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## Patient satisfaction and quality of life at least 10 years after total hip or knee arthroplasty

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### Abstract

Total hip and knee arthroplasty (THA and TKA respectively) are reliable and successful interventions in terms of relieving pain and improving joint function. Paucity exists on long-term data concerning patient satisfaction and patient related outcome measures (PROMs) after THA or TKA. We aimed to evaluate the long-term patient satisfaction and PROMs at least ten years after THA and TKA.

A cohort of THA and TKA patients from a randomized clinical trial was used. At least ten years after primary arthroplasty, patient satisfaction was evaluated by means of three questions: would you still consider surgery knowing now what a THA/TKA surgery consisted of? Would you recommend the surgery to friend or relatives? How satisfied are you at this moment with the THA/TKA. Oxford Hip/Knee score, EQ5D score and RAND36 scores were recorded.

A total of 123 patients were available for analysis. Respectively 78% and 64% of the THA/TKA patients would reconsider to undergo the same surgery again, 94% and 76% of them recommended the surgery to a friend or relative and mean score of satisfaction was 83.1 and 80.8 of the THA/TKA patients. The scores indicated that both THA and TKA patients are very satisfied at more than 10 years of follow-up. Comparable function and quality of life scores at a minimum 10-year follow-up after initial surgery were found in both groups.

In conclusion, we demonstrated that at a minimum of 10-year follow-up both THA and TKA patients are very satisfied, although THA patients being more satisfied compared to TKA patients.

**Keywords:** Total Hip Arthroplasty, Total Knee Arthroplasty, Satisfaction, Long-term follow-up, Patient Reported Outcome Measures

### Introduction

Total hip and knee arthroplasty (THA and TKA respectively) have both shown to be reliable and successful surgical procedures for relieving pain, improving function and improving quality of life [1-3]. Traditionally, clinical success of THA and TKA has been measured by implant survivorship, range of motion and outcome measures like joint stability. Next to these 'established' outcome variables patients' perceived health after arthroplasty is important as outcome variable, which is advocated for decades [4, 5]. Patient satisfaction is a proxy for the overall success of the initial surgery. Recent literature shows that not all patients are satisfied with the results after THA and TKA [6-9]. A systematic review published in 2004 on health related quality of life after THA and TKA was not able to identify studies with a follow-up period over 7 years [10]. The majority of recent literature on PROMs and patient satisfaction report short- to mid-term outcomes [11-13]. Reports on long term satisfaction as outcome are scarce [14, 15].

The aim of this study was to evaluate long-term patient satisfaction and patient reported outcome measures using validated questionnaires at least ten years after THA and TKA.

### Materials and methods

#### Study population

A multicentre observational cohort study was carried out on 336 THA and TKA patients between January 2012 and January 2013 with a minimum follow-up time of 10 years. Patients used for this study consisted of the orthopaedic subset of patients from a multicentre randomized clinical trial aiming to assess the importance of packed red blood cell transfusion with and without leukocyte depletion in THA and TKA patients; the TACTICS-trial [16].

Enrolment of this study took place in four hospitals between April 2001 and November 2002. The cohort consisted of 228 THA and 107 TKA patients. Ethics committee and Medical board approval was obtained from the Leiden University medical Centre (Protocol P11.050).

Written informed consent was obtained from all participants. All medical records in the participating hospitals were reviewed to check if patients were still alive, had complications in the course of the follow-up since inclusion. Contact addresses and death were also checked with information from the general practitioner. All patients were contacted about the study and received the questionnaires on outcome measures. Informed consent was received from all participants.

### Outcome measures

Three anchor questions with respect to outcome were posed regarding patient satisfaction:

1. Knowing now what your hip or knee replacement surgery did for you, would you still have undergone this surgery?
2. Would you recommend this surgery to a friend or relative if he/she had the same symptoms as you had before your hip or knee surgery?
3. At this moment, how satisfied are you with the outcome of your surgery?

