



Pain catastrophizing: does it affect surgical outcomes?

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The opioid epidemic in the United States is the foremost problem in healthcare today. From 1999 to 2014, there has been a quadrupling of opioid prescription sales, with a concurrent decrease in the prescribing of nonopioid analgesics for new musculoskeletal pain (1,2). In the last two decades, opioid prescription rate in patients with chronic pain increased exponentially. In patients with knee osteoarthritis (OA) it rose from 31% in 2003 to 40% in 2009 (3). Among aging adults, symptomatic knee OA is one of the leading causes of disability, and is associated with all-cause mortality due to impaired ambulation (4). Total knee replacement (TKA) is currently the third most common inpatient surgery performed in the United States, with the 5-year rate of surgical revision estimated between 2–5.7% (5,6). As reported by the worldwide National Joint Registries, nearly 10% of TKA revisions are indicated due to persistent postoperative knee pain only, with costs projected to increase to \$13 billion by 2030 (7,8).

Amongst patients presenting for TKA, the preoperative use of opioids results in increased postoperative intravenous narcotic rescue, increased length of hospital stay and in-hospital complications, and increased use of narcotics 90 days postoperatively (9). Moreover, a recent large-scale database study reported that long-term opioid use prior to TKA predisposes to an increased rate of knee revision (10).

In their study published in *the Journal of Bone and Joint Surgery*, Smith *et al.* looked at the chronic pain and postoperative outcomes in the TKA population from a new angle (11). For the first time, Smith *et al.* address an important component of perioperative chronic pain of which was never quantified in TKA patients—the emotional component. Smith *et al.* are the first group to quantify the

emotional component of chronic pain in the perioperative period in patients undergoing TKA, a component anesthesiologists have clinically noticed for years but have never reported.

The Adding Value in Knee Arthroplasty (AViKA) postoperative care navigation trial was a proof of concept randomized controlled trial aimed at determining efficacy of a novel rehabilitation protocol at 3 and 6 months after TKA, a protocol incorporating motivational interview (12). Utilizing data from the AViKA study, Smith *et al.* analyzed a subset of 156 patients, all of whom had a pre-TKA Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) pain score of ≥ 20 (11). The WOMAC scale measures pain, stiffness and functional status in patients with hip and knee joint OA, and each item may be rated on a 0 to 100 points scale (13). A score of 20 is lower than the average pre-TKA patient, but higher than the average post-TKA patient. The patients in Smith *et al.* cohort also completed the Pain Catastrophizing Scale, which is measured on a scale of 0–52, and their subset of patients had a mean baseline pain score of 11.8. Because the WOMAC score takes pain into account, it would be reasonable to assume that the element of pain catastrophizing would increase a patient's WOMAC score.

Smith *et al.* identified 36 out of 156 patients who had a minimum of one opioid prescription in the 2 years prior to the TKA and had not had any other surgery during those 2 years (11). Smith *et al.* report that patients who had used opioids prior to TKA (opioid group), had a higher WOMAC pain score 6 months post-TKA than those in the non-opioid group. The patients in the opioid group had less reduction in their WOMAC pain score 6

months postoperatively as compared to their non-opioid counterparts. Therefore, Smith *et al.* concluded that preoperative opioid use predisposes to less improvement in pain scores at 6 months post-TKA. This is an important critical observation. Furthermore, patients in the opioid group had a pre-TKA Pain Catastrophizing Scale higher than their non-opioid counterparts, and in fact, pain catastrophizing was the only factor independently associated with pre-TKA opioid use. Therefore, the authors' conclude that pain catastrophizing is often responsible for the preoperative prescribing of opioids in knee OA patients.

Recent research strongly suggests that the pre-TKA opioid use predisposes patients to increased postoperative pain and, moreover, to worse surgical outcomes (10,14). In addition to increased postoperative pain, the analysis by Zywiłł *et al.* revealed that patients in the pre-TKA opioid group had a significantly higher rate of post-TKA arthroscopic evaluations and knee revisions for persistent stiffness or pain compared to the non-opioid group (14). In retrospective analysis of over 32,000 veterans, Ben-Ari *et al.* found that long-term opioid use prior TKA is associated with an increased rate of post-TKA knee revision (10). Although not quantified, authors discussed that behavioral differences or sociopsychological environment of long-term opioid users might play a role in the worse outcomes after TKA and increase rate of post-TKA revisions (10). Indeed, this suggestion supports Smith *et al.*'s data demonstrating that pain catastrophizing might be responsible for pre-TKA opioid use. Reasonably thinking, those who catastrophize pain are more likely to be prescribed opioids, and are therefore more likely to need a knee revision surgery for continued post-TKA pain and stiffness.

Smith *et al.* are not the first to study pain catastrophizing and surgical outcomes. In fact, pain catastrophizing has been studied before in the obstetric population. It has been previously shown that women who are classified as pain catastrophizers anticipate and experience more pain during labor and have worse physical recovery in comparison to non-catastrophizers (15). However, Smith *et al.* are the first to study catastrophizing in the perioperative period amongst an orthopedic population. Although this was a small study, Smith *et al.* have paved the way for a new area of research into the emotional component of perioperative chronic pain patients.

It would be preliminary to conclude that the data of Smith *et al.* should be applied in everyday practice and all the patients with OA should undergo psychological evaluation prior prescription of opioids. There are many

unanswered questions regarding relationship of emotional component of pain. Whether long-lasting chronic pain exaggerates pain catastrophizing or vice versa, particularly in patients with OA, is not clear. What is definitely clear is that more research should be done to clarify who and when may benefit from surgical treatment for OA, and what is the role of pain catastrophizing in the course of OA, including surgical outcomes.

No doubt, that prescribing physicians should be vigilant to the emotional component of pain and consider a role of pain catastrophizing in their decision to prescribe opioids to patients with knee OA. And, it is important to remember, that the first line pain treatment in patients with OA should be physical therapy and nonopioid adjuncts such as acetaminophen and nonsteroidal anti-inflammatory medications.

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