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Patient-Reported Outcomes and Satisfaction 1 to 3 Years After Revisions of Total Knee Arthroplasties for Unexplained Pain Versus Aseptic Loosening

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ABSTRACT

Background: It is unknown if patients are relieved of pain after knee arthroplasty revision for unexplained pain. The aim of this cross-sectional case-control study was to compare patient-reported outcome measures (PROMs) and satisfaction 1 to 3 years after revision of total knee arthroplasties (TKAs) for the indications of unexplained pain versus aseptic loosening.

Methods: We included 384 patients undergoing TKA revision for the indications of unexplained pain and aseptic loosening from January 1, 2018 to December 31, 2020 from the Danish Knee Arthroplasty Register. A total of 81 patients were revised for unexplained pain and 303 for aseptic loosening. Questionnaires including PROMs (Oxford Knee Score, EQ-5D-5L, and Forgotten Joint Score) and satisfaction with the surgery on a 0-100 scale (100 = not satisfied; 0 = very satisfied) were sent to digitally secured mailboxes. Time from revision to data collection was a median 3.1 years (range, 1.4-4.4 years).

Results: Median Oxford Knee Score was 25 (interquartile range [IQR] 15) versus 31 (IQR 18) 1-3 years after revisions for unexplained pain versus aseptic loosening, $P = .009$. Median EQ-5D-5L was 0.6 (IQR 0.4) versus 0.8 (IQR 0.3) for unexplained pain versus aseptic loosening, $P = .009$. Median Forgotten Joint Score was 50 (IQR 7) versus 50 (IQR 16) for unexplained pain versus aseptic loosening, $P = .905$. Satisfaction was 75 (IQR 38) for unexplained pain and 50 (IQR 73) for aseptic loosening, $P < .001$.

Conclusion: Patients undergoing TKA revision for the indication of unexplained pain had worse results on PROMs than those revised for aseptic loosening. Likewise, patients revised for unexplained pain were less satisfied compared to patients revised for aseptic loosening. This information is valuable to both surgeons and patients when candidates for revision surgery are selected, to obtain the best possible outcomes.

The number of knee arthroplasty revisions performed annually is increasing [1]. It is well known that about 20% of patients undergoing primary knee arthroplasty experience persistent pain afterward but the proportion after revision might be even higher [2,3]. Some patients are revised because of unexplained pain without any other obvious knee pathology present, but it is unknown if these patients are relieved of pain after surgery. The indication of unexplained pain is controversial and generally not

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recommended but still widely used [4,5]. Although revision knee surgery for aseptic reasons may be as safe as primary surgery, patients are less satisfied after revision [6–8]. The use of opioids and other analgesics does not seem to decrease considerably after revision because of pain, suggesting a lack of effect on pain relief [9]. This also applied to patients revised for aseptic loosening. However, they might have had a mechanical problem, which was solved by revision.

Investigations of patient's perspectives are essential when it comes to estimations of pain and life quality. Data on patient-reported outcomes (PROs) after revision knee arthroplasty are limited [10,11]. It is unknown if the patients revised because of unexplained pain are as satisfied with the results as patients revised for the more well-established indication of aseptic loosening. Further knowledge of revisions performed because of unexplained pain is warranted to improve the selection of candidates for revision surgery.

Therefore, the aim of this study was to compare patient-reported outcome measures (PROMs) and satisfaction 1 to 3 years after revision of total knee arthroplasties (TKAs) for the indications of unexplained pain versus aseptic loosening.

Methods

Study Design

This cross-sectional nationwide case-control study was conducted in accordance with the consensus-based standards for the selection of health measurement instruments reporting guidelines for PROM studies [12].

Participants and Data Sources

Data on all knee arthroplasty revisions registered for the indication of unexplained pain or aseptic loosening exclusively in the period January 1, 2018 to December 31, 2020 were collected from the Danish Knee Arthroplasty Register (DKR). The DKR is a nationwide clinical database collecting data on primary and revision knee arthroplasties in Denmark since 1997 [13]. All orthopaedic departments, including private hospitals, report preoperative and intraoperative data to the database. The completeness of the register was 97% for primary knee arthroplasties and 92% for revision knee arthroplasties in 2020 [1]. We retrieved demographic data on age, gender, and body mass index from the DKR. A total of 384 patients were included in the study (Fig. 1). There were 81 patients revised for the indication of unexplained pain and 303 for the indication of aseptic loosening. The overall response rate was 68%. The demographic characteristics were overall alike for responders revised for unexplained pain versus aseptic loosening (Table 1).

