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Use of prescription analgesic medication and pain catastrophizing after total joint replacement surgery☆,☆☆

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ABSTRACT

Objective: To survey the use of analgesic medication 4.8 years after total joint replacement (TJR) surgery and assess the determinants of medication usage.
Patients and methods: Of 852 patients who had undergone TJR for osteoarthritis were recruited from secondary care. Participants (mean age, 73.7 years) responded to a questionnaire on medication use, physical function and pain (WOMAC, VAS and body pain), pain catastrophizing and illness behaviour (somatization).
Results: Only 37% of study participants were not on any pain relief medication, 25.1% were taking opioids, 6.9% were taking prescription NSAIDs and 25.9% were taking only non-prescription analgesics. Use of NSAIDs correlated with presence of back pain, body pain and high illness behaviour. The strongest associations with use of opioids were severe joint pain, high pain catastrophizing, body and back pain. After adjustment for covariates plus presence of pain, catastrophizing remained significantly associated with higher risk of opioid use (OR = 1.66, 95% CI: 1.13–2.43, $p < 0.009$) and of other prescription medication that can be used to treat pain (anti-depressants, anti-epileptics and hypnotics) (OR = 2.52, 95% CI: 1.61–3.95, $p < 0.0005$).
Conclusions: Use of opioid medication 4 years post-TJR is very high in our study population. In addition to joint, back and body pain, a major contributor to opioid use is pain catastrophizing. Our data suggest that current opioid and other analgesic prescribing patterns may benefit from considering the catastrophizing characteristics of patients.

Introduction

Total joint replacement (TJR) surgery is a cost-effective and safe intervention for severe large joint osteoarthritis and has a low revision rate [1]. However, the health-related quality of life after hip and knee arthroplasty is considerably less than that reported by the general population in the same age range [2]. A significant proportion of patients still report moderate to marked persistent pain post-TJR [3,4].

A recent study in France found that in the year following surgery, there was an increase in the use of analgesic medication [5]. The major risk factor predicting high use of analgesics was pre-operative pain. On the other hand, the use of NSAIDs in the UK 2 years after primary TJR has been reported [6] and in this setting, they found a substantial reduction with regards to pre-operative use. There are a number of potential factors contributing to use of pain relief medication including joint pain (pain persistence), other regional pain syndromes (body pain and back pain), pain catastrophizing and illness behaviour [7,8]. Several modest size studies ($n < 150$) have shown that pre-operative pain catastrophizing

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scores can predict postoperative pain severity and functional limitations 12 and 24 months following TKR surgery ([9,10]), and a systematic review which included 35 high-quality studies in the literature found strong evidence that patients with pain catastrophizing report more pain postoperatively [11]. Moreover, a survey of 519 patients phenotyped prior to TJR found that aberrant central pain processing predicted increased postoperative opioid consumption [12].

Catastrophizing has been defined as an individual's tendency to focus on and exaggerate the threat value of painful stimuli and negatively evaluate one's ability to deal with pain [13,14]. Importantly, persistent postoperative pain after breast cancer surgery has been reported to be associated with alterations in central nervous system pain-modulatory processes and of these alterations appear to be mediated by higher levels of pain catastrophizing [15].

Several lines of evidence suggest that high levels of catastrophizing may result in a dysfunction in the endogenous opioid pain-control system [16]. Endogenous opioids are central neurochemical players in multiple pain-inhibitory systems, and opioids act both in the periphery and in the central nervous system to modulate incoming information related to noxious stimulation [16]. The process of somatization has been described as the expression of personal and social distress through physical symptoms, often accompanied by patterns of behaviour such as increased medical help—seeking for those symptoms and as such it is viewed as a process of illness behaviour [17]. The role of postoperative catastrophizing and illness behaviour on use of analgesic medication post-TJR has not been reported to date.

The primary aim of this study was to assess the prevalence of prescription and over-the-counter medication use and the factors related to it. We hypothesised that medication use in post-TJR patients may be influenced by factors such as pain catastrophizing and illness behaviour.

