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Persistent pain after knee replacement: do factors associated with pain vary with degree of patient dissatisfaction?

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SUMMARY

Objective: Up to 20% of patients experience long-term pain and dissatisfaction following knee replacement. The aim of this study was to investigate factors associated with persistent pain following knee replacement and their implications for patient satisfaction.

Design: A case-controlled analysis compared patients with established persistent pain with patients who were pain-free. 2:1 frequency matching for age, gender, time from surgery and prosthesis was performed. 1310 patients were approached and 100 patients with persistent pain and 200 matched pain-free controls were included. Variables assessed included mechanical, biological, psychosocial and generalised factors.

Results: The study found that the degree of dissatisfaction experienced by the patient with persistent pain following knee replacement affected the factors associated with pain. In the most dissatisfied patients, pain was associated with instability in the coronal plane (OR 19.8, 95% CI 3.8–104.0), stiffness (OR 6.4, 95% CI 2.3–18.4) and negative social support (OR 3.3, 95% CI 1.1–10.0). In patients who were less dissatisfied, pain was associated with patellofemoral problems (OR 10.3, 95% CI 3.6–29.6), elevated BMI (OR 2.8, 95% CI 1.4–5.7) and reduced local pain thresholds (OR 4.4, 95% CI 2.0–9.6). Depression (OR 13.6, 95% CI 1.9–96.6) and presence of proximal tibial tenderness (OR 23.5 95% CI 7.8–70.7) were strongly associated with pain regardless of level of satisfaction.

Conclusions: Patients with persistent pain after knee replacement are dissatisfied. This study identifies factors associated with the worst pain outcomes, which lead to the greatest levels of dissatisfaction. Particular efforts with a holistic multidisciplinary approach should be focused towards these “red flag” factors in order to minimise persistent pain after knee replacement.

Introduction

Knee replacement is the most commonly performed joint replacement procedure in England and Wales with 96,986 primary knee replacement procedures performed in 2014[1] In appropriately indicated patients unicompartmental knee replacement (UKR) is a joint preserving alternative to total knee replacement (TKR) that gives broadly equivalent results[2–4]. TKR and UKR have been widely deemed two of the most successful orthopaedic operations; however there remains a significant proportion of patients who experience persistent pain and functional limitations following knee replacement with around 20% of patients reporting unfavourable pain outcomes[5]. Patient satisfaction has been deemed a key outcome metric in assessment of performance of the UK National Health Service and has been elevated to the highest priority measure of progress and success[6]. Importantly pain has been shown to be associated with reduced patient satisfaction and as such is an important metric in the assessment of knee replacement outcomes[7,8].

A wide variety of causes have been proposed for persistent pain following knee replacement. Initial assessment involves thorough clinical evaluation, serological investigation, diagnostic imaging and microbiological analysis in order to identify known aetiologies

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and guide treatment[9,10]. Despite such assessment there remain a proportion of patients in whom no clear cause can be established[11]. As knee replacement is primarily performed to relieve chronic pain, pain severity is a key outcome from surgery that impacts on patient satisfaction. Established orthopaedic causes for painful TKR or UKR include infection, referred pain and mechanical causes including malalignment, instability stiffness, impingement, loosening of components and patellofemoral joint problems[11–13]. In addition a number of psychosocial, biological and generalised factors have also been proposed[14,15]. The interplay between a variety of potentially causative or associative factors and the development of chronic post surgical pain after knee replacement, is clearly complex and in most cases multifactorial. This makes the development of protocols for the identification, assessment and ultimately management of the patient with persistent pain after knee replacement a particular challenge. In order to direct this future work, a clearer and more detailed characterisation of the profile of patients with persistent pain following knee replacement is required. The aim of this study was therefore to investigate factors associated with persistent pain following knee replacement and their implications for patient satisfaction.

Methods

Patient recruitment

Recruitment of patients into this study is depicted in Fig. 1. This study was approved by South West research ethics committee (reference 11/SW/0278) and all patients provided informed, written consent. Patients were identified from a prospectively collected database of all patients undergoing knee replacement at a single UK specialist orthopaedic centre in order to standardise for patient experience. The aim was to recruit 50 patients who had undergone TKR and 50 patients who had undergone medial UKR for osteoarthritis, that had persistent unexplained pain following surgery plus 100 TKR and 100 UKR patients without pain, frequency matched for age, gender, time from surgery and prosthesis to act as controls[16–18]. Sample size was based on previous studies assessing pain thresholds and postoperative determinants of pain after joint replacement and the numbers of patients required for accurate case matching from the study population. Inclusion and exclusion criteria for recruitment to this study:

Inclusion criteria:
- Ability to provide informed consent
- Having undergone TKR or UKR for osteoarthritis with included prostheses between 2001 and 2009.