We selected the study period 2018-2020, so that time from revision would not exceed 4 years. PROs from patients revised before this time period might be memory-biased and thus not relevant for this study. We included all revisions registered in the DKR for the two indications of investigation and therefore no sample size calculation was performed. We divided the revisions into surgical subgroups defined by the types of prostheses removed and inserted at surgery. We included surgical subgroup 1 (total revision of both femoral and tibial component in a TKA to new TKA) and surgical subgroup 2 (partial revision of either femoral or tibial component in a TKA). The excluded surgical subgroups were not relevant for the study and the number of revisions in most of the excluded groups was too low to perform a meaningful analysis (Fig. 1).

Outcomes

Data Collection

All included patients received an e-mail with a link to an electronic questionnaire in a secured digital mailbox, which linked to the patient's Danish personal registration number. If the questionnaires were not answered within 2 weeks, two reminder

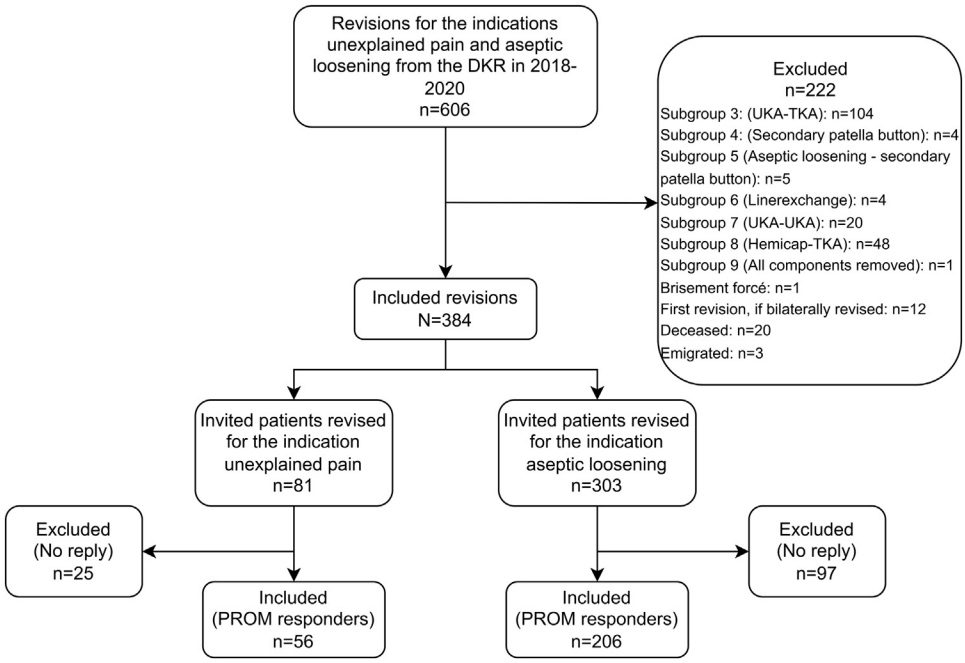

Fig. 1. Flowchart of patients included/excluded in this study. DKR, Danish knee arthroplasty register; UKA, unicompartmental knee arthroplasty; TKA, total knee arthroplasty; PROM, patient-reported outcome measure.

Table 1
Demographic Characteristics of Included Patients for Responders and Nonresponders of Patient-Reported Outcomes.

Characteristic	Responders		*P* Value	Nonresponders		*P* Value
	Pain	Aseptic Loosening		Pain	Aseptic Loosening	
	n = 56 (69%)	n = 206 (68%)		n = 25 (31%)	n = 97 (32%)	
Mean age in years (range)	65 (29-82)	69 (47-91)	.003	65 (44-80)	69 (43-92)	.039
Women (%)	31 (55%)	123 (60%)	.557	17 (68%)	56 (58%)	.350
BMI (Median [IQR]) (3 missing values)	24 (IQR 13)	22 (IQR 12)	.032	21 (IQR 10)	22 (IQR 12)	.649
Surgical subgroup			.572			.137
1. TKA-TKA	49 (88%)	174 (84%)		16 (64%)	76 (78%)	
2. Partial revision	7 (12%)	32 (16%)		9 (36%)	21 (22%)	
Time from primary surgery to revision (Mean [SD])	4.7 (SD 3.9)	6.4 (SD 5.5)	.313	3.9 (SD 3.5)	7.3 (SD 5.8)	.530
Follow-up (Years from revision to data collection) (Median [range])	3.4 (1.5-4.4)	3 (1.4-4.4)	.009	3 (1.6-4.4)	2.9 (1.4-4.4)	.222

