

Waiting for hip revision surgery: the impact on patient disability

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Objective: Increased wait times for total joint arthroplasty (TJA) are a concern nationally and provincially. Additionally, the number of patients requiring revision of their initial TJA is increasing. The purpose of this study was to evaluate the wait times and impact of waiting for revision TJA. **Methods:** We followed 127 revision hip arthroplasty patients (mean age 68 y) prospectively while they waited for surgery. We collected Western Ontario and McMaster Universities Osteoarthritis Index (pain, stiffness and physical function) data at the decision for surgery and at 6-month intervals until surgery. **Results:** The mean wait time for surgery was 123.8 days (mean wait times for individual surgeons ranged from 7 to 213 d). Of the patients, 106 waited < 6 months, 12 waited 6–12 months and 9 waited > 12 months. Wait times evaluated up to 6 months, 6–12 months or > 12 months demonstrated significant increases in pain ($F = 7.12, p = 0.01$), with a mean change of 2.6 points when patients waited > 6 months. Physical disability increased ($F = 4.61, p = 0.01$), with a mean change of 5.1 points when the wait time was 6–12 months and 8.8 points when the wait time was > 12 months. **Conclusion:** Waiting > 6 months for revision hip arthroplasty resulted in significant increases in pain and physical disability.

Objectif : L'allongement des temps d'attente pour une arthroplastie totale (AT) préoccupe, à l'échelle nationale et provinciale. En outre, le nombre de patients qui ont besoin d'une révision de leur AT initiale augmente. Cette étude visait à évaluer les temps d'attente et l'effet de l'attente d'une révision d'une AT. **Méthodes :** Nous avons suivi prospectivement 127 patients devant subir une révision d'une arthroplastie de la hanche (âge moyen de 68 ans) pendant qu'ils attendaient une intervention chirurgicale. Nous avons recueilli des données sur l'indice de l'arthrose des universités Western Ontario et McMaster (douleur, raideur et fonction physique) au moment où l'on a pris la décision de pratiquer l'intervention chirurgicale et à des intervalles de six mois jusqu'à ce que l'intervention soit pratiquée. **Résultats :** La durée moyenne de l'attente pour la chirurgie s'est établie à 123,8 jours (le temps d'attente moyen pour chaque chirurgien a varié de 7 à 213 j). Parmi les patients, 106 ont attendu moins de six mois, 12 ont attendu de six à 12 mois et 9, plus de 18 mois. Les temps d'attente évalués jusqu'à 6 mois, de 6 à 12 mois ou de plus de 12 mois se sont accompagnés d'une augmentation importante de la douleur ($F = 7,12, p = 0,01$) et d'un changement moyen de 2,6 points lorsque les patients ont attendu plus de 6 mois. L'incapacité physique a augmenté ($F = 4,61, p = 0,01$), le changement moyen atteignant 5,1 points lorsque la période d'attente était de 6 à 12 mois et 8,8 points lorsqu'elle dépassait 12 mois. **Conclusion :** L'attente de plus de 6 mois pour une révision d'une arthroplastie de la hanche a entraîné des augmentations importantes de la douleur et de l'incapacité physique.

Scarce resources have led to growing waiting lists in most publicly funded health care systems.^{1,2} The issue has received much attention, particularly for non-life-threatening conditions with known efficacious treatments in which patients experience significant pain and disability.^{1,3-5} One such elective procedure is

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total joint replacement surgery for lower-extremity arthritis.^{2,6-8} To compound the problem of wait time in the face of limited resources, Hawker and colleagues⁹ have demonstrated that an unmet need for arthroplasty exists even as volumes of patients undergoing joint arthroplasty are increasing annually.¹⁰

In addition to the suffering experienced by patients as they wait for surgery, there is concern that patient function deteriorates as they wait. This is potentially significant because at present the best-known predictor of outcome following joint replacement surgery is the patient's functional status before surgery.¹¹ Data from primary hip and knee replacement (in which 572 patients, or 16%, and 124 patients, or 5%, respectively waited for more than 6 months) suggest that pain and functioning remain relatively stable as people wait for surgery.^{7,12} The impact of waiting for surgery has not been evaluated in patients who require revision hip arthroplasty. The purpose of the current study was to evaluate how long people wait for revision hip arthroplasty in academic tertiary care centres and whether patient pain and functioning as measured by the Western Ontario and McMaster Universities Osteoarthritis Index^{13,14} (WOMAC; Likert 3.0 version used in this study) are adversely affected by this wait.

