Osteoarthritis and Cartilage 25 (2017) 885–891

Osteoarthritis and Cartilage

Variations in pain and function before and after total knee arthroplasty: a comparison between Swedish and Australian cohorts

M.M. Dowsey † *, O. Robertsson ‡ §, M. Sundberg ‡ §, L.S. Lohmander ‡, P.F.M. Choong †, A. W-Dahl ‡ §

† *Department of Orthopaedics and the University of Melbourne Department of Surgery, St. Vincent's Hospital Melbourne, Australia*
‡ *Orthopaedics, Department of Clinical Sciences, Lund University, Lund, Sweden*
§ *The Swedish Knee Arthroplasty Register, Lund, Sweden*

ARTICLE INFO

Article history:
Received 12 July 2016
Accepted 14 December 2016

Keywords:
Total knee arthroplasty
Patient reported outcomes
Pain
Function

SUMMARY

Objective: Preoperative pain and function is viewed as an important predictor of total knee arthroplasty (TKA) outcomes. We examined whether variations in pain and function outcomes existed at 12 months between two centres in Sweden and Australia, and whether this was explained by variations in patient presentation for TKA.

Methods: This was a retrospective analysis of prospectively collected data. Patients from one centre in Australia (St. Vincent's Hospital (SVH), $N = 516$) and in Sweden (Trelleborg (TBG), $N = 899$) who underwent primary TKA between 2012 and 2013. The Western Ontario and McMaster Universities Arthritis Index (WOMAC) was analysed pre- and 12 months' post TKA from which non-response to surgery was determined using the OMERACT-OARSI criteria. Multiple linear regression analysis was used to examine the relationship between change in pain and function and surgery centre, adjusting for preoperative patient characteristics and surgical technique.

Results: Despite worse preoperative outcomes in all subscales of the WOMAC for the SVH cohort, there were no clinically meaningful differences in 12-month WOMAC subscales nor change in WOMAC subscales between SVH and TBG. Almost identical proportions of patients were considered OMERACT-OARSI responders, 85.7% (SVH) and 85.9% (TBG), however for the SVH cohort 25 (4.9%) were moderate and 417 (80.8%) were high responders, compared to the TBG cohort of which 225 (25%) were moderate and 547 (60.9%) were high responders.

Conclusion: Despite differences in preoperative presentation between 2 countries, improvements in pain and function and the proportion of individual who responded to TKA surgery at 1 year were similar. Factors related to poor response to TKA surgery require further elucidation.

Introduction

The number of total knee arthroplasty (TKA) procedures performed each year continues to rise throughout many developed countries and this continual rise is in part due to an ageing population and increasing rates of obesity. While TKA is a cost-effective procedure for treating end-stage osteoarthritis (OA)[1], increases in the costs of this procedure[2] as well as projected rises in disease burden[3] have raised considerable concern about the sustainability of current practices. Models of care for managing end-stage OA and more specifically clinical guidelines to support decision making in arthroplasty surgery are lacking however, and thus patient selection for TKA is left to clinical judgement alone. It is not surprising therefore that wide variations in the pre-operative characteristics of patients undergoing TKA have been reported. A recent study comparing Australian and European centres highlighted wide variations in the age and physical status of those undergoing hip and knee total joint arthroplasty (TJA) both within and between countries[4]. Variations in baseline status have also been

* Address correspondence and reprint requests to: M.M. Dowsey, Department of Orthopaedics and the University of Melbourne Department of Surgery, St. Vincent's Hospital Melbourne, Australia, PO Box 2900, Fitzroy, Victoria 3065, Australia. Fax: 61-3-9416-3610.
E-mail addresses: mmdowsey@unimelb.edu.au (M.M. Dowsey), otto.robertsson@med.lu.se (O. Robertsson), martin.sundberg@med.lu.se (M. Sundberg), stefan.lohmander@med.lu.se (L.S. Lohmander), pchoong@unimelb.edu.au (P.F.M. Choong), annette.w-dahl@med.lu.se (A. W-Dahl).

http://dx.doi.org/10.1016/j.joca.2016.12.018
1063-4584/

noted in comparisons between Canada and the United States[5], within Europe[6] as well as Australia and the United Kingdom[7]. A number of reasons for these variations have been postulated including variations in waiting times for surgery[8,9], rationing of surgery due to resource issues, cultural differences and disparities in access to surgery according to socio-economic status, gender or ethnicity[10–12].

Studies comparing international cohorts have highlighted the importance of baseline pain and physical function as a predictor of TKA outcomes, arguing that those with worse baseline pain and function experience poorer outcomes or less improvement from surgery, suggesting that earlier surgical intervention is warranted[5,13]. While these studies report poorer pain and function outcomes at 6 months and 2 years post TKA for those with worse baseline scores, the levels of improvement between baseline and post-surgery scores have not been reported. Given the variability in pain and function in those presenting for TKA across European and Australian centres, we sought to compare post-operative pain and function in individuals with a diagnosis of knee OA who underwent surgery at two high volume arthroplasty centres, in metropolitan Melbourne (Australia) and in the Region of Skane (Sweden). We aimed to examine whether variations in pain and function outcomes existed at baseline and 12 months between the two centres and whether this was explained by variations in patient presentation for TKA surgery.