PROM, Patient-Reported Outcome Measure; SD, standard deviation; BMI, body mass index; IQR, interquartile range; TKA, total knee arthroplasty; UKA, unicompartmental knee arthroplasty.

e-mails were sent with a 2-week interval. Patients who were not registered to the digital mailbox received a paper version of the questionnaire by postal mail. Paper versions were also sent on request. Study data were collected and managed using REDCap electronic data capture tools hosted at Odense Explorative Patient data Network (OPEN), Odense, Denmark [14,15].

Questionnaires

We included the standardized questionnaires Oxford Knee Score (OKS), EQ-5D-5L, Forgotten Joint Score (FJS), and Copenhagen Knee range of motion (ROM) Scale, and we further asked questions about pain, satisfaction, and reason for revision.

Oxford Knee Score

OKS was calculated from the validated joint specific 12-item questionnaire developed in 1998 to measure outcomes after TKA and it was translated into Danish in 2009 [16,17]. A score of 0 to 48 was calculated, with 48 being the best possible score. Calculation of the OKS followed recommendations from the developers [18].

EQ-5D-5L

EQ-5D-5L consists of a 5-item questionnaire and the EQ visual analogue scale (EQ VAS) designed to measure health state. The Danish edition was validated in 2021 [19]. The EQ Index was calculated from the United Kingdom value set, which was developed from a population sample from 6 countries including Denmark [20].

Forgotten Joint Score

FJS was calculated from the 12-item questionnaire developed in 2012 and translated and validated in Danish in 2016 [21,22]. A total score of 0-100 was obtained. A high score indicated a high degree of "forgetting" the artificial joint. The FJS is an efficient tool for evaluation of small differences in knee performance after surgery. The FJS score was calculated following the instructions by the developers [21].

Copenhagen Knee Range of Motion

We used the Copenhagen Knee ROM Scale to estimate the ROM of the revised knees [23]. The patients reported ROM from the 2-item scale with 11 illustrations of knee motion.

Pain

We asked the patients about their level of pain. The answers were reported on a VAS.

"What was your average pain level the last month on a 0 to 100 scale" (0 = no pain; 100 = worst pain imaginable)

Satisfaction

We asked questions about the satisfaction after surgery.

"How satisfied are you with the result of the surgery on a 0 to 100 scale" (0 = very satisfied; 100 = not satisfied)

Improvement. "How are your knee problems now compared to prior to the operation?"

Data Analyses

Data were presented with means and standard deviations (SDs) for normally distributed continuous variables and median and interquartile range (IQR) for non-normally distributed continuous variables. Distributions were inspected for normality via quantile-quantile plots. Frequency counts and percentages were provided for categorical variables. Pearson's Chi-squared tests were used to test for statistical differences between categorical measures. Wilcoxon Rank-Sum tests were used to test non-normally distributed continuous variables for statistical differences.

Missing data of the respective PROMs were handled as recommended by the developers [18,21,24].

Table 2
Patient-Reported Outcomes of Patients Revised for the Indication of Unexplained Pain Versus Aseptic Loosening.

PROM	Unexplained Pain	Aseptic Loosening	*P* Value
	N = 56	N = 206	
Oxford Knee Score[a]	25 (IQR 15)	31 (IQR 18)	.009[b]
EQ-5D-5L Index[a]	0.6 (IQR 0.4)	0.8 (IQR 0.3)	.009[b]
EQ VAS[a]	61 (IQR 37)	60 (IQR 40)	.276[b]
FJS[a]	50 (IQR 7)	50 (IQR 16)	.905[b]
Copenhagen Knee ROM			
Flexion[a]	5 (IQR 1)	5 (2)	.035[b]
Flexion deficit (0-4)	23 (41%)	54 (26%)	.035
Extension[a]	4 (IQR 1)	4 (IQR 2)	.083[b]
Extension deficit (0-3)	21 (42%)	61 (29%)	.258

If no statistical test is mentioned for *P* values, Chi-squared test was used.
PROM, Patient-reported outcome measure; IQR, interquartile range; EQ-5D-5L Index, a value of 1 indicates the best quality of life and 0 indicate the worst; EQ VAS, EuroQol Visual Analogue Scale: 100 = best health imaginable and 0 = worst health imaginable; Copenhagen Knee ROM = Copenhagen Knee Range of Motion.
[a] Median (IQR).
[b] Wilcoxon Rank-Sum test.