Subjects and methods

Study participants

People who had undergone a total hip replacement or a total knee replacement were identified from hospital orthopaedic clinic lists in the Nottingham area and sent a postal invitation to enter the study. Approval for the study was obtained from the research ethics committees of Nottingham City Hospital and North Nottinghamshire. Consenting participants underwent a home visit by a nurse between 2008 and 2012 and completed a nurse-administered questionnaire. Participants who gave consent to be re-contacted were sent a follow-up postal questionnaire between 2013 and 2014. The average time between TJR and the baseline/nurse-administered questionnaire was 1.27 years (SD = 2.1 years). The average time since surgery plus time to follow-up was 4.8 years (Table 1). We compared the demographic characteristics of the individuals who did not return the follow-up questionnaire to those who did and found no significant difference for age ($p < 0.38$), gender ($p < 0.89$) or body mass index ($p < 0.07$). For those that had completed a pain questionnaire at baseline (only since 2011), no difference was seen on baseline WOMAC pain scores ($p < 0.51$) between individuals who returned the questionnaire and those who did not. All participants were of White British ethnic background (to create a more homogeneous cohort initially recruited for genetic studies).

The questionnaire included a pain body mannequin, the Visual Analogue Scale (VAS) for pain intensity for each operated joint, the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), the 13-item pain coping strategies (PCS) instrument and the 6-item illness behaviour subscale of the Illness Attitude Scales (IAS) instrument. In addition, participants were asked about current medication use and the use of prescription medicines was validated against responses and prescriptions recorded at the time of the nurse visit. The recruitment strategy and how the final sample size was reached are presented in the Figure.

Statistical analysis

Descriptive statistics were calculated (Table 1). Cross-sectional associations between analgesic medication use post-TJR (dependent variable) and various postoperative risk factors (independent variables) were carried out using multivariate logistic regression adjusting for age, gender and body mass index (BMI) as covariates (Table 2). Further adjustments were made for catastrophizing and illness behaviour, and their relationship to medication use was adjusted for age, gender, BMI, back pain, body pain and high index joint pain. Other risk factors were added to the second multivariate model (Table 3) after the initial multivariate analysis (Table 2) if they showed a significant association with analgesic medication use and were therefore potential confounding factors.

Binary traits

In order to compare odds ratios across the various determinants, quantitative scores and continuous measures, most of which are not normally distributed were dichotomised as follows: WOMAC pain (Likert scale <10 vs ≥ 10, the definition of severe pain used by other authors) [4], BMI (<30 vs ≥ 30), illness behaviour (<5 vs ≥ 5, the cut-off shown to predict risk of developing CWP) and pain catastrophizing (<9 vs ≥ 9, corresponding to the highest tertile).

Trait definitions for statistical analysis

The pain catastrophizing scale (PCS) is a 13-item self-report scale to measure pain catastrophizing created by Sullivan et al. [13]. Possible scores range from 0 to 52 [13]. In the PCS, each item is rated on a 5-point scale. The scale was developed as a self-report measurement tool that provides a valid index of catastrophizing in clinical and non-clinical populations [9]. High catastrophizers were defined as those in the top tertile of the PCS distribution (PCS $\geq$ 9).

The Illness Attitude Scales (IAS) instrument assesses attitudes and concerns about illness and health. A study based on a principal components analysis demonstrated that the IAS measures two dimensions reflecting “health anxiety” and “illness behaviour.” The “illness behaviour” subscale consists of six items (such as “Do your bodily symptoms stop you from working?”) and has a total score between 0 and 24, with a general population mean score of 4.7. A score greater than 4 has been shown to be strongly predictive of the 1-year development of chronic widespread pain [7] so for analysis purposes, a cut-off of <5 and ≥ 5 was used.

To assess total body pain, the questionnaire included two line-drawing body mannequins (front and back views), and participants were asked to highlight regions of their body in which they had had pain for 1 day or longer during the past 4 weeks. Individuals who indicated the back were classified as having back pain. Individuals who indicated having back pain plus pain in the upper right, lower right, upper left and lower left quadrants of the body were classified as having chronic widespread body pain.

Medication use

Individuals were classified as taking opioids, non-steroidal anti-inflammatory drugs (NSAIDs), other prescription medication which can be used to treat pain, over-the-counter analgesics, or