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Prognostics of outcome of total knee replacement: on patient selection and intraoperative issues

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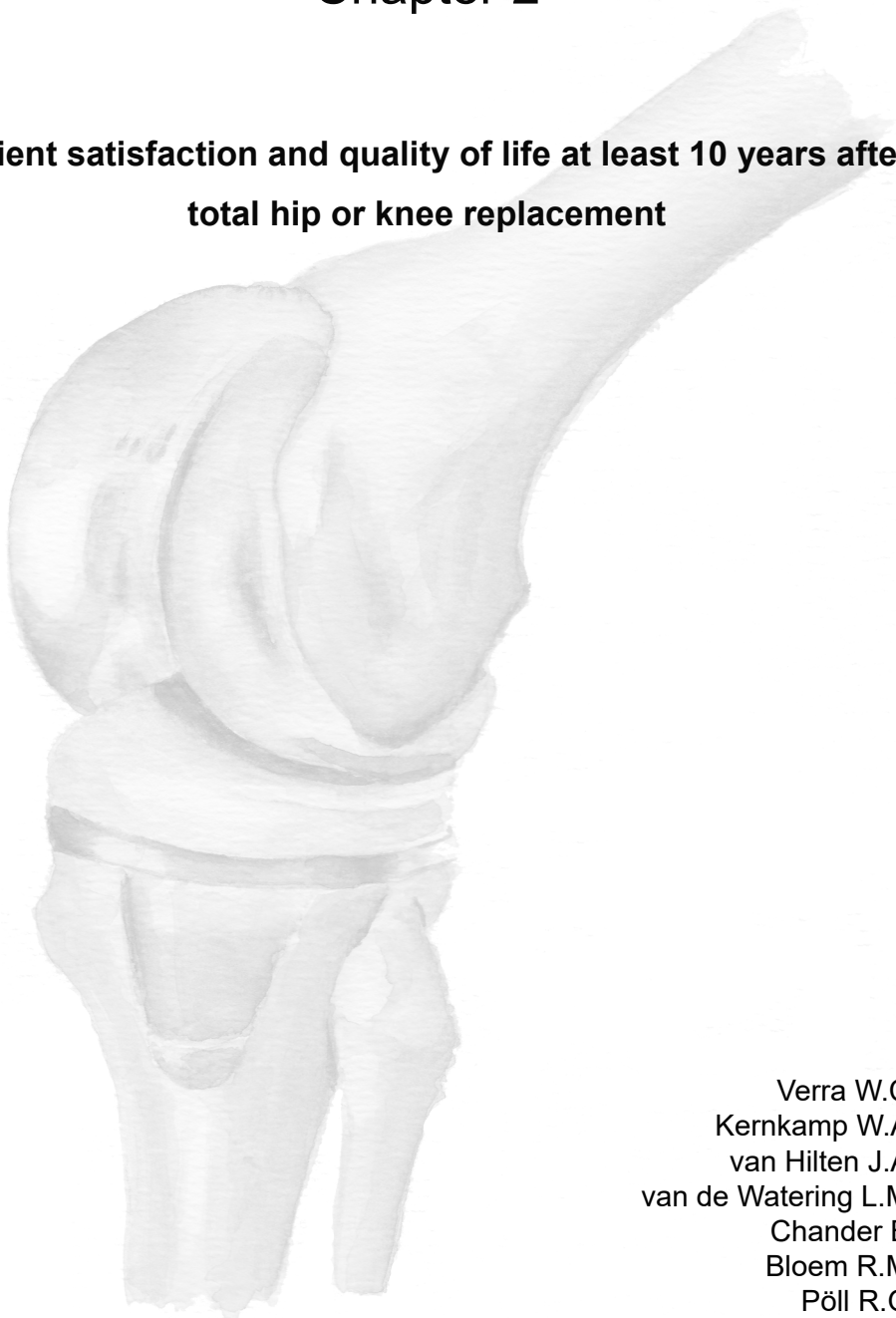
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Chapter 2

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



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Abstract

Introduction. Total hip and knee replacement (THR and TKR 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 (PROM's) after THR or TKR. We studied the long-term patient satisfaction and PROM's at least 10 years after THR and TKR.