Table 3
Questions on Pain and Satisfaction.

Question	Unexplained Pain	Aseptic Loosening	*P* Value
	n = 56	n = 206	
Pain			
What was your average pain level the last month on a 0-100 scale; 0 = no pain; 100 = worst pain imaginable[a]	62 (IQR 41)	45 (IQR 56)	.008[b]
Satisfaction			
How satisfied are you with the result of the surgery on a 0-100 scale; 0 = very satisfied; 100 = not satisfied[a]	75 (IQR 38)	50 (IQR 73)	< .001[b]
Improvement. How are your knee problems now compared to prior to the operation?			.356
Importantly improved	25 (69%)	116 (77%)	
Not importantly improved	11 (31%)	35 (23%)	
Do you find your present situation acceptable considering your daily level of function?			.005
Yes	19 (35%)	109 (57%)	
No	35 (65%)	83 (43%)	
The question was only asked to patients replying no to the above: Do you think the treatment has failed?			.790
Yes	21 (64%)	53 (66%)	
No	12 (36%)	27 (34%)	
Would you go through the surgery again?			.263
Yes	19 (35%)	91 (47%)	
Maybe	21 (39%)	67 (35%)	
No	14 (26%)	36 (18%)	

If no statistical test is mentioned for *P* values, Chi-squared test was used.
IQR, interquartile range.
[a] Median (IQR).
[b] Wilcoxon Rank-Sum test.

Statistical significance was set at the 5% level. For all analyses, we used Stata Statistical Software: Release 17. College Station, Texas: StataCorp LLC.

Ethics and Funding

Permission from the Danish Data Protection Agency was achieved (Journal no. 19/14,416). We achieved accept to contact the patients in our study from the Head of Departments of all included departments performing the revisions.

The authors had no conflicts of interest to declare.

Results

Patient-Reported Outcome Measures

Median OKS was 25 (IQR 15) for unexplained pain versus 31 (IQR 18) for aseptic loosening 1-3 years after revision, $P = .009$ (Table 2 and Fig. 2). Median EQ-5D-5L was 0.6 (IQR 0.4) for unexplained pain and 0.8 (IQR 0.3) for aseptic loosening 1-3 years after revision, $P = .009$ (Table 2 and Fig. 3). There were no differences in these scores within indication groups comparing revisions after 1-2 years versus > 2 to 3 years (Supplementary Table 1).

There were no differences in EQ VAS and FJS between indication groups. The flexion ability estimated by the Copenhagen Knee ROM was slightly better for revisions for aseptic loosening than for unexplained pain (Table 2). PROMs at a surgical subgroup level showed similar results (Supplementary Table 2).

Pain

The average pain score was significantly worse for unexplained pain than aseptic loosening, $P = .008$ (Table 3 and Fig. 4).

Satisfaction

The average satisfaction score was significantly worse for unexplained pain than aseptic loosening, $P < .001$ (Table 3 and Fig. 5). Patients revised for unexplained pain were also less likely to find their knee problem importantly improved or their daily level of function acceptable (Table 3). Scores for pain and satisfaction at a surgical subgroup level showed similar results (Supplementary Table 3).

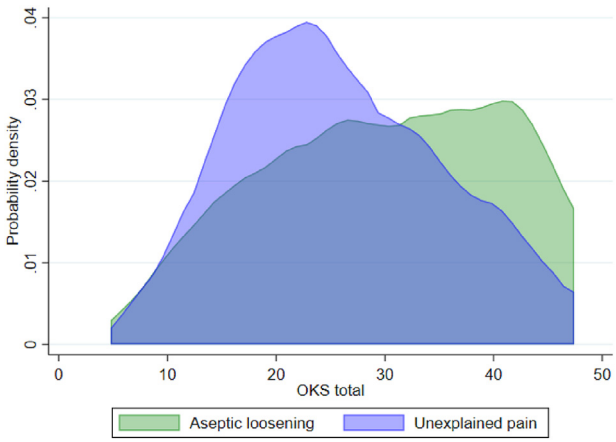

Fig. 2. OKS for the indications of revision unexplained pain and aseptic loosening presented as kernel curves. OKS, oxford knee score.