Methods

This study evaluating the impact of waiting for revision hip arthroplasty is 1 phase of a cohort study evaluating the predictors of disability outcomes 2 years after revision surgery. Patients were eligible for this prospective, longitudinal cohort study if they had a prior total hip arthroplasty for primary or secondary osteoarthritis, were fluent in spoken and written English and consented to participate. Patients were excluded if they had rheumatoid arthritis or other collagen vascular disease or if revision surgery was required

for infection or owing to a traumatic fracture. Eligible subjects were recruited from 4 teaching centres in Metropolitan Toronto between July 1998 and December 1999. Inception occurred when both the patient and surgeon agreed that revision hip arthroplasty surgery was required and should be scheduled. The waiting list was managed independently by each surgeon according to established office procedures. One surgeon maintained an "urgent" waiting list in addition to the nonurgent waiting list. Those on the urgent list were contacted for surgery only in the event of a surgical cancellation or if additional operating time became available. Waiting time for surgery was calculated as the number of days between the date of study inception and the date of surgery for all participants.

Within 1 week of study inception, patients completed a baseline questionnaire including demographics, comorbidity and the WOMAC.¹³ The WOMAC was completed every 6 months as the patient waited for surgery, with a presurgery questionnaire completed within 1 week of surgery. The WOMAC is a patient-based questionnaire that evaluates symptoms and functional disability in patients with hip or knee arthritis or both. It has demonstrated reliability, validity and responsiveness, and its use is recommended for consistent reporting of outcomes in patients undergoing hip and knee arthroplasty.¹⁴ The pain scale includes 5 items (maximum total score 20), and the function scale includes 17 items (maximum total score 68); lower scores indicate less pain and less physical disability.

Patients were asked whether they were told about the length of the wait for surgery at the time of their initial consult with the surgeon. As well, patients were asked whether they considered going to another surgeon to try to have surgery more quickly.

The sample size for our study was based on the primary research ques-

tion evaluating predictors of disability outcomes as measured by the WOMAC 2 years after surgery. The calculated sample size of 127 analyzable cases is included in this study. During the accrual period, an additional 22 eligible patients refused to participate, 2 who were enrolled in the study died while waiting for surgery, 7 who initially consented to participate dropped out while waiting for surgery, and 1 went elsewhere for surgery to avoid waiting and declined further participation.

Descriptive statistics including mean, median, standard deviation (SD) and proportions were calculated for the sample and wait time. Change in WOMAC pain and function scores while waiting for surgery was calculated by repeated-measures analysis of variance. Wait time was categorized as less than 6 months, 6-12 months and more than 12 months. We evaluated the following factors as potential predictors of change in WOMAC pain and change in WOMAC function: wait time categorized as above, age, sex, baseline WOMAC pain score, baseline WOMAC function score, reason for revision, number of comorbid diseases, number of revisions and education level. Factors that were significant at $p < 0.10$ in univariate analysis were retained for the multivariate analysis.

Results

The 127 patients included in this study were on average 68 years of age, and there were equal proportions of men and women. Of the subjects, 90% had high school or higher education. Recruitment from the 4 centres was disproportionate, with 51 (40.2%), 31 (24.4%), 31 (24.4%) and 14 (11%) patients, respectively. Just over one-half of the patients were awaiting their second or more revision surgery, and multiple reasons for requiring revision surgery were cited. Pain, functional difficulties and aseptic loosening were most common. Of the sample,

60% used a pain-relieving or anti-inflammatory medication; 17% were able to ambulate without a gait aid. Where an aid was needed, a single cane was most frequently required ($n = 58$). Details of the patient sample are reported in Table 1.

Table 1

Patient demographics ($n = 127$)	
Characteristic	No. of patients (and %)*
Age	
mean (and SD)	68.6 (10.9)
range	35.0–89.3
Sex, male:female	66:61
Education level	
Public school	11 (8.6)
High school	54 (42.5)
College or university	53 (41.7)
Graduate or professional degree	7 (5.5)
Missing	2 (1.5)
Comorbidity†	
Cardiac	24 (18.9)
High blood pressure	31 (24.4)
Revision number	
1	61 (47.9)
2	43 (33.9)
3	11 (8.7)
4	8 (6.3)
5–7	4 (4.0)
Revision reason‡	
Pain	123 (84.1)
Function	73 (57.5)
Loose	95 (74.8)
Osteolysis	17 (13.4)
Dislocation	8 (6.3)
Medication use	
None	39 (30.7)
NSAIDs	26 (20.5)
Nonnarcotic pain	49 (38.6)
Narcotic	13 (10.2)
Gait aid use	
None	22 (17.4)
1 cane	58 (45.7)
2 canes	12 (9.4)
Crutches	14 (11.0)
Walker	16 (12.6)
Wheelchair	5 (3.9)

NSAID = nonsteroidal antiinflammatory drug; SD = standard deviation.
 *Unless otherwise indicated.
 †Any other comorbid diseases were reported by a single patient.
 ‡Multiple reasons could be cited. Percentages do not necessarily equal 100% owing to rounding.