Methods. A cohort of THR and TKR patients from a randomized clinical trial was used. At least 10 years after primary joint replacement, patient satisfaction was evaluated by means of three questions:

1. Would you still consider surgery knowing now what a THR/TKR consisted of?
2. Would you recommend the surgery to friends or relatives?
3. How satisfied are you at this moment with the THR/TKR? (using visual analogue scale)

Furthermore the Oxford Hip/Knee scores, EQ5D scores and RAND36 scores were recorded.

Results. A total of 123 patients were available for analysis. Of the THR's 78% and of the TKR's 64% would reconsider to undergo the same surgery again. Also 94% of the THR's and 76% of the TKR's would recommend the surgery to a friend or relative and the mean score of satisfaction was 83.1 of the THR and 80.8 of the TKR patients. The scores indicated that both THR and TKR patients are very satisfied at more than 10 years of follow-up. Furthermore comparable function and quality of life scores 10 years after initial surgery were found in both groups.

Conclusion. We demonstrated that at a minimum of 10 years of follow-up both THR and TKR patients are very satisfied, although THR patients being slightly more satisfied compared to TKR patients.

Introduction

Total hip and knee replacement (THR and TKR respectively) have both shown to be reliable and successful surgical procedures in terms of relieving pain, improving function and improving quality of life.¹⁻³ Traditionally, clinical success of THR and TKR 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 too, this has more and more been investigated this last decade.^{4,5} Patient satisfaction is a proxy for the overall success of the initial surgery. Literature shows that not all patients are satisfied with the results after THR or TKR.⁶⁻⁹ A systematic review published in 2004 on health-related quality of life after THR and TKR was not able to identify studies with a follow-up period of more than 7 years.¹⁰ The majority of recent literature on patient reported outcome measures (PROM's) 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 10 years after THR or TKR.

Methods

Study population

Patients used for this study consisted of the orthopedic subset of patients from a multicenter randomized clinical trial aiming to assess the difference between packed red blood cell transfusion with and without leukocyte depletion in THR and TKR patients; the TACTICS trial.¹⁶ Enrolment of the TACTICS trial took place in four hospitals between April 2001 and November 2002. The cohort consisted of 228 THR and 108 TKR patients. Ethics committee and Medical review board approval was obtained from the Leiden university medical center (Protocol P11.050). Written informed consent was obtained from all participants.

The study was carried out on 336 THR and TKR patients between January 2012 and January 2013 when patients had at least a follow-up time of 10 years. All medical

records in the participating hospitals were reviewed to check if patients were still alive and/or had complications in the course of the follow-up since inclusion (i.e. since index operation). Contact addresses and death or alive status were also checked with information from the general practitioner. All patients were contacted about the study and received questionnaires. Informed consent for this follow-up study was received from all participants too.

Outcome measures

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 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/knee surgery?
3. At this moment, how satisfied are you with the outcome of your hip/knee replacement?

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

Furthermore, function and quality of life questionnaires were recorded: the validated Dutch version of the modified Oxford hip and knee score (OHS and OKS respectively), the validated Dutch version of the EQ5D and the general health status RAND36.¹⁷⁻²²

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 summarizing 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).^{17,18,22,23} 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 VAS-score about experienced 'health today' ranging from 0-100. The RAND-36 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 mental health. It is said to take up to 10 minutes to complete.^{21,22}