Exclusion criteria:
- Unwilling or unable to provide informed consent
- Having undergone revision surgery
- Inability to complete English language self-assessment forms (As questionnaires used have been validated in the English Language)

In order to minimise variables relating to surgical technique and prosthesis design, all recruited TKR patients had the same prosthesis. This was the Press Fit Condylar (P.F.C) Sigma TKR from DePuy International, Leeds, UK. For UKR a pragmatic decision was made to expand this to patients who had one of two prosthesis designs to ensure a sufficient pool of patients for UKR. These were the AMC/Uniglide UKR (manufactured by Corin, Cirencester, UK) or Oxford Medial UKR (manufactured by Biomet, Bridgend, UK).

A screening questionnaire was sent to all potential participants (sent at mean 5.6 (SD1.8)/mean 5.8(1.9) years after surgery for ongoing pain and pain free patients respectively). This

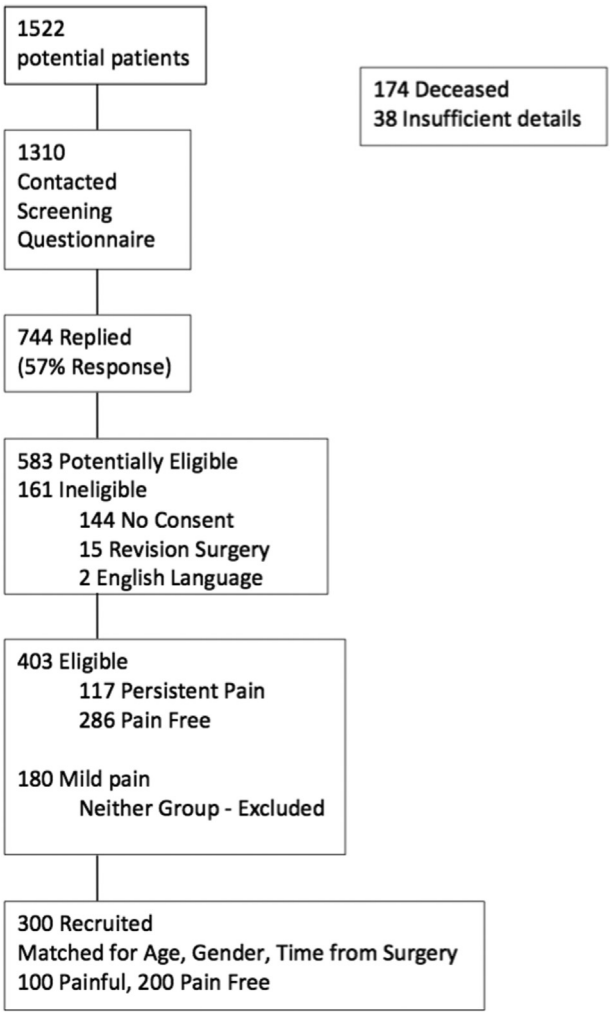

Fig. 1. Recruitment flow diagram.

questionnaire included the Western Ontario and McMasters University Osteoarthritis Index (WOMAC) Pain scale[19] and questions regarding the nature, severity, consistency and onset of pain. The WOMAC pain scale was used to assess severity of pain experienced in the replaced knee when performing five different activities. To aid interpretation and comparison as per consensus in the orthopaedic literature this was transformed into a 0–100 scale with 0 indicating extreme pain and 100 indicating no pain[18,20,21].

Responses to questionnaires were reviewed to determine if patients meet the criteria for a painful case or a pain-free control. Criteria for a painful case included reporting moderate, severe or extreme pain to any of the five questions on the WOMAC Pain scale. In addition the pain had to have been persistent from the day of surgery or from within the first few weeks following surgery. Patients with complete resolution of pain for a period and then recurrence of pain were excluded as it was deemed important to eliminate the possibility of pain secondary to prosthesis wear, loosening or implant failure. Patient report was cross referenced with clinical notes to confirm pain persistence was present in all included patients.

Patients were deemed pain-free and eligible to be controls if they scored 95 or greater on the WOMAC pain scale and did not report moderate or worse pain to any of the five questions.

Case matching was undertaken on a 2:1 frequency matching basis where groups of 4–6 patients with pain were matched for