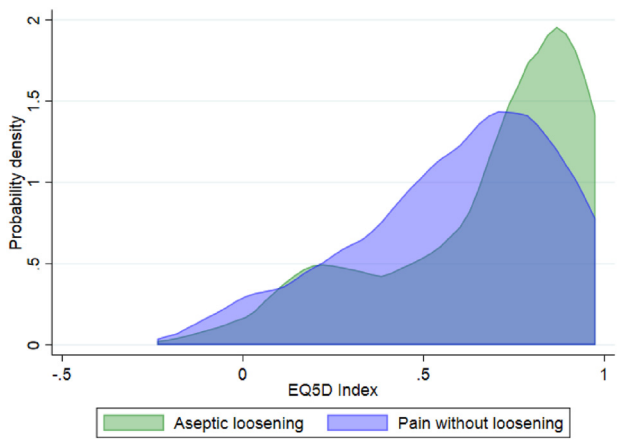

Fig. 3. EQ-5D Index for the indications of revision unexplained pain and aseptic loosening presented as kernel curves.

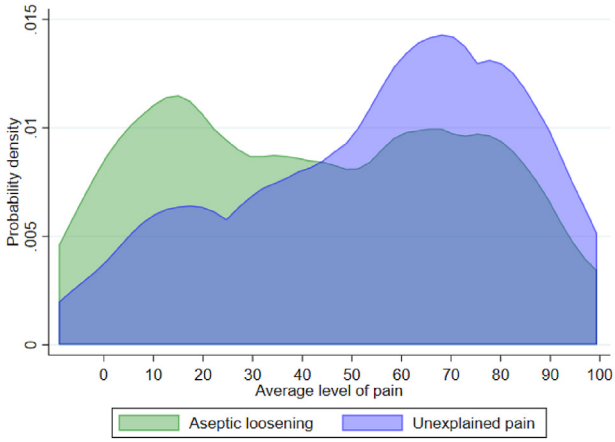

Fig. 4. Average level of pain (0 = no pain; 100 = worst pain imaginable) presented as kernel curves for the indications of revision unexplained pain and aseptic loosening.

Discussion

This was a nationwide study of PROM and satisfaction data from 384 patients collected 1 to 3 years after knee arthroplasty revision for the indications of unexplained pain versus aseptic loosening. We found significantly lower OKS and EQ-5D-5L Index scores for patients revised for unexplained pain. Patients revised for unexplained pain were less satisfied with the result of the surgery. There were 69% revised for pain versus 77% revised for aseptic loosening who considered the result of the surgery an important improvement. The author group has previously conducted a survival study including the same indications as in this study: unexplained pain and aseptic loosening. We found similar rerevision rates between groups [25].

Patient-Reported Outcome Measures

Baker et al investigated PROMs of a cohort of 996 revision patients recorded by the National Joint Registry for England and Wales from 2008 to 2010 [11]. Mean postrevision OKS was 26.4 (95% CI 23.5 to 29.3) for unexplained pain and 27.8 (95% CI 26.6 to 28.9) for aseptic loosening/lysis. Sabah et al investigated a cohort of 10,727 revision patients recruited from the UK National Health Service PROMs dataset from 2013 to 2019. They reported postrevision OKS of 29.0 without a specification of indications [10]. These scores are concordant with those of our study for both indication groups, although we did find a statistical significant difference between groups.

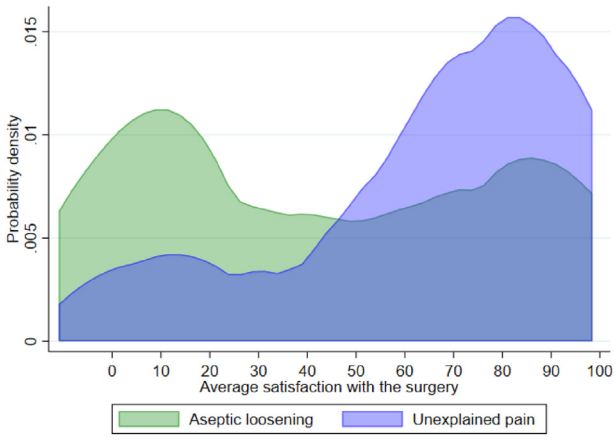

Fig. 5. Average level of satisfaction with the surgery (0 = very satisfied; 100 = not satisfied) presented as kernel curves for the indications of revision unexplained pain and aseptic loosening.

