SF-12; SF-12, Short Form 12; TE, temporal equivalence of the EQ-5D; UFE, unfulfilled expectations; VAS rates, to transversal comparison between samples of the EQ-5D; WOMAC, Western Ontario and McMaster Universities Osteoarthritis Index.

many cases improved (Table 4). In the five items, all domains had significantly improved except the question regarding the ability to interact with others, where only the MCS ($P = 0.13$) and TE ($P = 0.19$) remained unchanged. Besides, no difference was seen for the MCS among the questions ability to walk ($P = 0.13$) and psychological well-being ($P = 0.11$). As shown in Fig. 2, there was a significant increase ($P < 0.001$) in the percentage of patients who fulfilled their expectations from 3 to 12 months in all of the expectations items.

As shown in Table 5, there was an inverse relationship between preintervention expectations and the fulfillment of these expectations 12 months after surgery in all five items. Patients with few expectations fulfilled them in 100% of cases. In comparison, only approximately 30% of patients with very high preintervention expectations fulfilled them. The exception was with pain relief, for which 48.3% of patients with very high preintervention expectations reported fulfillment.

Discussion

The results of this prospective study of a sample of consecutive patients with knee and hip OA undergoing TJR offers insights

Table 5 Patient-reported fulfillment of expectations at 12 months according to preintervention level of expectations

Expectation items	Expectation levels	FE, n (%)	UFE, n (%)	Total
Relieve pain	Few	38 (100)		38
	Many	152 (66.7)	76 (33.3)	228
	Very high	271 (48.3)	290 (51.7)	561
Daily activities	Few	90 (100)		90
	Many	230 (61.0)	147 (39.0)	377
	Very high	106 (29.8)	250 (70.2)	356
Ability to walk	Few	32 (100)		32
	Many	186 (68.4)	86 (31.6)	272
	Very high	177 (34.1)	342 (65.9)	519
To interact with others	Few	144 (100)		144
	Many	154 (52.4)	140 (47.6)	294
	Very high	77 (23.1)	257 (76.9)	334
Psychological well-being	Few	100 (100)		100
	Many	173 (55.6)	138 (44.4)	311
	Very high	99 (27.1)	266 (72.9)	365

FE, fulfilled expectations; UFE, unfulfilled expectations.

into the relationship between preintervention expectations, their fulfillment, and gains in HRQoL. We observed that patients undergoing TJR had high preintervention expectations about the benefits of the surgery. Those whose expectations were fulfilled had better postintervention outcomes as measured by three HRQoL questionnaires—the SF-12, WOMAC, and EQ-5D—3 and 12 months after surgery. As expected, patients with lower expectations were most likely to have them fulfilled.

In spite of TJR has proved its ability in improving quality of life, increasing functional capacity and reducing pain of patients affected by OA, the high level of expectations before surgery can be because of the interactions with their orthopedic surgeons, who in general, are optimistic about joint replacement. On the other side, perhaps surgeons should invest a bit more time explaining the benefits of the interventions, but taking into account the personal expectations of each patient, regarding different aspects of their lives. Possibly, all patients do not hope to get the same things when they are operated. Similarly, it seems that elders and women had few baseline expectations. To what could this fact be due? Again, we can hypothesize that would be due to the relationship with their surgeons. Is a well-known fact that can be a discriminating bias by age and gender.

Several previous studies have explored the relationship between expectations and HRQoL outcomes. Burton et al. divided 88 patients who underwent total hip replacement into two groups, FE and UFE, and found significantly higher post-intervention quality of life in the group whose expectations had been met [16].

When we divided our sample into two similar groups based on preintervention expectations—high (our “many” and “very high” groups) and low (our “no,” “few,” and “some” groups)—the majority of the sample had high expectations for the benefits of the operation. Expectations were highest for pain relief (95.3%) and the ability to walk (96.1%). This finding is consistent with the work of Mahomed et al. on preintervention expectations in TJR [10]. In a prospective cohort of 102 patients, they found that 75% of the patients expected to be completely pain free after surgery.

