## Table of Contents

**Editorial**
Is that acute post-surgical pain management truly preventing progression to chronic pain? ........................................... 3

**Regional Anesthesia**
- Comparison of efficacy of transversus abdominis plane block and iliohypogastric/ilioinguinal nerve block for postoperative pain management in patients undergoing inguinal herniorrhaphy with spinal anesthesia: a prospective randomize controlled open-label study ........................................................................................................... 5
- Prospective double blind randomized placebo-controlled clinical trial of the pectoral nerves (Pecs) block type II ............................... 8
- Regional Nerve Blocks Improve Pain and Functional Outcomes in Hip Fracture: A Randomized Controlled trial ................................. 11
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Editorial

**IS THAT ACUTE POST-SURGICAL PAIN MANAGEMENT TRULY PREVENTING PROGRESSION TO CHRONIC PAIN?**

In 2011, the Institute of Medicine (IOM) published their renowned report titled: Relieving Pain in America: A Blueprint for Transforming Prevention, Care, Education, and Research. Some of the more staggering statistics cited include the following:

- 80% of surgical patients experience postoperative pain. This alone isn’t alarming considering that surgery itself causes tissue trauma which naturally results in pain, as does the inflammatory response that occurs with tissue trauma. Additionally, we have a greater understanding of the term “nociceptive pain;” our sensory nervous system's response to harmful or potentially harmful stimuli. The sensation of pain has five phases:
  1) Transduction
  2) Conduction
  3) Transmission
  4) Modulation
  5) Perception

What is alarming, however, is that in our modern era, fewer than half of the 80% who experience postoperative pain report they had adequate pain relief in the immediate post-surgical period. And even more staggering is that 88% of these individuals report their postsurgical pain as moderate, severe, or extreme.

- up to 50% of patients with postsurgical pain develop what is now known as prolonged postsurgical pain and a great number of these people develop chronic pain. Originally, we believed that only complex and massively invasive surgical procedures such as limb amputations were associated with the development of chronic pain. Evidence is now showing that a wide range of surgical procedures are associated with progression from acute to chronic pain. Procedures that are much less severe than amputations or thoracotomies. For example, approximately 18% of women who have a cesarean section report persistent pain one year later. And the list is growing for other surgical procedures such as breast surgery, general surgery, and even reconstructive procedures.

At the time the IOM report was made public, significant emphasis was placed on pain as the 5th vital sign. All efforts were focused on managing the surgical patients’ pain and for obvious reasons. Satisfaction with care and patient pain scores were being publicized. Pain relief was aimed at minimizing complications that result from pain. Plus, third party payments were being tied to analgesic efficacy. Opioids were the standard of care for relief of postoperative pain and were prescribed at alarming rates.

Fast forward and serious problems are now tied to opioid use and abuse. Enhanced recovery after surgery (ERAS) protocols were developed to maximize patient care outcomes and minimize the adverse effects of opioids. Multimodal analgesia is becoming the new norm. Additionally, a plethora of non-opioid drugs are being studied for their analgesic efficacy and we have become optimistic that we are making progress in pain management. Advances in a wide range of regional anesthesia techniques have occurred and ultrasound guidance has gained widespread use. The scientific literature is replete with clinical trials focused on techniques to minimize acute post-surgical pain without opioids and again we feel we are gaining ground.
The reality, however, is that we still do not have the answer to why some individuals develop chronic pain following surgery; even when their acute postoperative pain is well managed. The original theory, that if acute postoperative pain was managed chronic pain would not develop, has been refuted. And while there are numerous reports identifying generally recognized risk factors for persistent post-surgical pain; such as anxiety, catastrophizing, preoperative pain, acute postoperative pain, preexisting opioid use, depressive symptoms, and genetic variations, clinical trials have failed to demonstrate that these risk factors are consistently associated with chronic pain. People who have none of these risk factors are experiencing prolonged post-surgical pain and at alarming rates. We have much more work to do in identifying ways to prevent the phenomenon of chronic pain.