Statistics

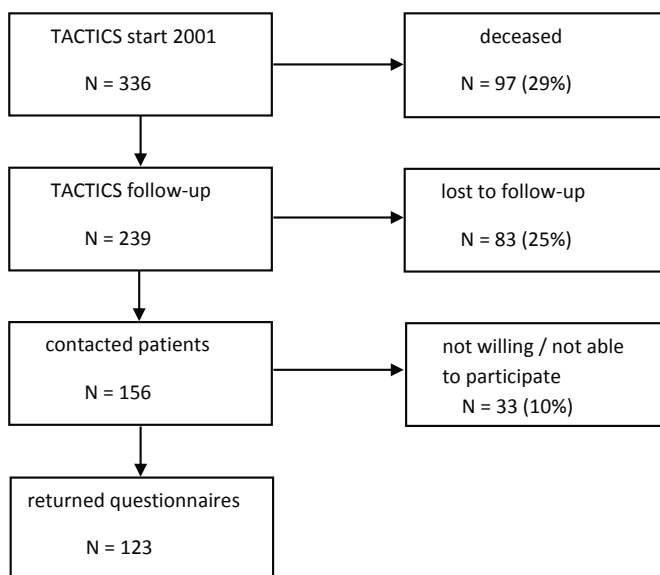
All data were entered and analyzed using SPSS Statistics (Version 21.0. Armonk, NY: IBM Corp). Data for THR and TKR were analyzed separately. Univariate qualitative comparison was calculated using Chi-square-tests. The Student's t-test was used for normally distributed quantitative parameters. Linear or logistic regression was applied to adjust for confounders (age and gender). A p-value of ≤ 0.05 was considered 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 follow-up study of which 81 THR and 42 TKR patients (Figure 2.1). Baseline patient characteristics at follow-up of both responders and non-responders are presented in Table 2.1.

Table 2.2 shows an overview of data from the completed questionnaires of THR and TKR patients.

Figure 2.1: Follow-up study population



Outcomes at follow-up

First, the three anchor questions regarding patient satisfaction:

1. Knowing now what your hip/knee replacement surgery did for you, would you still undergo this surgery?

Of the THR patients 78% (N=63) answered yes, 12% (N=10) answered no to this question, 8 participants did not answer this question. Of the TKR participants 64% (N=27) answered yes, 24% (N=10) answered no, 6 participants did not answer. More THR than TKR patients were willing to have their surgery again.

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 THR participants 94% (N=76) answered yes, 1 participant answered no, 4 participants did not answer this question. Of the TKR participants 76% (N=32) answered yes, 7% (N=3) answered no, 7 participants did not answer this question. More THR patients were willing to recommend their joint replacement to friends compared to TKR patients.

3. At this moment, how satisfied are you with your operation?

For THR patients the mean score on the visual analogue score was 83.1 (95% CI 79.1 – 87.2) and for TKR patients the mean score was 80.8 (95% CI 74.6 – 86.9).

Table 2.1: Patient characteristics of responders and non-responders

	Responders (N = 123)		Non-responders (N = 33)	
	THR (N = 81)	TKR (N = 42)	THR (N = 20)	TKR (N = 13)
Gender female N(%)	62(77)	36(86)	16(80)	11(85)
Mean age years(SD [#])	78(9.9)	78(8.6)	80(10.5)	85(8.6)
Indication for hip/knee replacement				
Primary replacement N(%)	59(73)	42(100)	15(75)	13(100)
Fracture N(%)	2(3)	0	2(10)	0
Other N(%)	1(1)	0	0	0
Unknown N(%)	19(23)	0	3(15)	0
Erythrocyte transfusions N(%)	35(43)	12(29)	7(35)	1(8)

[#] SD: standard deviation. THR: Total hip replacement. TKR: Total knee replacement

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 2.2). A satisfactory joint function (i.e. 40-48 points) was obtained by 63% of the THR patients, and by 40% of the TKR patients. The percentage of patients, who scored 0 to 19 points, indicating severe joint problems, was 2.7% for THR and 10% for TKR patients.

