

Revision in previously satisfied knee arthroplasty patients is the result of their call on the physician, not on pre-planned follow-up

A retrospective study of 181 patients who underwent revision within 2 years

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Submitted 04-07-09 Accepted 05-05-17

Background Degree of satisfaction with a knee arthroplasty is said to be correlated to reduced pain and better function. During a validation of the Swedish Knee Arthroplasty Register in 1997, previously operated patients were asked how satisfied they were with their knee. A subgroup of “satisfied” patients was identified who underwent revision within 2 years of having expressed satisfaction. Our aim was to study the revision diagnosis, to determine whether the problem leading to revision had been discovered as a result of routine follow-up, and also to find out when the symptoms leading to revision had started.

Methods We retrospectively studied the medical records of 181 patients (181 knees), with a median age of 74 (31–88) years. 68% were women and the median time between primary operation and revision was 8 (3–21) years.

Results Aseptic loosening (74/181) was the most common diagnosis. 2 cases were revised as a result of routine follow-up. 44% of the medical records included reports of pain in the replaced knee prior to answering the satisfaction questionnaire.

Interpretation Few patients were admitted to knee revision surgery due to medical findings discovered during routine follow-up. The term “satisfaction” must be interpreted with care, as it seems to have a more complex meaning for the patients than absence of knee pain.

The cumulative revision rate after a total knee arthroplasty in Sweden is reported to be 5% during the first 10 years (Lidgren et al. 2003). Aseptic loosening of the prosthesis was the most common cause of primary revision, accounting for 44% of all knee arthroplasty revisions in Sweden between 1975 and 1987. Other indications for revision were infection, periprosthetic fracture, patellar problems, instability, progress of primary disease and other mechanical problems such as implant failure and wear or misplacement of components (Robertsson et al. 2001).

The necessity of clinical and radiographic follow-up examinations after hip or knee arthroplasty in diagnosing problems requiring revision is debatable. From Switzerland, Roder et al. (2003) concluded that regular follow-up examinations of asymptomatic patients with hip arthroplasty are not necessary during the first 5–6 years. In the US, O'Rourke et al. (2002) found a high prevalence of osteolysis in patients with good or excellent clinical scores, and recommended routine follow-up radiographs after all arthroplasties to detect such cases. King et al. (2004) noted that when assessing 30 patients (35 knees) originally lost to follow-up, at a minimum follow-up of 5 years, there were no differences in clinical outcome as compared to 131 patients (165 knees) from the same period who were fol-

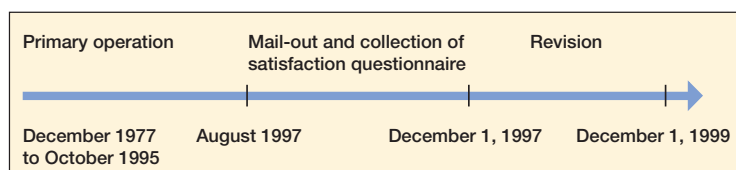


Figure 1. Relation in time between primary operation, questionnaire and revision of the 181 patients.

lowed up. Moreover, there were no revisions in the group originally lost to follow-up.

In Sweden, there are no guidelines for routine postoperative follow-up examinations; the number of postoperative examinations, the use of radiography, and the interval in-between vary by hospital and region. Other possible options are to use self-administered questionnaires (Lonner et al. 1999) or to leave it to the patients to spontaneously report back to the clinic if any problems arise. Rationalization of follow-up of routine knee arthroplasty will become more relevant as the demand for knee arthroplasty rises in the future (Robertsson et al. 2000b), as there is already increasing competition for the limited healthcare resources available.

In 1975, the Swedish Knee Arthroplasty Register (SKAR) was started as a prospective, nationwide study. Primary knee arthroplasties and revisions are reported annually to the administrative center at the Department of Orthopedics in Lund. The SKAR defines revision as addition, exchange or removal of prosthetic components (Lidgren et al. 2003). In 1997, during a process evaluating the SKAR, a satisfaction questionnaire concerning 28,962 registered knee replacements was mailed to and answered by 95% of the patients. 25,275 knees had not been revised at the time the patients responded to the satisfaction question. 20,978 (83%) of the patients with unrevised knees had been satisfied or very satisfied with their operated knee (Robertsson et al. 2000a). A subgroup of 184 patients (185 unrevised knees) was identified who underwent revision surgery within 2 years of having declared they were satisfied or very satisfied.