EQ-5D Index values of 0.5-0.7 after revision have been reported [10,11,26]. We reported higher values in our study. Index values differ among populations and the average EQ-5D Index of the Danish population is 0.9; thus, the revised patients had a worse quality of life than expected of Danish citizens [19].

A larger proportion of patients revised for unexplained pain (41%) had a flexion deficit than patients revised for aseptic loosening (26%) estimated by the Copenhagen Knee ROM. A study investigating a cohort of patients revised for unexplained pain also found a large proportion of pain patients with a decreased ROM [27]. The study found poor results of revisions for unexplained pain, especially for those with normal ROM. We did not detect differences in PROMs 1-2 years versus > 2-3 years after revision in both indication groups. This was expected because PROMs after revision have been shown to peak and stabilize after 1 year for most patients [28]. The PROMs were similar among the surgical subgroups. This could indicate a stronger influence of the indication for revision on the outcomes than the influence of the surgical subgroups.

Satisfaction

Satisfaction rates of 72%-88% after aseptic revisions have been reported [10,29]. Baker et al reported satisfaction rates after revision of 58% versus 72% of patients revised for unexplained pain versus aseptic loosening [11]. Sabah et al concluded that two-thirds of the patients achieved a clinically meaningful improvement in joint function [10]. These results correspond to those of our study and it seems that patients revised because of pain are generally less satisfied.

Strengths and Limitations

This was a nationwide study contributing with important information on PROs after knee arthroplasty revisions. Our study provides valuable data on what can be achieved after revision for unexplained pain and aseptic loosening.

We did not have prerevision PROs available for this study, as these are not captured in the DKR; thus, the delta change in PROs may actually not be different between groups, which is a major limitation. In addition, it is unknown if the indication groups differed at baseline or improved/worsened equally. The additional questions asked in this study do bring some information of the patient self-reported improvements or worsening, although memory bias might influence the answers.

The response rate of 68% may be acceptable in a nationwide study; however, results were less certain when responses were not complete. There are missing data in this study, as all patients did not complete or answer every item of each questionnaire. We accounted for this in the data analyses but it could potentially skew the results.

Conclusion

Patients undergoing TKA revision for the indication of unexplained pain had worse results on PROMs than those revised for aseptic loosening. Likewise, patients revised for unexplained pain were less satisfied compared to patients revised for aseptic loosening. This information is valuable to both surgeons and patients when candidates for revision surgery are selected, to obtain the best possible outcomes.

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Appendix

Supplementary Table 1
Patient-Reported Outcome Measures Presented as Total Scores for Unexplained Pain and Aseptic Loosening and as Scores in Two Time Periods Defined as Time From Revision to Data Collection (1-2 Y Versus 3 to < 4 Y) for Each Indication.