Beginning with this issue of Anesthesia Abstracts we will provide a series of five CE credits focused on different non-opioid analgesic techniques and their efficacy in managing pain during the acute postsurgical period, but also on the prevention of chronic postsurgical pain and resultant improvement in quality of life.

Mary Golinski, PhD, CRNA

Guest Associate Editor
Regional Anesthesia

Comparison of efficacy of Transversus Abdominis Plane block and Iliohypogastric/Ilioinguinal nerve block for postoperative pain management in patients undergoing inguinal herniorrhaphy with spinal anesthesia: a prospective randomized controlled open-label study

J Anesth. 2017;31:678–685
DOI: 10.1007/s00540-017-2378-3
Okur O, Tekgul ZT, Erkan N

Abstract

Purpose The purpose of this study was to compare the Iliohypogastric/Ilioinguinal nerve block and the Transversus Abdominis Plane block (TAP block), performed with ultrasound guidance for the reduction of both acute and prolonged postsurgical pain following inguinal herniorrhaphy. A second purpose was to assess which of the techniques was associated with fewer complications.

Background Two common regional anesthesia techniques currently used for managing acute pain following inguinal hernia surgery are the iliohypogastric/ilioinguinal nerve block and the Transversus Abdominis Plane block (TAP block). Findings, however, are inconclusive regarding superiority in alleviating acute pain, and minimal research has been done comparing these two techniques for efficacy when performed with ultrasound guidance. Furthermore, no studies have been published assessing the impact either technique has on preventing prolonged postsurgical pain. Patients continue to report dissatisfaction with post-herniorrhaphy pain managements and the risk of progression to a chronic pain state is elevated in this surgical population.

Methodology This was a prospective, randomized, controlled, open label clinical trial. Each patient received a subarachnoid block with 15 mg of hyperbaric bupivacaine followed by randomization into one of the three groups as follows:

- **TAP Block** - ultrasound guided TAP block with 20 mL 0.25% bupivacaine
- **Iliohypogastric Block** - ultrasound guided Iliohypogastric/Ilioinguinal block with 5 mL of 0.25% bupivacaine
- **Control** - control group - no peripheral nerve block administered

The entire perioperative process was standard for all enrollees. Premedication was not administered to any
patient in any group. All patients received a spinal anesthetic followed by either the TAP block, the Iliohypogastric/Ilioinguinal nerve block, or neither, according to the randomization scheme. Postoperative pain scores were assessed with the numeric rating scale and recorded immediately following surgery (hour 0) and then at 2, 4, 6, 24 and 48 hours. If discharged from the hospital, phone interviews were conducted to ascertain pain scores. Pain at the surgical site was also assessed via phone interviews at one and six-months. Postoperative analgesic regimens consisted of IV acetaminophen 10-15 mg/kg every six hours (1000 mg max dose, 4000 mg daily dose max), and, if necessary for breakthrough pain, tramadol 50-100 mg (400 mg daily maximum). Pain intensity at surgical incision site was assessed at 1 and 6 months and if present without other obvious cause, these patients were considered to have chronic and/or severe pain. All adverse outcomes such as hematoma, urinary retentions, signs of infection, and others were documented.

**Result** The demographic profiles of all three groups were similar including the mix of surgical techniques. There were no differences between groups for spinal sensory and motor block levels, duration of surgery, or hospital length of stay. Significance was found in the following:
1. Time to first complaint of pain was longer in the block groups than the control group (P < 0.001)
2. Pain scores were lower in the two block groups than the control group at all time points including 1 month and 6 months (P< 0.007)
3. Pain scores in the TAP Block group were lower than pain scores in the Iliohypogastric/Ilioinguinal nerve block group (P = 0.048)
4. Rescue analgesic requirements were greater in the control group at all time points compared to the two block groups (P < 0.007). No analgesics were required in the two block groups at hour 1 and 48 hours. The TAP block group had less nausea at hour 24 than either the Iliohypogastric/Ilioinguinal block group or the control group (P = 0.043)

There were no differences between groups in the rate of urinary retention, hematomas, or signs of infection.