The first two questions had a binary (yes or no) answer; the third question used a visual analogue scale ranging from 0 to 10 cm with a 100-point subdivision. Zero indicated a very dissatisfied score and ten indicated a highly satisfied score of the operation.

Furthermore, function and quality of life questionnaires were asked: the validated Dutch version of the modified Oxford hip and knee score (OHS and OKS respectively)<sup>[17, 18]</sup>, the validated Dutch version of the EQ5D<sup>[19, 20]</sup> and the general health status RAND36<sup>[21, 22]</sup>.

The OHS and OKS each consist of 12 questions to describe hip or knee pain and physical function. Each question is answered on a five-point Likert scale, and the overall score is calculated by summarising the responses to each of the 12 questions. The total score ranges from 0-48, with a higher score indicating greater disability. The Oxford score uses a four band grading scale for determination of the joint function (0-19 may indicate severe joint problems, 20-29 may indicate moderate joint problems, 30-39 may indicate mild to moderate joint problems, and 40-48 may indicate satisfactory joint function)<sup>[17, 18, 22, 23]</sup>. The EQ5D questionnaire has 5 items. It contains the domains of mobility, self-care, usual activity, pain/distress and depression/anxiety. It also contains one visual analogue score (VAS-score) about 'health today' ranging from 0-100. The RAND36 questionnaire has 36 items and the score ranges from 0-100. It focuses on physical functioning, physical role, bodily pain, general health, vitality, social functioning, emotional role and mentally health. It is said to take up to 10 minutes<sup>[21-22]</sup>.

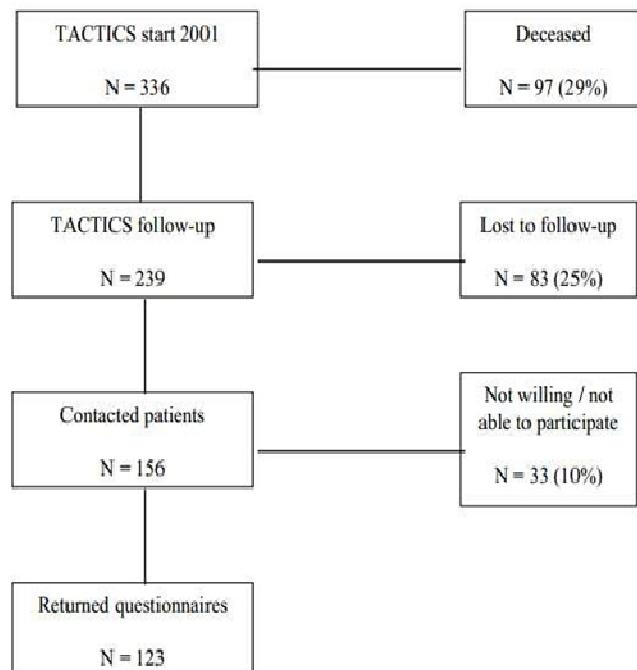
### Statistics

All data were entered and analysed using IBM SPSS Statistics for Windows (Version 21.0. Armonk, NY: IBM Corp). Data for THA and TKA were analysed separately. Univariate qualitative comparison was calculated using Chi-square-tests. The t-test was used for normally distributed quantitative parameters. Linear or logistic regression was applied to adjust