PROM Outcome Measure	Unexplained Pain			P (1-2Y Versus > 2-3)	Aseptic Loosening			P (1-2Y Versus > 2-3Y)	P (Pain Versus AL)
	Total n (%) n = 56	1-2 Y n (%) n = 23	>2-3 Y n (%) n = 33		Total n (%) n = 206	1-2 Y n (%) n = 104	>2-3 Y n (%) n = 102		
Oxford Knee Score[a]	25 (15)	26 (16)	24 (12)	0.667[b]	31 (18)	31 (19)	31 (17)	0.338[b]	0.009[b]
EQ-5D-5L Index[a]	0.6 (0.4)	0.7 (0.3)	0.6 (0.4)	0.311[b]	0.8 (0.3)	0.8 (0.4)	0.8 (0.3)	0.176[b]	0.009[b]
EQ VAS[a]; 100 best health imaginable-0 worst health imaginable	61 (37)	65 (32)	50 (41)	0.306[b]	60 (40)	62 (32)	53 (40)	0.257[b]	0.276[b]
FJS[a]	50 (7)	50 (9)	48 (10)	0.112[b]	50 (16)	50 (13)	48 (16)	0.61[b]	0.905[b]
Copenhagen Knee ROM									
Flexion[a]	5 (1)	4 (2)	5 (2)	0.122[b]	5 (2)	5 (1)	5 (2)	0.706[b]	0.035[b]
Flexion deficit (0-4)	23 (41%)	12 (52%)	11 (33%)	0.242	54 (26%)	24 (23%)	30 (29%)	0.354	0.035
Extension[a]	4 (1)	4 (1)	4 (1)	0.998[b]	4 (2)	4 (1)	4 (2)	0.647[b]	0.083[b]
Extension deficit (0-3)	21 (42%)	8 (47%)	13 (38%)	0.675	61 (29%)	31 (29%)	30 (28%)	0.909	0.258
Additional questions									
What do you think was the reason for reoperation of your knee?									
Pain	23 (43%)	12 (52%)	11 (35%)		51 (27%)	29 (30%)	22 (23%)		
Loosening of the components	7 (13%)	2 (9%)	5 (16%)		83 (43%)	42 (43%)	41 (43%)		
Instability	8 (15%)	3 (13%)	5 (16%)		21 (11%)	6 (6%)	15 (16%)		
Decreased range of motion	13 (24%)	6 (26%)	7 (23%)		16 (8%)	9 (9%)	7 (7%)		
Other	3 (5%)	0 (0%)	3 (10%)		22 (11%)	12 (12%)	10 (11%)		
What was your average pain level the last month on a 0-100 scale; 0 = no pain; 100 = worst pain imaginable[a]	62 (41)	50 (38)	72 (31)	0.061[b]	45 (56)	50 (59)	35 (55)	0.228[b]	0.008[b]
How satisfied are you with the result of the surgery on a 0-100 scale; 0 = very satisfied; 100 = not satisfied[a]	75 (38)	73 (30)	81 (42)	0.343[b]	50 (73)	50 (82)	35 (69)	0.141[b]	< 0.001[b]
How are your knee problems now compared to prior to the operation?									0.042
Better, an important improvement	13 (25%)	5 (23%)	8 (26%)		87 (45%)	42 (43%)	45 (48%)		
Somewhat better, but enough to be an important improvement	12 (23%)	8 (36%)	4 (13%)		29 (15%)	15 (16%)	14 (15%)		
Very small change, not enough to be an important improvement	4 (8%)	1 (4%)	3 (10%)		14 (7%)	9 (9%)	5 (5%)		
About the same	5 (9%)	0 (0%)	5 (16%)		23 (12%)	9 (9%)	14 (15%)		
Very small change, not enough to be an important improvement	3 (6%)	1 (5%)	2 (6%)		7 (4%)	4 (4%)	3 (3%)		
Somewhat worse, but enough to be an important deterioration	9 (17%)	5 (23%)	4 (13%)		11 (6%)	4 (4%)	7 (7%)		
Worse, an important deterioration	7 (13%)	2 (9%)	5 (16%)		21 (11%)	14 (15%)	7 (7%)		
Improvement				0.169				0.085	0.356
Importantly improved	25 (69%)	13 (81%)	12 (60%)		116 (77%)	57 (71%)	59 (83%)		
Not importantly improved	11 (31%)	3 (19%)	8 (40%)		35 (23)	23 (29%)	12 (17%)		

(*continued on next page*)

Supplementary Table 1 (*continued*)

PROM Outcome Measure	Unexplained Pain			P (1-2Y Versus > 2-3)	Aseptic Loosening			P (1-2Y Versus > 2-3Y)	P (Pain Versus AL)
	Total n (%) n = 56	1-2 Y n (%) n = 23	>2-3 Y n (%) n = 33		Total n (%) n = 206	1-2 Y n (%) n = 104	>2-3 Y n (%) n = 102		
Do you find your present situation acceptable considering your daily level of function?				0.272				0.915	0.005
Yes	19 (35%)	10 (43%)	9 (29%)		109 (57%)	56 (57%)	53 (56%)		
No	35 (65%)	13 (57%)	22 (71%)		83 (43%)	42 (43%)	41 (44%)		
The question was only asked to patients replying no to the above: Do you think the treatment has failed?				0.632				0.813	0.790
Yes	21 (64%)	7 (58%)	14 (67%)		53 (66%)	27 (67%)	26 (65%)		
No	12 (36%)	5 (42%)	7 (33%)		27 (34%)	13 (33%)	14 (35%)		
Would you go through the surgery again?				0.220				0.125	0.263
Yes	19 (35%)	6 (26%)	13 (42%)		91 (47%)	51 (52%)	40 (42%)		
Maybe	21 (39%)	12 (52%)	9 (29%)		67 (35%)	35 (35%)	32 (34%)		
No	14 (26%)	5 (22%)	9 (29%)		36 (18%)	13 (13%)	23 (24%)		