**Conclusion** Both TAP block and Iliohypogastric/Ilioinguinal block provided superior acute and extended postoperative pain relief following inguinal hernia surgery compared to the control group. Additionally, there were minimal analgesic requirements in both study groups at all time periods including 1 and 6 months. The TAP block was more effective in minimizing postoperative pain and nausea at hour 24, compared to either the Iliohypogastric/Ilioinguinal block or control groups. There were no complications noted across all three groups.

**Comment** Acute postoperative pain is caused by numerous psychologic and physiologic processes. It is the result of trauma and insult to tissue and organ systems. Recent evidence suggests that less than 50% of those who have surgery report adequate postoperative pain relief. Evidence also suggests that inadequate relief of acute pain after surgery can increase the risk of developing prolonged postsurgical pain, identified as a major public health issue by the Institute of Medicine. Post herniorrhaphy pain is one of the most significant complications occurring after inguinal hernia repair. It is reported with great frequency, more than previously thought. The approximate incidence of “prolonged pain” after inguinal hernia surgery is
25%, and many of these patients define the prolonged pain as moderate or severe. In fact, it is so common that there is now a generic term describing it: Inguinodynia.

Advances in ultrasound guided peripheral nerve block techniques coupled with a clearer understanding of physiologic pain processes provide opportunities to reduce the incidence of acute pain and possibly chronic pain after surgery. Our understanding of the limitations and adverse effects of opioids as the sole technique to manage postsurgical pain is expanding rapidly. TAP blocks and easy to administer field blocks are being performed frequently to prevent pain resulting from surgical insult to the abdominal skin, muscles, and parietal peritoneum. Iliohypogastric/Ilioinguinal nerve block prevents transmission of pain impulses from the ilioinguinal and iliohypogastric nerves. It is indicated for analgesia following inguinal hernia repair because these nerves provide sensory innervation to the skin of the lower abdominal wall in addition to the upper hip and upper thigh.

Irrespective of the technique used, it is now known that both are efficacious for acute postsurgical pain relief and reduced opioid requirements. As a result, the adverse effects of opioids, often seen when opioids are the sole pain management technique, are reduced. Additionally, the complication rate of these nerve blocks, especially when performed under ultrasound guidance, is very low.

Mary A. Golinski, PhD, CRNA

**RESOURCES**

- Overview of Transversus Abdominis Plane Block and Iliohypogastric/Ilioinguinal Nerve Block
  www.nysora.com/truncal-and-cutaneous-blocks

- Transversus Abdominis Plane (TAP) Block Details
  www.nysora.com/files/2013/pdf/
  (v12p28-33)TAPBlock.pdf

- Iliohypogastric/Ilioinguinal Nerve Block Details
  www.nysora.com/ilioinguinal-and-iliohypogastric-blocks
Regional Anesthesia

**Prospective double blind randomized placebo-controlled clinical trial of the pectoral nerves (Pecs) block type II**

J Clin Anesth 2017;40:46-50  
DOI: 10.1016/j.jclinane.2017.03.054  
Versyck B, van Geffen GJ, Van Houwe P

**Abstract**

**Purpose** The purpose of this study was to assess the overall effectiveness of a superficial block of the pectoral nerves, commonly called the “Pecs II block,” for postoperative analgesia in women who underwent surgery for breast cancer.

**Background** Breast cancer is the most common form of cancer in women. Treatment decisions are based on numerous factors including cancer type. Breast surgery, however, remains the most efficacious treatment. Evidence suggests even minimally invasive techniques result in significant postoperative pain. Inadequate pain relief results in patient dissatisfaction and physiologic and psychologic impairment. Additionally, prolonged postoperative pain may progress to a chronic pain state. Regional anesthesia techniques, namely paravertebral and intercostal nerve blocks, have been used to manage postoperative pain following breast surgery, but not all providers are skilled in performing these blocks. The benefit of regional anesthesia is multifactorial, but reduced opioid use avoids a number of potential opioid side effects. The pectoral nerve block type II (Pecs II block) is a “superficial” regional anesthesia technique in which local anesthesia is deposited between the pectoralis major and minor muscles and above the serratus anterior muscle. Placement of local anesthesia in these areas blocks pain from the pectoral, intercostobrachial, several intercostal, and long thoracic nerves. It is an easy to master technique for the novice provider of regional anesthesia. The hypothesis for this research was that the Pecs II block provided postoperative analgesia similar to or better than opioid analgesics and would reduce total opioid consumption in patients having surgery on the breast.