Earlier studies of patient satisfaction have been shown that satisfaction is correlated with subscales of pain and function—in both a general health questionnaire and a disease-specific questionnaire (Anderson et al. 1996). The satisfaction questionnaire used in the SKAR was validated in 2001 and

was found to have a high response rate and good reliability (Robertsson and Dunbar 2001). According to this report, unrevised, satisfied patients were likely to have less pain and better function than dissatisfied patients.

The aim of our study was to find out whether the subgroup of patients we had identified who had been satisfied or very satisfied with their primary knee arthroplasty—but who still underwent revision relatively soon afterwards—were sufferers of acute problems, whether the problems had started some time after answering the questionnaire, or whether they did not acknowledge any problems at all. We analyzed the patients' diagnoses and symptoms, determined at what time the symptoms leading to revision started, and investigated whether contact with the health care system had been due to regular follow-up or whether it had been initiated by the patient.

Patients and methods

In August 1997, the SKAR mailed a satisfaction questionnaire to all patients who had a total or unicompartmental knee arthroplasty. The questionnaire allowed four possible responses regarding satisfaction with the operated knee: 1) very satisfied, 2) satisfied, 3) uncertain, or 4) dissatisfied (Robertsson et al. 2000a). Most of the answers had been received by December 1, 1997, 4 months after sending out the questionnaires. The patients included in this study were those who had stated in the survey that they were satisfied or very satisfied with their primary knee arthroplasty, but who still underwent a revision between December 1, 1997 and December 1, 1999 (Figure 1).

The revisions were performed at 50 hospitals in Sweden. The medical records for the 184 patients (one knee from each patient was included) from the various hospitals were requested, but 3 medi-

Table 1. Patient age and time to revision. Values are median years (range)

	OA n = 151	RA n = 29	All n = 181
Age ^a	74 (39–88)	69 (31–87)	74 (31–88)
Years between operation and revision questionnaire ^a and revision	8.0 (2.9–21)	10 (3.9–21)	8.2 (2.9–21) 1.4 (0.3–2.3)
^a in August 1997			

cal records were unobtainable. The medical records for the remaining 181 patients were investigated systematically. We searched for information on reasons for revision (doctor's diagnosis and patient's concern), the onset of the patient's symptoms, and whether or not the doctor's visit which led to revision had been part of a routine follow-up examination.

In August 1997, the median age of the 181 patients was 74 (31–88) years, and 124 (68%) were women. 52% were satisfied with their knee arthroplasty and 48% were very satisfied. 151 patients had osteoarthritis (OA), 29 rheumatoid arthritis (RA) or other inflammatory arthritides, and 1 had osteonecrosis of the knee. The median time interval between the primary operation and revision was 8.2 (2.9–21) years (Table 1).

The study was approved by the Ethics Committee of the Medical Faculty of Lund University (LU 20-02).

Results

Doctors' diagnoses and patients' symptoms

The most common reasons for revision (as stated by the orthopedic surgeon in the medical records) were aseptic loosening/migration in 74 knees, wear of the prosthesis in 39 knees, and progression of OA in 25 knees (progression in the contralateral compartment or patellar OA) (Table 2). Mechanical loosening (67 patients) increased with time and accounted for one-third of the diagnoses (9/30 knees) in the group who had had their prosthesis for less than 5 years, one-third (30/87 knees) in those who had had their prosthesis for 5–10 years, and one-half (28/64 knees) where the prosthesis had been worn for more than 10 years.

Table 2. The main reasons for revision, as stated by the surgeon in the operative report (n = 181).

Indication for revision	n
Loosening/migration of prosthesis	74
Polyethylene wear	39
Progress of OA	25
Deep infection	10
Fracture of prosthesis	8
Instability, dislocation	6
Patellofemoral complications	6
Arteriosclerotic gangrene	4
Diabetic gangrene	3
Fracture of femoral condyle	2
Femoral pseudarthrosis	2
Various (progress of RA/pain)	2

According to the medical records, for 145/181 knees the primary symptom and concern was pain—either with weight bearing or at rest. For 2 of the patients, no diagnoses other than knee-related pain had been recorded by the orthopedic surgeon before the operation. After a revision had been performed, the diagnosis changed to progression of primary disease in one of the cases, but was still unexplained in the other.