Patients in our study had higher expectations for improvements in physical or functional symptoms than in social or psychological capacities. This could be because of the fact that

physical and functional expectations are more related to the direct effects of the intervention, so patients look forward to potential benefits that are more related to their basal symptoms such as pain and the ability to walk or perform activities of daily living.

After the intervention, patients demonstrated improved HRQoL as measured by the WOMAC, SF-12, and EQ-5D. In nearly all dimensions, patients who fulfilled their expectations had higher gains in HRQoL than patients who did not fulfill their expectations. A similar pattern between higher expectations and gains in HRQoL was observed by Leedham et al. in a sample of 31 heart transplant patients [27]. Positive expectations were positively associated with physical health 6 months after the transplant. A possible explanation for this association is that patients with high preintervention expectations interpret their gains in HRQoL more optimistically and participated more intensely in the rehabilitation process, as suggested by Mahomed et al. [10]. In their study, patient expectation was the second most important determinant of outcome after preoperative functional health status.

We observed a strong association between fulfillment of pre-intervention expectations and postoperative HRQoL outcomes, with greater gains in HRQoL among patients who fulfilled their expectations. The percentage of patients reporting that they had fulfilled their expectations significantly increased from 3 to 12 months after surgery. Gains in HRQoL also increased during this period. Most of these gains were in physical and functional domains, with fewer gains in HRQoL in expectations of an emotional or psychological nature.

It is important to note that even 12 months after surgery, more than 30% of patients reported that their expectations had not been fulfilled. It is possible that this could be because baseline expectations were too high. As shown in Fig. 1, the majority of patients had high expectations for the benefits of the intervention, especially for pain relief and the ability to walk. An inverse relationship between preintervention expectations and postoperative fulfillment is not unexpected. A good sign is that the percentage of patients who reported that surgery met their expectations increased from 3 to 12 months.

It also important to point out that only 53.1% of the patients of the baseline sample answer at 12 months. Those patients with higher baseline expectations were those who completed the follow-up assessment at 12 months in the case of relieve pain, ability to walk, and to interact with others expectations. In the other two items, there were no differences in the baseline expectations between responders and nonresponders. Then, it is probable that it could be more difficult for those patients who answered to fulfill those high expectations.

A possible limitation of our study is the percentage of non-responders or missing values. Of patients who completed the baseline questionnaire, only 54% completed the 3-month questionnaire and 53% completed the 12-month questionnaire. Probably owed to our questionnaire extension, the patient's burden to complete the questionnaire could be important. However, our sample keeps on being large enough comparing with others similar studies. Another limitation is that we did not ask patients' information about TJR before interventions, which could strongly influence expectations such as previous experience in the other joint.

The close connection between expectations before TJR and outcomes after the procedure highlight how important it is that orthopedic surgeons and other health-care professionals talk to their patients about what they can realistically expect from joint replacement surgery. This information helps shape patient expectations, which should make it easier for patients to have their

expectations fulfilled. Burton et al. observed that the majority of patients who reported not meeting their expectations after total hip replacement felt that they had not been given sufficient information about the operation by their surgeon [16].

In conclusion, this prospective study showed that patients preparing for TJR had high expectations for the procedure, and those patients who met their expectations had greater gains in HRQoL than patients who did not meet their expectations. Given that patients and providers often differ in their beliefs about the benefits of TJR, surgeons should talk with their patients about realistic expectations for recovery and quality of life after surgery. Future studies need to evaluate in greater depth the exact nature of patient expectations for TJR, the relationship of preintervention expectations to HRQoL outcomes, and other factors that influence expectations.

Acknowledgements

We thank the staff members of the different services, research and quality units, as well as the medical record sections of the participating hospitals and the patients for their collaboration. The authors also acknowledge editorial assistance provided by Patrick J. Skerrett. This study was supported by a grant from the Fondo de Investigación Sanitaria (PI 04/0938) (PI 04/0542) (PI 04/2577) and the Basque Country Health Department (200411012).

Source of financial support: This study was supported by a grant from the Fondo de Investigación Sanitaria (PI04/0938). No conflicts of interest.

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