**Methodology** This was a prospective randomized double-blind placebo controlled trial. After approval, 140 ASA physical status classification I, II, & III adult women scheduled for mastectomy or lumpectomy with sentinel or axillary lymph node dissections were consented to participate. Women were randomized into one of the two following groups:

- **Pecs II block group**
- **control group - no block**

A standardized general anesthetic was administered to both groups with propofol, sufentanil, and rocuronium. Sevoflurane was used for maintenance. Sufentanil 5 µg was administered if vital signs increased 20% above baseline. After induction of general anesthesia, the Pecs II group received a total of 30 mL of 0.25% levobupivacaine with ultrasound guidance; 10 mL between the pectoral muscles and 20 mL under the pectoralis minor muscle but above the serratus anterior. The control group received normal...
saline in the same fashion. Surgical incision was 10 minutes after the blocks were administered.

Effectiveness was measured by:

- numeric pain scale
- opioid use
- “patient satisfaction”

Postoperative pain management was standardized and consisted of IV acetaminophen 5 mg/kg every 6h for 24 hours. When awake, patients were assessed for pain using a Numeric Rating Scale pain score where 0 = no pain and 10 = the worst pain imaginable. Pain scores were recorded at 15-minute intervals in the PACU; 2-hour intervals for the first 24 hours, and 4-hour intervals during hours 24 - 48. If >3, rescue opioids were administered and included tramadol 200 mg, and if necessary piritramide 1 mg IV. (Editor’s Note: Piritramide is a synthetic opioid used in Europe but not in the USA. It is approximately ¾ as potent as morphine.) Patients were given a “pain diary” for self-documentation during their hospital stay and instructed to rate their satisfaction with the comprehensive pain management regimen at discharge. The primary outcome variables were pain scores and intraoperative and postoperative opioid consumption. Secondary outcome variables were the patient satisfaction score and the incidence of PONV, if any.

Result  After numerous exclusions, mostly due to protocol violations, a total of 45 patients were randomized to the Pecs II block group and 40 to the control group. There were no statistically significant differences in demographics between groups; intraoperative sufentanil requirements, pain scores upon emergence and PACU admittance time, pain scores while in the hospital, or general satisfaction ratings.

Significant differences were found in three outcomes:

1. pain scores in PACU lower in Pecs II group (P= 0.048)
2. total opioids in PACU lower in Pecs II group (P = 0.039)
3. total opioids in first 24-hours lower in Pecs II group (P = 0.037)

The low pain scores and subsequent decreased opioid consumption in the PACU contributed the most toward statistical significance during the first 24 hours postoperatively. The Pecs II block group demonstrated lower pain scores during the first 24-hours and required less post-surgical opioids compared to control patients. Both groups were equally satisfied with their care.

Conclusion  This small clinical trial supported the hypothesis that the Pecs II block provided similar or better postoperative analgesia and reduced opioid consumption vs. opioid analgesia in women who underwent breast surgery for cancer. Also, 12 hours following surgery the need for postoperative analgesia was minimal. A single-shot block provided effective postoperative analgesia. The major study limitation was related to the surgical procedures. Most patients in both groups underwent lumpectomy with sentinel node dissection and not mastectomy. There is a possibility that the results may be skewed due to the differences in invasiveness of the surgical procedure.