If no statistical test is mentioned for *P* values, Chi-squared test was used.
PROM, Patient-reported outcome measure; IQR, interquartile range; EQ VAS, EuroQol Visual Analogue Scale where 100 = best health imaginable and 0 = worst health imaginable; Copenhagen Knee ROM, Copenhagen Knee Range of Motion.
[a] Median (IQR).
[b] Wilcoxon Rank-Sum test.

Supplementary Table 2
Patient-Reported Outcomes From Patients Revised for the Indication Unexplained Pain Versus Aseptic Loosening by Surgical Subgroups 1 and 2.

PROM	Unexplained Pain		Aseptic Loosening	
	N = 56		N = 206	
Surgical Subgroup	1. TKA-TKA	2. Partial Revision	1. TKA-TKA	2. Partial Revision
	n = 49	n = 7	n = 174	n = 32
OKS (median [IQR])	26 (13)	19 (9)	31 (16)	24.5 (23)
EQ-5D-5L Index (median [IQR])	0.7 (0.4)	0.5 (0.5)	0.8 (0.4)	0.7 (0.5)
EQ VAS (median [IQR])	62 (37)	40 (50)	60 (31)	40 (39.5)
FJS (median [IQR])	50 (8)	46 (13)	50 (17)	48 (13)
Copenhagen Knee ROM				
Flexion (median [IQR])	5 (2)	5 (1)	5 (1)	5 (2)
Flexion deficit (0-4)	20 (41%)	3 (43%)	40 (23%)	14 (44%)
Extension (median [IQR])	4 (1)	3 (1)	4 (2)	4 (1)
Extension deficit (0-3)	17 (35%)	4 (57%)	49 (28%)	12 (38%)

PROM, Patient-reported outcome measure; OKS, Oxford Knee Score; IQR, interquartile range; EQ-5D-5L, a value of 1 indicates the best quality of life and 0 indicate the worst; EQ VAS, EuroQol Visual Analogue Scale where 100 = best health imaginable and 0 = worst health imaginable; Copenhagen Knee ROM, Copenhagen Knee Range of Motion.

Supplementary Table 3
Questions on Pain and Satisfaction for Patients Revised for the Indication Unexplained Pain Versus Aseptic Loosening by Surgical Subgroups 1 and 2.

Questions	Unexplained Pain n = 56		Aseptic Loosening n = 206	
Surgical Subgroup	1. TKA-TKA n = 49	2. Partial Revision n = 7	1. TKA-TKA n = 174	2. Partial Revision n = 32
Pain				
What was your average pain level the last month on a 0-100 scale; 0 = no pain; 100 = worst pain imaginable (median [IQR])	56 (48)	70 (20)	35 (57)	38 (35)
Satisfaction				
How satisfied are you with the result of the surgery on a 0-100 scale; 0 = very satisfied; 100 = not satisfied (median [IQR])	73 (37)	80 (32)	33 (70)	73 (64)
Improvement. How are your knee problems now compared to prior to the operation?				
Importantly improved	22 (71%)	3 (69%)	104 (81%)	12 (55%)
Not importantly improved	9 (29%)	2 (40%)	25 (19%)	10 (45%)
Do you find your present situation acceptable considering your daily level of function?				
Yes	17 (36%)	2 (29%)	97 (60%)	12 (40%)
No	30 (64%)	5 (71%)	65 (40%)	18 (60%)
The question was only asked to patients replying no to the above: Do you think the treatment has failed?				
Yes	18 (62%)	3 (75%)	36 (58%)	17 (94%)
No	11 (38%)	1 (25%)	26 (42%)	1 (6%)
Would you go through the surgery again?				
Yes	18 (38%)	1 (14%)	77 (47%)	14 (47%)
Maybe	17 (36%)	4 (57%)	57 (35%)	10 (33%)
No	12 (26%)	2 (29%)	30 (18%)	6 (20%)