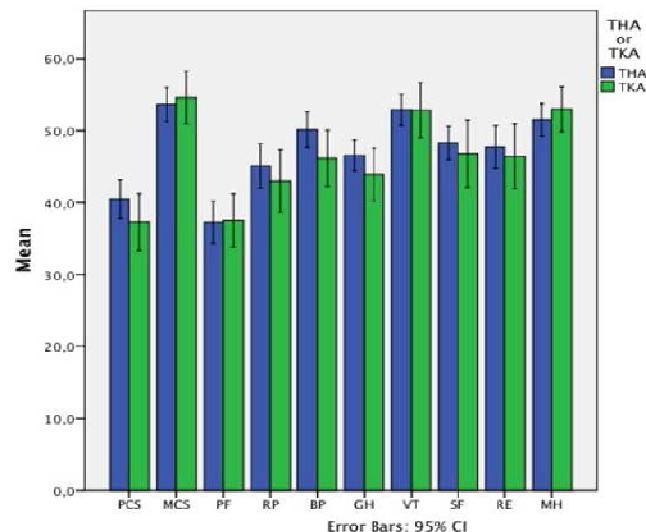
for confounders (age and gender). A p-value of  $\leq 0.05$  was found to be statistically significant.

### Results

From the 336 originally included patients, 97 (29%) patients had died, 83 (25%) patients were lost to follow-up (due to several reasons including missing information from hospital records, from GP records or simply missing), 16 (5%) patients were not able to and 17 (5%) were not interested in participating. Overall, 123 (37%) patients were able to respond to the current follow-up study of which 81 THA and 42 TKA patients (Figure 1). Baseline patient characteristics at follow-up of both responders and non-responders are presented in Table 1. The completeness of the questionnaires by number of participants is shown in Table 2.



**Fig 1:** Follow-up study population



**Fig 2:** Mean RAND36 health domain scores with 95%-CI comparing THA and TKA patients.

**Table 1:** Patient characteristics

	Responders (N = 123)		Non-responders (n = 33)	
Gender female (%) Mean age (y)	THA (n = 81) 62 (77%) 78 (SD 9.9)	TKA (n = 42) 36 (86%) 78 (SD 8.6)	THA (n = 20) 16 (80%) 80 (SD 10.5)	TKA (n = 13) 11 (85%) 85 (SD 8.6)
Preoperative prosthesis indication				
Primary joint prosthesis	59 (73%)	42 (100%)	15 (75%)	13 (100%)
Fracture	2 (3%)		2 (10%)	
Other	1 (1%)			
Unknown	19 (23%)		3 (15%)	
Erythrocyte transfusions	35 (43%)	12 (29%)	7 (35%)	1 (8%)
Fresh frozen product transfusions	13 (16%)	6 (14%)	0	0

**Table 2:** Completed questionnaires and Oxford score grading.

	Total (n)	Hip (n = 81)	Knee (n = 42)
<b>Satisfaction</b>			
Undergo surgery again?	110	90%	88%
yes		78%	64%
no		12%	24%
Recommend surgery?	112	95%	83%
yes		94%	76%
no		1%	7%
VAS satisfaction	121	88%	100%
CI 95%		83.1 (79.1 - 87.2)	80.8 (74.7 - 86.9)
OHS/OKSS\$	115	93%	95%
0-19 (severe arthritis)		2.7%	10%
20-29 (moderate to severe)		4%	20%
30-39 (mild to moderate)		30.7%	30%
40-48 (satisfactory joint function)		62.7%	40%
CI 95%		40 (38.1 - 42.0)	35.5 (32.3 - 38.7)
EQ5D	123	100%	100%
VAS health today		72.9 (69.0 - 76.5)	70.6 (63.9 - 77.3)
Total score		0.8 (0.76 - 0.85)	0.76 (0.69 - 0.83)
RAND 36	123	100%	100%
\$ Oxford Hip Score / Oxford Knee Score			

### Outcome variables at follow-up

First, three anchor questions with respect to outcome were posed regarding patient satisfaction