Comment  We continually strive to provide the highest quality and safest anesthetic irrespective of the magnitude of tissue trauma caused by surgery. A critical component of anesthesia is postoperative analgesia. One risk of
unrelieved acute postoperative pain is the development of chronic pain. Breast surgery has been shown to be a risk factor for development of chronic pain. Our goal, therefore, is to mitigate risk factors such as acute pain that are within our control. In light of our increased understanding of the physiologic principles of pain signaling and the effects of opioids on recovery we have an opportunity to employ techniques that minimize acute post-operative pain, opioid consumption, and ultimately prevent prolonged pain after surgery.

The evidence is conclusive: opioid use as the sole technique to prevent acute postoperative pain is associated with a number of problems. Multimodal approaches which include regional anesthesia performed with ultrasound guidance appear to be our greatest opportunity to date. More evidence is needed supporting these techniques and their role in preventing prolonged pain after surgery, especially in high risk groups with non-modifiable risk factors. The investigators conducting this research did an outstanding job of describing the differences between the Pecs I block, where only the lateral and medial pectoral nerves are targeted, and the Pecs II block, which also includes the intercostobrachial, anterior divisions of the intercostals T3-T6, and long thoracic nerve. Local anesthesia supplementation is necessary to block the anterior cutaneous branches of the intercostal nerves that innervate the sternum. Therefore, with the Pecs II block acute post-surgical pain is managed safely and the probability of reducing chronic pain after breast surgery is increased.

Mary A. Golinski, PhD, CRNA

YouTube Video Describing Pecs II Block: https://www.youtube.com/watch?v=YFWneF4pwOA
Regional Anesthesia

Regional Nerve Blocks Improve Pain and Functional Outcomes in Hip Fracture: A Randomized Controlled Trial

DOI: 10.1111/igs.14386
Morrison RS, Dickman E, Hwang U, Akhtar S, Ferguson T, et al

Abstract

Purpose The purpose of this study was to compare two pain management interventions for elderly patients who presented to the emergency department with hip fracture: a single injection femoral nerve block followed by a continuous fascia iliaca ropivacaine infusion versus conventional analgesia.

Background Pain following hip fracture is an extremely common complaint. Pain is a major barrier to functional recovery especially in the elderly who often have other physiologic impediments due to comorbidities or the natural aging process. Pain management that facilitates postoperative recovery and promotes a return to a pre-fracture function and quality of life is needed. When pain is mismanaged, the risk of postoperative complications increases exponentially. For example, severe postoperative hip fracture pain causes reduced mobility. While opioids effectively relieve pain, the elderly are quite susceptible to their adverse effects. Due to this problem, the American Academy of Orthopedic Surgeons Physician Volunteer Workgroup published evidence based clinical practice guidelines that support regional analgesia in this patient population. Evidence suggests that femoral nerve blocks administered in the emergency department and followed by a postoperative continuous fascia iliaca block produces superior pain relief in the elderly who have hip fractures and surgical repair, and may enhance recovery.

Methodology This was a randomized controlled trial comparing peripheral nerve blocks with conventional pain management in people >60 years of age with hip fracture. Outcomes assessed included:

- acute pain
- acute postoperative function
- functional status 6 weeks after discharge
- opioid requirements
- side effects

Patients who presented to the emergency departments of three hospitals in New York City with hip fracture were consented and randomized into two groups:

- **Nerve Block group** - femoral nerve block in the emergency department and a fascia iliaca catheter with continuous ropivacaine infusion
- **Conventional Pain Management group** - IV and/or oral analgesia with opioids and acetaminophen

Emergency department physicians were trained to administer ultrasound guided femoral nerve blocks. Patients randomized to the nerve block group received a femoral nerve block with 20 mL of 0.5% bupivacaine in the emergency department. The continuous fascia iliaca catheter was placed by anesthesia personnel. A bolus of 15 mL of 0.2%
ropivacaine was injected and followed by a continuous infusion at 5mL/h. The primary outcomes included pain, measured via the numeric rating scale at the following time points:

- prior to treatment in emergency department
- 1 - 2 hours after treatment
- transferring out of bed
- walking with physical therapy on postop day three

Patients were asked to rate their pain relief as:

- worse pain than prior pain
- no relief
- slight relief
- moderate relief
- a lot of relief
- complete relief

Secondary outcomes included opioid requirements in morphine equivalents, opioid related adverse effects, delirium, missed or shortened physical therapy sessions, and functional independence scores six weeks after discharge.