On average, patients waited 123.8 days (median 81, SD 141.4, d) for surgery. Of the 127 patients, 106 waited less than 6 months for surgery, 12 waited 6–12 months, and 9 waited more than 1 year. The wait varied by surgeon, even within a centre. Of the 7 participating surgeons, the mean wait time by surgeon ranged from 7.0 to 213.4 days. One surgeon who accrued one-third of the sample ($n = 40$) had the longest mean wait time (213.4, SD 194.6, d), but for the remaining surgeons, increased wait time was not related to the number of patients accrued to the study. For example, surgeons accruing 30 and 32 patients had average wait times of 72.3 (SD 81.1) and 114.7 (SD 90.3) days, respectively.

All patients responded that they were told about the wait time for surgery by each of the surgeons. However, all but 1 patient elected to wait for surgery rather than go to another surgeon. We do not know whether the 7 patients who initially agreed to participate but withdrew from the study while waiting for their surgery never had surgery or went elsewhere for surgery.

There was no change in WOMAC pain or function for those waiting less than 6 months for surgery. For patients waiting 6–12 months or more than 12 months for surgery, there were statistically significant increases in pain and function ($F = 7.12$, $p = 0.01$ and $F = 4.61$, $p = 0.01$, respectively). For the 12 patients waiting 6–12 months, pain

scores increased by 2 points and function scores increased by 5 points. For the 9 patients waiting more than 12 months for surgery, pain scores increased by 2 points and function scores increased by 9 points, representing increased pain and poorer function (Table 2).

Wait time (categorized as < 6 mo, 6–12 mo or > 12 mo), age, sex, baseline WOMAC pain, baseline WOMAC function, reason for revision, number of comorbid diseases, number of revisions and education level were evaluated as potential predictors of change in WOMAC-assessed pain or function. Only wait time and education were significant univariate predictors ($p < 0.10$) and were retained for the multivariate analysis. Increase in pain in the multivariate model was predicted only by increasing education level ($p = 0.03$); wait time was not a significant predictor ($p = 0.91$). Deterioration in physical function was marginally predicted by longer wait time ($p = 0.05$), and there was a trend to increasing education as a statistically significant predictor of change in function ($p = 0.06$).

Discussion

Patients waiting for revision hip arthroplasty in 4 academic tertiary care centres in Toronto, Ontario, waited on average 123 days for surgery from the time that the surgeon and patient decided that surgery was required. About 16% waited

Table 2

WOMAC pain and function scores by wait time				
Wait time	Pain; mean (and SD)		Function; mean (and SD)	
	Inception	Presurgery	Inception	Presurgery
< 6 mo ($n = 106$)	9.1 (4.2)	9.0 (4.1)	35.6 (14.1)	34.1 (13.8)
6–12 mo* ($n = 12$)	8.5 (3.9)	10.5 (2.8)	33.2 (10.1)	38.3 (9.6)
> 12 mo* ($n = 9$)	8.6 (5.3)	10.4 (4.5)	32.8 (16.9)	41.6 (18.2)

WOMAC = Western Ontario and McMaster Universities Osteoarthritis Index; SD = standard deviation.
 *Pain: $p = 0.01$; function: $p = 0.01$.

6 months or more for their surgery. It seems that patients waiting more than 6 months experienced increased pain and decreased function as measured by the WOMAC. The average changes were small but greater than change due to measurement error alone¹³ and greater than the minimal clinically important difference.¹⁵

The findings in the current study are contrary to the findings of Kelly and colleagues,⁷ who did not find changes in WOMAC pain and function scores in patients waiting for primary hip or knee arthroplasty over any period of wait time. Similarly, Derrett and colleagues¹² did not find any change in pain or function, as measured by the Short Form 36 Health Survey, in 47 patients waiting for primary hip or knee replacement. Of these patients, 42% had waited more than 12 months for their surgery.¹² Mahon and colleagues⁸ did not report change while waiting but did find that patients who had shorter waiting times (and reported more severe symptoms) had greater improvements in health status post-surgery. This study of patients undergoing hip revision arthroplasty also suggests that patients who had longer waits for surgery had more pain and poorer WOMAC-assessed function 2 years after surgery.