1. Knowing now what your hip/knee replacement surgery did for you, would you still undergo this surgery? Of the THA patients 78% answered yes (n=63), 12% answered no (n=10) to this question, 8 participants did not complete this question. Of the TKA participants 64% answered yes (n=27), 24% answered no (n=10), six participants did not complete this question. More THA patients were willing to have their arthroplasty again procedure compared to TKA patients.
2. Would you recommend this surgery to a friend or relative if he/she had the same symptoms as you had before your surgery? Of the THA participants 94% answered yes (n=76), 1 participant answered no, 4 participants did not complete this question. Of the TKA participants 76% answered yes (n=32), 7% answered no (n=3), 7 participants did not complete this question. More THA patients were willing to recommend their arthroplasty procedure to friends compared to TKA patients.
3. At this moment, how satisfied are you with your operation? For THA patients the mean score on the visual analogue score was 83.1 (95% CI 79.1 – 87.2) and for TKA patients the mean score was 80.8 (95% CI 74.6 – 86.9).

### Oxford hip and knee score

Due to incomplete questionnaires, scores could not be calculated for eight patients. The mean OHS score was 40.0 (95% CI 38.1 – 42.0) and the mean OKS score was 35.5 (95%CI 32.3 – 38.7) (adjusted p=0.007) (Table 2). A satisfactory joint function (i.e. 40-48 points) was obtained by 63% of the THA patients, indicating a satisfactory joint

function, and 40% of the TKA participants achieved the optimum score. The percentage of patients, who scored 0 to 19 points, indicating severe joint problems, was 10% for TKA patients and 2.7% for THA patients.

### EQ5D

Mean score for the VAS “health today” score was 72.9 (95% CI 69.0 – 76.5) for THA patients and 70.6 (95% CI 63.9 – 77.3) for TKA patients. The mean EQ5D score was 0.80 (95% CI 0.76 – 0.85) for THA patients and 0.76 (CI 0.69 – 0.83) for TKA patients.

### RAND36

Due to not completing all of the questions in the questionnaire, not all scores could be calculated for each participant (table 3). The mean scores for THA and TKA patients for the health domains are shown in table 4.

**Table 3:** Overview of participants counts per RAND-36 domain.

Domain	Total	THA (n = 81)	TKA (n = 42)
PCS	100	84%	76%
MCS	100	84%	76%
PF	117	98%	91%
RP	110	91%	86%
BP	119	95%	100%
GH	114	94%	91%
VT	115	94%	93%
SF	122	99%	100%
RE	108	93%	79%
MH	114	94%	91%

PCS= physical component score, MCS= mental component score, PF=physical functioning, RP= role-functioning physical, BP=bodily pain, GH=general health perceptions, VT=vitality, SF=social role functioning, RE=emotional role functioning, MH=mental health

**Table 4.** Mean RAND36 scores per domain

Domain	Participants THA		Participants TKA	
	(n)	THA (95% CI)	(n)	TKA (95% CI)
PCS	68	40,5 (37,8 - 43,1)	32	37,3 (33,5 - 41,1)
MCS	68	53,7 (51,3 - 56,0)	32	54,6 (50,7 - 58,1)
PF	79	37,0 (34,2 - 39,7)	38	35,2 (31,7 - 38,8)
RP	74	44,4 (41,4 - 47,3)	36	42,1 (38,0 - 46,1)
BP	77	49,6 (47,1 - 52,0)	42	47,7 (44,3 - 51,2)
GH	76	46,0 (44,0 - 48,1)	38	43,7 (40,6 - 46,8)
VT	76	53,0 (51,0 - 55,1)	39	52,7 (49,3 - 56,0)
SF	80	46,8 (43,9 - 49,7)	42	47,2 (43,3 - 51,1)
RE	75	46,7 (43,8 - 49,7)	33	45,7 (41,3 - 50,2)
MH	76	51,5 (49,4 - 53,6)	38	52,7 (50,1 - 55,4)

PCS= physical component score, MCS= mental component score, PF=physical functioning, RP= role-functioning physical, BP=bodily pain, GH=general health perceptions, VT=vitality, SF=social role functioning, RE=emotional role functioning, MH=mental health

## Discussion

The present study showed high quality of life scores, patient satisfaction and willingness to have surgery again at a minimum 10 years after primary THA and TKA. The willingness to have surgery again and the recommendation of this arthroplasty surgery was higher for THA compared to TKA patients. This difference was also found earlier by our group<sup>7</sup>, and is confirmed by others showing less satisfied TKA patients at mid-term follow-up<sup>[24, 25]</sup>. Compared to a Dutch background population both patients who received THA and TKA have comparable function and quality of life scores at a minimum 10-year follow-up after initial surgery<sup>[10, 13, 15, 26, 27]</sup>.