Methods

Study institution

This study was conducted at St. Vincent's Hospital (SVH), in Melbourne, Australia and at Trelleborg hospital (TBG), Sweden. SVH is a major metropolitan tertiary referral centre for elective arthroplasty surgery. TBG is the hospital used by the orthopaedic department at Skane University Hospitals in Lund and Malmö, for all elective arthroplasty surgery.

Inclusion and exclusion criteria

All patients admitted to the two institutions who underwent primary TKA for knee OA between 1 January 2012 and 31 December 2013 were considered eligible for enrolment into the study. Patients were excluded from analysis if deceased or they underwent revision knee arthroplasty during the 12 months' follow-up. Revision was defined as a new operation in a previously resurfaced knee in which one or more of the components are exchanged, removed or added (including arthrodesis or amputation). In patients who underwent staged bilateral knee arthroplasty during the study time frame (SVH = 60, TBG = 75), only the pre and 12 month WOMAC scores for the most recently performed TKA were included in the analyses. In cases of simultaneous bilateral TKA's the right knee was included and only patients with complete WOMAC scores, pre- and 12 months postoperatively were analysed.

Data collection

For the SVH campus data were extracted from the St. Vincent's Melbourne Arthroplasty Outcomes (SMART) Registry. SMART is a clinical registry based at SVH that houses clinical and patient reported outcome data, in all patients who undergo elective lower limb arthroplasty at the study institution. Baseline data is prospectively collected and includes patient demographics, diagnoses, and self-reported co-morbidities. Patients complete a disease-specific questionnaire (The Western Ontario and McMaster Universities Osteoarthritis – WOMAC) within 12 weeks prior to surgery and annually post-operatively. Questionnaires are sent to patients prior to each scheduled follow-up appointment and additional mail-outs are sent to non-attenders followed by a phone call 4 weeks later for any incomplete data or missing surveys. The SMART Registry has been approved by the Human Research Ethics Committee of St. Vincent's Hospital Melbourne (HREC-A 100/14), and informed consent is obtained prior to entry onto the Registry.

Patient and procedure related data for the TBG cohort were extracted from the Swedish Knee Arthroplasty Register (SKAR). Patient reported outcome measures (PROM) are routinely collected in the hospital, which was initiated by the health authorities to be used as a quality measure of the care provided. TBG was the first unit to be included in the SKAR PROM pilot project. Preoperatively patients fill in, among other questionnaires, the disease-specific Knee injury and Osteoarthritis Score (KOOS) at the preoperative outpatient visit approximately 4 weeks prior to surgery. One year postoperatively the same questionnaire is mailed to patients. Patients are informed of the planned 1-year follow-up, but no reminders are sent in case of no response at that time. The study was approved by the regional ethical review board in Lund (LU 20-02).

Patient and procedure related variables

Sex, age, body mass index (BMI) were available patient characteristics in both registers as well as the American Society of Anaesthesiologists (ASA) classification[14] grade 1 to 4 which was recorded by the attending anaesthesiologist at the time of surgery. Information regarding type of prosthesis (minimally stabilized, posterior stabilized and congruent), fixation (cemented/uncemented), patella resurfacing (yes/no), use of computer assisted navigation (CAS) (yes/no) and length of stay (days) were common procedure measures available.

PROM

The WOMAC[15] is a widely used, disease-specific measure for knee OA that contains 24 items: 5 pain, 2 stiffness, and 17 physical function. WOMAC pain, stiffness and physical function subscales can be derived from the KOOS[16], using accepted techniques. In short, all questions contained within the WOMAC are included in their full and original form in the KOOS questionnaire[17]. The maximum possible scores for each subscale of the WOMAC are 20 for pain, 8 for stiffness, and 68 for function. A normalized score was created for each subscale from 0 to 100, with a higher score indicating better outcome. OMERACT-OARSI criteria were applied to calculate responder rates at 12 months[18]. By definition, an improvement in pain or function of 50% and an absolute change of 20 points is considered a responder, and if the patient does not fulfil these criteria, improvement in two of the 3 following is also considered a responder: pain of 20% and an absolute change of 10 points, function of 20% and an absolute change of 10, and patient's global improvement of 20% and an absolute change of 10 points. The outcome at 12 months was dichotomised into ‘responders’ and ‘non-responders’ according to these criteria.

Statistics

This was a retrospective analysis of prospectively collected data. PROM, age, BMI and length of stay are presented as a mean value and standard deviation (SD) and/or 95% confidence interval (CI). The Welch's *t*-test was used in statistical analysis for comparisons between the two cohorts taking in to consideration if the number of observations between the groups was not equal. For analysis of proportions of sex, ASA, prosthesis, fixation, patella resurfacing, computer assisted surgery (CAS) and OMERACT-OARSI responder