If the relation between deterioration and wait time for revision hip arthroplasty were linear, it would be expected that this deterioration would occur before 6 months. However, it is possible that the WOMAC is not sensitive enough to pick up these smaller changes. Alternatively, patients may be adapting and using strategies to cope and maintain their functional level. Gignac and colleagues¹⁶ have suggested that people with arthritis learn to adapt and make measured decisions about valued activities that they give up. These potential coping and adaptation strategies are not, nor were they intended to be, captured by the WOMAC.

We asked patients whether they

were told about the wait time when they first saw the surgeon and whether they were offered the option to have surgery with another surgeon who had shorter wait times. All patients reported that they were told about the wait, but only 1 patient elected to have surgery by another surgeon. This also suggests that patients somehow elect to manage their condition during this waiting period.

The wait times reported in this study for revision hip arthroplasty are slightly shorter than those reported for primary joint arthroplasty in the province of Ontario, where, according to the reported time intervals between orthopedic consultation and surgery, the median wait for hip replacement was about 115 days until 1998; it then increased to 139 days in 1999. For total knee replacements, median wait until 1998 was 150 days, increasing to 181 days in 1999.¹⁷ Williams and colleagues¹⁸ found that about 60% of patients ($n = 238$) from community and academic surgeon practices waited more than 6 months for surgery. In the Capital Health Region of Alberta between 1995 and 1997, Kelly and colleagues⁷ reported a mean wait time of 107 days for total hip or knee replacement. Overall, 16% ($n = 304$) waited more than 6 months and 52% waited less than 3 months.⁷ Patients referred for primary total hip arthroplasty to 7 surgeons working at an academic tertiary care centre in London, Ontario, waited an average of 6.5 (SD 5.0) months between referral for orthopedic consultation and surgery.⁸ Of these patients, 50% ($n = 99$) had wait times of 4.7 months and 25% waited 9–24 months.⁸ More recently, a joint report from the British Columbia Orthopaedic Society and the Arthritis Society of British Columbia reported that the average wait time was 18 months for knee replacement surgery and 11 months for hip replacement surgery.¹⁹ This literature suggests that wait times may be longer for primary as opposed to revision joint replacement surgery;

however, the percentage of patients waiting more than 6 months (range 16%–25%) is similar for both primary joint and revision hip arthroplasty.^{7,8,17,18} It should be noted that waiting time is most often defined from the decision for surgery to the surgery date, which may underestimate the total wait time by not including the referral to orthopedic consult time. It is possible that patients requiring revision arthroplasty are already within the orthopedic surgeon's practice and, hence, may have enhanced access.

In this study, severity of pain or functional limitations as measured by the WOMAC was not predictive of the waiting time. Baseline pain and function scores were similar in patients waiting less than 6 months, 6–12 months and more than 12 months. This finding is similar to findings of other authors.^{7,12,18} Nilsson and Lohmander²⁰ evaluated wait time dichotomized at 3 months and found no differences in WOMAC scores at baseline or follow-up. However, Mahon and colleagues⁸ did find that patients with longer wait times (> 6 mo) had less pain and fewer functional limitations at initial evaluation than those with shorter wait times. Kelly and colleagues⁷ found that marital status, primary language, body mass index, pain medication and volume of the surgeons' joint replacement practices determined wait time. In the current study, surgeons were using their usual criteria for placing patients on the surgical waiting list, were not using any standardized priority criteria for wait times for surgery and did not have access to the WOMAC study data. The perception of the surgeons was that disability level and amount of bone loss were given implicit consideration in determining whether a patient should be given priority for surgery. There was no indication in the other reports of whether the functional scores were available to assist surgeons in making decisions about urgency.

This study suggests that, in addition to the suffering experienced by patients waiting for revision hip arthroplasty, patients who wait more than 6 months seem to experience increased pain and functional limitations. This is important because preoperative pain and function levels are predictive of pain and functional outcomes in primary hip and knee replacement.¹¹ In the patients in this study, pain was similarly predictive of pain outcomes 2 years after revision hip arthroplasty, and there was a trend to preoperative function predicting 2-year function outcomes.²¹ Limiting wait times and ensuring optimal patient status presurgery is critical for maximizing outcomes for people undergoing revision hip arthroplasty.

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