THA and TKA are effective from a societal perspective over the entire lifespan, with costs that compare favorably to those of other medical interventions<sup>[28, 29]</sup>. Although long-term implant survival in both TKA and THA has a mean survival at 10 years of at least 90%, these data are not well associated with perceived outcome after these procedures by the patient. Few studies have been published on THA and TKA patients with long-term follow-up (i.e. >10 years); particularly knowledge of long-term patient satisfaction after such procedures is scarce. Although, recall bias might obscure negative experiences of the early postoperative period at long-term follow-up moments.

Loughead *et al.* evaluated patient satisfaction and PROMs in TKA patients showing good satisfaction and moderate functional limitations fifteen years after TKA<sup>14</sup>. Beverland *et al.* evaluated a cohort of THA and TKA patients ten years after surgery and found a much higher percentage ‘very happy’ patients after THA compared to TKA and a higher percentage of ‘never happy’ patients after TKA compared to THA<sup>15</sup>. Our study not only used three questions relating to patient satisfaction it also has three different validated questionnaires, enabling it to provide more elaborate long-term results.

If asked on the likelihood to reconsider surgery again for themselves or advice this to relatives/friends our study showed differences between THA (respectively 78% and 94%) and TKA (respectively 64% and 76%) patients. In both groups almost all (except for four patients) said to recommend surgery to a relative or friend. Initially this may seem contradictory, as this means there were patients who claim to be ‘not satisfied’, but do recommend surgery to a friend or relative. This is due to a lack of power and is considered a type-II error. A difference in favour of THA participants was found for the PCS, GH and BP sub domains of the RAND36 compared to the TKA participants. This corresponds with the

other findings in our study and is in line with earlier published, short term results<sup>10</sup>. Meeting post-operative patient expectations is an important determinant of the subjective post-operative satisfaction<sup>[30, 31]</sup>. Unfortunately this study did not have detailed demographic-or pre-and postoperative information about patient expectations. Both THA and TKA patients were highly satisfied given a mean score of over 80.0 for satisfaction on their joint replacement with THA patients being more satisfied compared to TKA patients. The latter was also found earlier in a different cohort of Dutch THA and TKA patients at a mean follow-up of 3 years<sup>24</sup>. This is also substantiated by the higher Oxford hip compared to Oxford knee scores, thus THA patients have better pain reduction and a higher functionality compared to TKA patients<sup>[11, 12, 27]</sup>. This study has several strengths. Patients from the study cohort were both included from academic and non-academic hospitals yielding a diverse population of patients and participating orthopaedic surgeons. To our knowledge it is one of the most detailed studies to date to describe detailed long-term satisfaction and PROMs in THA and TKA patients using disease specific and generic quality of life questionnaires. There was a good response rate of 74% (123 patients).

Some limitations exist, since the Oxford hip and knee scores did not exist when this study started, no preoperative data could be collected. Thus no change scores (i.e. after the intervention) could be calculated nor different preoperative symptom states between patients could be taken into account in order to have a more valid comparison between groups<sup>[32, 33]</sup>. Another limitation might be that results are based on responders, in long-term follow-up studies response bias is an issue since non-responders may have different outcomes compared to responders. Responders in this study tended to be younger than non-responders.

## Conclusion

We demonstrated that at a minimum of 10-year follow-up both THA and TKA patients are on average very satisfied, THA patients being more satisfied compared to TKA patients.

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