For 36 knees, pain was not stated as a problem in the medical records. According to the records, these patients experienced instability (8 knees) or infection with fever (6 knees). Others had symptoms originating from gangrene in the lower part of the leg (7 knees), or fracture (2 knees), and one subject experienced no symptoms or concerns regarding the knee replacement. Although not specifically mentioned, many of these cases most likely implied a pain problem for the patient. For 12 subjects, there was no information at all in the medical records regarding the problems experienced by the patients.

Asymptomatic osteolysis was not mentioned in any of the medical records for the 181 patients. 1 patient with RA did not report any symptoms at all at the follow-up examination that were explicitly stated in the medical record, but underwent a revision due solely to radiographic findings. The radiographs revealed wear of a metal-backed patellar component of a Miller-Galante-I prosthesis, and a prophylactic revision was performed.

Acute problems or admissions leading to revision

27 patients (23 OA, 3 RA, and 1 osteonecrosis) were referred from an emergency room due to the knee problem, which led to revision. 7 of these patients (3 OA and 4 RA) underwent an acute operation: 3 due to acute infection, 2 due to gangrene in the lower limb, 1 due to trauma and fracture of the prosthesis, and 1 due to suspected infection—which turned out to be a loose prosthesis.

In 15 of the 181 knees, it was not possible to understand from the medical record whether the admission had been acute. The remaining 139 knees underwent an elective revision.

Initial reports of knee problems

The questionnaire on patient satisfaction was returned between August 1997 and December 1, 1997. Before that period, a revision had already been planned for 6 patients. According to the medical records, by December 1, 1997, 79 satisfied patients (44%) had already reported problems related to their knee arthroplasty. From 9 of the medical records, it was not possible to find out at when the problems had started. For the remaining 93 knees, the problems reported had started after the questionnaire was returned (December 1, 1997).

Initiation of contact

In 132 cases, the patient initiated the contact with the orthopedic surgeon for a knee problem that later led to revision. The contact was initiated either by a telephone call or a letter from the patient (14 knees), by referral from another doctor either in primary care or at a smaller hospital (91 knees), or by acute admission (27 knees).

In 17 cases, the knee problem that led to revision was defined in consultation with an orthopedic surgeon in a regular follow-up examination. How-

ever, the consultation was due to follow-up of the operated knee in only 2 of these cases, and one of these patients was not aware of any problems. In the remaining 15, the consultation was a follow-up due to another musculoskeletal complaint and the diagnosis that led to knee revision was made incidentally.

In 32 cases, the medical report did not specify whether the patient or the surgeon had initiated the contact that led to revision.

Discussion

We found that knee arthroplasty patients made contact with the medical care system when they experienced a problem in their replaced knee, which led to revision later on. The patients in our study were satisfied (or very satisfied) with their primary knee arthroplasty; but even so, 44% of the medical records included reports of pain in the operated knee even before the questionnaire was answered.

Routine follow-up

The question of whether follow-up examinations after knee arthroplasty should be clinical—with or without radiography—has been treated differently by the various Swedish clinics, and no guidelines exist.

In Sweden, after an uneventful knee arthroplasty operation, most patients have had at least one scheduled postoperative appointment with an orthopedic consultant. A primary concern is the possibility of asymptomatic osteolysis. If the cause of revision was asymptomatic, the patients in the identified subgroup would not have been aware of a problem. However, in this study there was only 1 of the 181 patients who underwent a prophylactic revision due to radiographic findings without experiencing pain or reduced physical function. In that particular case, the problem originated from a Miller-Galante-I prosthesis, which was made of titanium and which used a metal-backed patella, the combination of which led to a specific and well-reported failure pattern of wear with risk of metallosis (Berger et al. 2001, Kraay et al. 2001). According to our study, revisions of asymptomatic knee arthroplasties are unusual. The two most common diagnostic reasons for revision

were aseptic loosening and wear of the prosthesis, which is in accordance with the results of other studies from the SKAR (Robertsson et al. 2001). Similar results were found by Sharkey et al. (2002) in a study of 203 patients who had revision surgery within 9 days to 28 years (average 3.7 years). Our patients differed in age (range 31–88 years old), with a wide range of years from primary operation to revision (3–21 years).

