Chronic Persistent Pain after Surgery: Mechanisms and Management Strategies

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Persistent postoperative pain after surgery
Chronic pain after surgery is more common than previously noted. Prevalence rates for chronic pain after surgery vary with procedure. Several factors have been linked to chronic pain after surgery. One factor is nerve injury. Intraoperative nerve injury may produce sustained pain and neuroplastic changes in the periphery and higher centers. Other factors associated with chronic pain after surgery are severe acute postoperative pain, young age, female gender, and level of pain before the operation.

Psychological variables may also affect chronic pain after surgery. Psychological variables like neuroticism have been suggested to contribute to chronic pain. In addition, fear of long-term consequences was associated with greater long-term pain six months after major surgery. Recent studies noted attentional bias toward positive stimuli as a risk factor associated with persistent pain after repair of chest wall deformity.

Amputation
The greatest incidence of chronic pain may occur after limb amputation. Recent studies report incidences of 60-80%. Both chronic stump and phantom limb pain after amputation are challenging clinical problems. Improving postoperative analgesia attempts to prevent chronic postoperative pain by minimizing pain before and after surgery. Treatments included local anesthetics, opioids, and others.

Thoracotomy
Acute pain has not been consistently evaluated as an associated faction in relation to postthoracotomy pain syndrome. Acute postoperative pain was related to postthoracotomy pain syndrome in some studies whereas other investigations could not find this positive factor. Possibly the extent and duration of surgery may influence acute pain and in turn the extent and duration of surgery may associate with the development of persistent pain. Surgical approach and risk of nerve injury are factors associated with persistent pain after thoracotomy.

There are controversies regarding the prevention of postthoracotomy pain syndrome. Several studies hinted a preventative effect could be achieved with preincision epidural analgesia; however, the largest study failed to find a positive effect.

Hysterectomy
Chronic pain after hysterectomy varies from 5% to 32% of patients. In a prospective study, patients were evaluated for pain 4 months after hysterectomy. Approximately 17% of patients had persistent pain post-hysterectomy. Preoperative pain unrelated to the surgery and a high acute pain were associated with the presence of pain 4 months later. A later survey evaluated pain one year after hysterectomy. Pain was reported by 31.9% at 1 year. Risk factors for chronic pain were preoperative pelvic pain, previous cesarean delivery, pain as the main indication for surgery, and pain problems in other body regions.

Persistent pain after total joint replacement
Chronic pain after joint surgery occurs in as high as ten percent of patients undergoing total knee arthroplasty or hip replacement. A variety of factors have been implicated in persistent pain after total joint
replacement. Factors include female gender, younger age, and greater preoperative pain, predicted greater risk of moderate to severe persistent pain postoperatively. However, the current literature is contradictory regarding all of these factors and their influence on chronic pain after surgery.\textsuperscript{16}

Risk of nerve injury is rare in chronic pain after joint replacement surgery. However, CRPS-like pain following total knee arthroplasty has been studied.\textsuperscript{18} For example, CRPS criteria were met in approximately ten percent postoperative total knee arthroplasty patients. Greater preoperative pain intensity predicted CRPS at three and six months following total knee arthroplasty. Preoperative distress also predicted signs of CRPS following total knee arthroplasty.

One study implicated acute postoperative pain based on a survey that acute postoperative pain, as the patient recalled, predicted persistent pain complaints 12 to 18 months follow-up.\textsuperscript{19} While other studies indicated presurgical pain severity and psychological factors, including pain catastrophizing predicted postsurgical pain at six weeks follow-up.\textsuperscript{20,21} Other psychological variables are also a significant co-factor in pain after total knee replacement.\textsuperscript{17}

Two recent studies have prospectively evaluated in randomized controlled trials, treatment of acute pain and the prevalence of persistent pain after joint replacement surgery.\textsuperscript{22} Patients were randomized to ketamine or placebo during and after surgery for total hip replacement. Ketamine (0.5 mg/kg and 2 mcg/kg/min) reduced opioid consumption by a modest amount and also decreased a prevalence of patients with persistent pain at rest in the operated hip at six months. Twenty-one percent of placebo patients experienced pain at rest versus only eight percent in the ketamine group at 6 months.

A recent study examined the effect of perioperative treatment with pregabalin to decrease the incidence of postsurgical neuropathic pain.\textsuperscript{30} Patients undergoing total knee arthroplasty were randomized to receive pregabalin before and for two weeks after total knee arthroplasty. Patients were followed for neuropathic signs and symptoms. More than 100 patients were randomized per group and pregabalin reduced the incidence of neuropsychic pain, which was zero in the pregabalin treated group and five percent at six months in the placebo treated group. An opioid-sparing effect of pregabalin was noted. The authors concluded that perioperative pregabalin decreased the prevalence of chronic neuropathic pain after total knee arthroplasty.

A third study examined the effect of gabapentin in reducing postoperative pain, opioid consumption, and persistent pain after total hip replacement surgery.\textsuperscript{31} A single dose of Gabapentin administered either before surgery or in the immediate postoperative period did not influence acute pain or opioid consumption. Six months after surgery, the incidence and severity of chronic pain did not differ significantly among groups, demonstrating that a single dose of gabapentin did not have any beneficial effects in patients undergoing total hip replacement.

\textbf{Conclusion}

There have been many links to preoperative pain and persistent postoperative pain in a variety of surgeries. In joint replacement surgeries, it is arguable whether preoperative pain is a risk factor for predicting postoperative pain. Psychological variables are also important. Furthermore, the type of pain the patient experiences requires evaluation of the joint replacement stability and other factors like infection or pain at other sites.

In general, for patients undergoing surgery, preoperative nociceptive testing can predict acute pain and opioid consumption in the early postoperative period.\textsuperscript{32} The link to preoperative pain testing and chronic postoperative pain has not been made. The idea that acute pain after surgery predicts chronic pain has not been made for joint replacement surgery, nor has improved treatment of acute pain and reduction in the prevalence of chronic pain after surgery has not been made.

Finally, any study attempting to reduce the incidence of persistent pain must take into account preoperative psychological variables and extensive preoperative testing. Rigorous follow-up in the acute postoperative period and follow-up long-term for at least six months must include evaluation of other factors, like age, sex, pain in other areas of the body, stability of the prosthetic joint and rule out infection. Perhaps stratification into the type of persistent pain may advance the field.
References:

Disclosure

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