EQ5D

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

Table 2.2: Completed questionnaires, Oxford hip/knee score and EQ5D

	THR (N = 81)	TKR (N = 42)
Satisfaction		
1. Undergo surgery again?		
yes	78%	64%
no	12%	24%
2. Recommend surgery?		
yes	94%	76%
no	1%	7%
3. VAS ^{&} satisfaction (95% confidence interval)	83.1 (79.1 -87.2)	80.8 (74.7 - 86.9)
OHS/OKS^S		
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%
95% confidence interval	40 (38.1 - 42.0)	35.5 (32.3 - 38.7)
EQ5D		
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)

^S Oxford Hip Score / Oxford Knee Score. [&] Visual Analogue Scale

RAND-36

The mean scores for THR and TKR patients for the health domains are shown in table 2.3. There were no significant differences comparing RAND-36 results for all domains between THR and TKR patients.

Table 2.3: Mean RAND-36 scores per domain

Domain #	Participants THR	Participants TKR
	THA (95% CI)	TKA (95% CI)
PCS	40.5 (37.8 – 43.1)	37.3 (33.5 – 41.1)
MCS	53.7 (51.3 – 56.0)	54.6 (50.7 – 58.1)
PF	37.0 (34.2 – 39.7)	35.2 (31.7 – 38.8)
RP	44.4 (41.4 – 47.3)	42.1 (38.0 – 46.1)
BP	49.6 (47.1 – 52.0)	47.7 (44.3 – 51.2)
GH	46.0 (44.0 – 48.1)	43.7 (40.6 – 46.8)
VT	53.0 (51.0 – 55.1)	52.7 (49.3 – 56.0)
SF	46.8 (43.9 – 49.7)	47.2 (43.3 – 51.1)
RE	46.7 (43.8 – 49.7)	45.7 (41.3 – 50.2)
MH	51.5 (49.4 – 53.6)	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.
THR: Total Hip Replacement. TKR: Total Knee Replacement. CI: confidence interval

Discussion

The present study showed high quality of life scores, high patient satisfaction and high willingness to undergo total hip or knee replacement again at a minimum 10 of years after primary surgery. The willingness to have surgery again and the recommendation of this procedure to friends or family was higher for THR than for TKR patients. This difference was also found earlier by our group, and is confirmed by others showing less satisfied TKR patients at mid-term follow-up.^{24,25} Compared to a Dutch background population both patients who received THR and TKR have comparable function and quality of life scores at a minimum 10 years follow-up after initial surgery.^{10,13,15,26,27}

THR and TKR are effective from a societal perspective over the entire lifespan, with costs that compare favorably to those of other medical interventions.^{28,29} Although long-term implant survival in both THR and TKR 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 THR and TKR

patients with long-term follow-up (i.e. >10 years); particularly knowledge of long-term patient satisfaction after such procedures is scarce. Recall bias might obscure negative experiences of the early postoperative period at long-term follow-up moments.

Loughead *et al.* evaluated patient satisfaction and PROM's in TKR patients showing good satisfaction and moderate functional limitations fifteen years after TKR.¹⁴ Beverland *et al.* evaluated a cohort of THR and TKR patients ten years after surgery and found a much higher percentage 'very happy' patients after THR compared to TKR and a higher percentage of 'never happy' patients after TKR compared to THR.¹⁵ 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 THR (respectively 78% and 94%) and TKR (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 might very well be due to a lack of power and is considered a type-II error. Meeting postoperative patient expectations is an important determinant of the subjective postoperative satisfaction.^{30,31}

Unfortunately this study did not have detailed demographic or pre-and postoperative information about patient expectations. Both THR and TKR patients were highly satisfied given a mean score of over 80.0 for satisfaction on their joint replacement with THR patients being more satisfied compared to TKR patients. The latter was also found earlier in a different cohort of Dutch THR and TKR patients at a mean follow-up of 3 years. This is also substantiated by the higher Oxford hip compared to Oxford knee scores, thus THR patients have better pain reduction and a higher functionality compared to TKR patients.^{11,12,27} 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 orthopedic

surgeons. To our knowledge it is one of the most detailed studies to date to describe detailed long-term satisfaction and PROM's in THR and TKR patients using disease specific and generic quality of life questionnaires.

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 ^{32,33} 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 years of follow-up both THR and TKR patients are on average very satisfied, THR patients being more satisfied compared to TKR patients.

Chapter 2

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