Only 2 patients in our study underwent revision as a result of a regular follow-up. Unfortunately, the information in the medical reports concerning initiation of contact was often unclear. We have used a prospective register, the SKAR, for a retrospective study by studying the medical records for information not registered earlier. Due to this, there is a great deal of missing information, which reflects the problem of using medical records as the only source of information in a retrospective study. In 32 cases, it was not possible to ascertain whether the patient initiated the contact—or whether it was a regular follow up. Adding these 32 patients to the group of patients for whom information in the medical records was lacking would imply that, at most, 20% had been referred to revision surgery as a result of regular scheduled appointments. 3 out of 4 satisfied patients asked for medical care when they experienced a problem with the operated knee. For most patients (80%), the reason for seeking consultation with the surgeon was pain in the replaced knee. Subjects with instability, fever and infection, gangrene and fracture probably experienced pain, even though it was not stated in the medical records.

Regular routine follow-up of arthroplasty may be potentially burdensome to the patient and consumes healthcare resources that are limited, such as clinic space, radiography, and staff—especially the orthopedic surgeon. All of these factors constitute an inherent cost to society. Trusting the patients to self-report when there is a problem would free valuable resources. Another option would be to follow only those patients having implants with specific problems such as those with metal-backed patellar components or poor-quality polyethylene inserts.

The satisfaction questionnaire

It is well acknowledged that healthcare profession-

als should investigate the patient's expectations and opinions as well as testing his or her physical performance (Brokelman et al. 2003, Jinks et al. 2003, Moran et al. 2003). A single answer to a question regarding "satisfaction" with a replaced knee can be interpreted in different ways. It reflects the subjective view of the patient. The question regarding satisfaction has been found to show a correlation with pain and function measured using other health- and disease-specific outcomes (Robertsson and Dunbar 2001). Also, Brokelman et al. (2003) suggested that the most important factor in patient dissatisfaction is pain during activity.

For 51% of the 181 satisfied patients in our study, their problems started after the satisfaction questionnaire had been answered. However, 44% of the patients answered that they were satisfied—even though they had pain in their knee (according to the medical records) prior to answering the questionnaire. Being satisfied with the primary operation might imply that their expectations and desires had been met, and may have very little to do with the absence of pain (Mahomed et al. 2002). These patients had worn their prosthesis for a long time, which could be one reason for being satisfied. Another possible explanation for having pain and still being satisfied is that such patients are used to having pain and to being disabled, so that their expectations are limited. It has been shown that even though pain and disability improves after arthroplasty, levels of pain and disability are higher in patients who have undergone arthroplasty than in the general population (Jones et al. 2000, Boutron et al. 2003). It has also been found that psychosocial variables are related to functional outcomes after total knee replacement (Sharma et al. 1996), and these patients might be generally satisfied people. In the study by Anderson et al. (1996), it was also shown that patients with high scores on the SF-36 subscales mental health, emotional role and social functioning were more likely to be satisfied after a primary total knee arthroplasty. To be satisfied with a knee arthroplasty probably has a more complex meaning for the patients than absence of pain, which must be taken into account when formulating this question.

In the study by Robertsson et al. (2000a) on satisfaction, RA patients accounted for 13% of the total and they tended to be slightly more often satisfied

than OA patients. In our study, the RA patients were younger and had had their prosthesis slightly longer than the OA patients—which might explain why they also accounted for a larger fraction (16%) of the reported cases than in the SKAR.

Limitations of the study

A retrospective study only relying on information from medical records is admittedly imperfect. In some medical reports, the patient's problems are extensively covered, while in others the explanations are fragmentary. The subgroup of satisfied patients was selected on the basis of our interpretation of the satisfaction questionnaire as a group of patients with less pain and better function. During the study, this turned out to be partly false and with this in mind, it would be interesting to include dissatisfied patients also in a future study.

Author contributions

AB, MD, OR, IP and KK designed the study, AB performed the data collection and the data reduction, and AB and KK did the data analysis. AB wrote the manuscript and all authors were included in revision of the manuscript.

This study was supported financially by the Swedish Rheumatism Association, Stockholm, by the Department of Orthopedics, University Hospital, Lund, by the Swedish Research Council and by the Center of Research and Development at Spenshult Hospital for Rheumatic Diseases, Halmstad.

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