Delirium was assessed using the Confusion Assessment Method which was supplemented by review of the medical record. Demographic data was recorded for both groups including: comorbid conditions measured by Charlson Comorbidity Index, functional status before fractures using the Functional Independence Measure, depression measured by the 15-item Geriatric Depression Scale, and overall health and quality of life information as reported by the participants.

Six weeks following hospital discharge, telephone interviews were conducted to again assess functional status.

**Result** There were no statistically significant differences in demographics between groups. The study included 72 patients randomized to the nerve block group and 81 to the conventional pain management group. The nerve block group had significantly lower pain scores at one and two hours after emergency department treatment ($P < 0.001$), with transfers ($P = 0.005$), and during physical therapy or walking ($P = 0.002$). Function was also significantly better in the nerve block group.

Participants walked farther on the third postoperative day ($P = 0.04$), and were less likely to miss physical therapy or request shortened therapy sessions ($P = 0.03$) versus the conventional pain management group. At the six week postoperative assessment via phone, the nerve block group reported better walking and stair climbing ability compared to the conventional pain management group ($P = 0.04$). The nerve block group required significantly less morphine equivalents versus the conventional pain management group ($P = 0.03$). The number of participants that reported severe nausea, sedation, or unclear thinking, was significantly lower in the nerve block group ($P = 0.04$). Delirium rates, however, were similar in both groups.

**Conclusion** This study supports the administration of femoral nerve block for hip fracture in the elderly who present to the emergency department followed by a fascia iliaca nerve block with continuous infusion vs. conventional analgesia with IV and/or oral opioids and acetaminophen. Pain scores during postoperative recovery and rehabilitation were significantly lower than control
and resulted in enhanced physical therapy and functional recovery. Adverse effects were minimal in the nerve block group which also facilitated functional recovery.

**Comment**

The statistics are staggering. Approximately one in three women and one in twelve men will sustain a hip fracture in their lifetime. Additionally, 86% of hip fractures occur in individuals aged 65 years and older. The evidence is conclusive. Hip fractures are associated with significant morbidity, mortality, loss of independence, and financial burden. There exists a 5 to 8 fold increased risk of all-cause mortality during the first 3 months after the fracture and almost half of the mortality risk during the first year has been attributed to in-hospital deaths. I choose this publication because it validates several critical themes:

1. multidisciplinary pain relief for hip fracture in this vulnerable population and the ability to coordinate perioperative care amongst several specialties
2. need for long term follow up after acute care interventions so therapeutic regimes can be validated
3. to magnify the needs & complexities of the geriatric population vs. younger age groups

There is a greater understanding of sedative hypnotic induced cognitive impairment and delirium in the elderly. The data collected to date validates this statement. Consider also the fact that unmanaged acute postoperative pain following hip fracture surgery predisposes the elderly to:

- adverse effects of increased doses of opioids
- complications of immobility related to pain
- prolonged postsurgical pain
- development of delirium
- impaired functional recovery

All these outcomes create a huge financial burden for the patient and the healthcare systems. The anesthetist is optimally poised to guide and implement the most efficacious approach to manage pain for this vulnerable subset of the population. Our knowledge of ultrasound guided peripheral nerve block techniques has potential to change outcomes that have existed for years and the change will be positive.

**Mary A. Golinski, PhD, CRNA**

**RESOURCES**

**Femoral nerve block:**  [http://www.nysora.com/femoral-nerve-block](http://www.nysora.com/femoral-nerve-block)


**Geriatric Depression Scale:**  [https://consultgeri.org/try-this/general-assessment/issue-4.pdf](https://consultgeri.org/try-this/general-assessment/issue-4.pdf)