

# Life After COVID

NAAMA 43rd National Medical Convention

*Irvine, California | Sept 3<sup>rd</sup> - 5<sup>th</sup>*



**SEPT**  
**5<sup>th</sup>**  
**2021**

## **Day 2: Medical Convention**

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# Life After COVID

NAAMA 43rd National Medical Convention

*Irvine, California | Sept 3<sup>rd</sup> - 5<sup>th</sup>*



SEPT | 12:30 PM - 01:00 PM

5<sup>th</sup>

**Regional Anesthesia And Opioid Crisis**

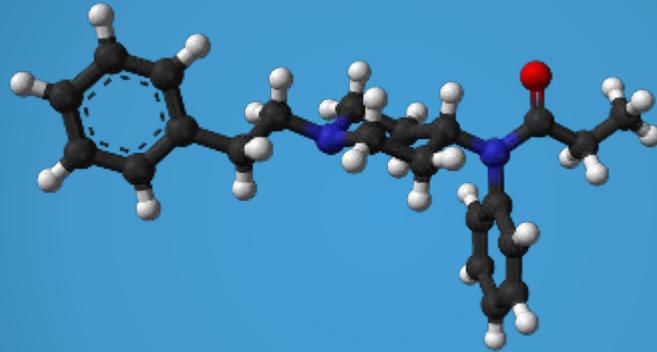
2021



**Amir Shbeeb MD**

Acute Pain & Regional Anesthesiologist  
Convention Scientific Committee Co-Chair

# Regional Anesthesia and the Fight Against the Opioid Crisis



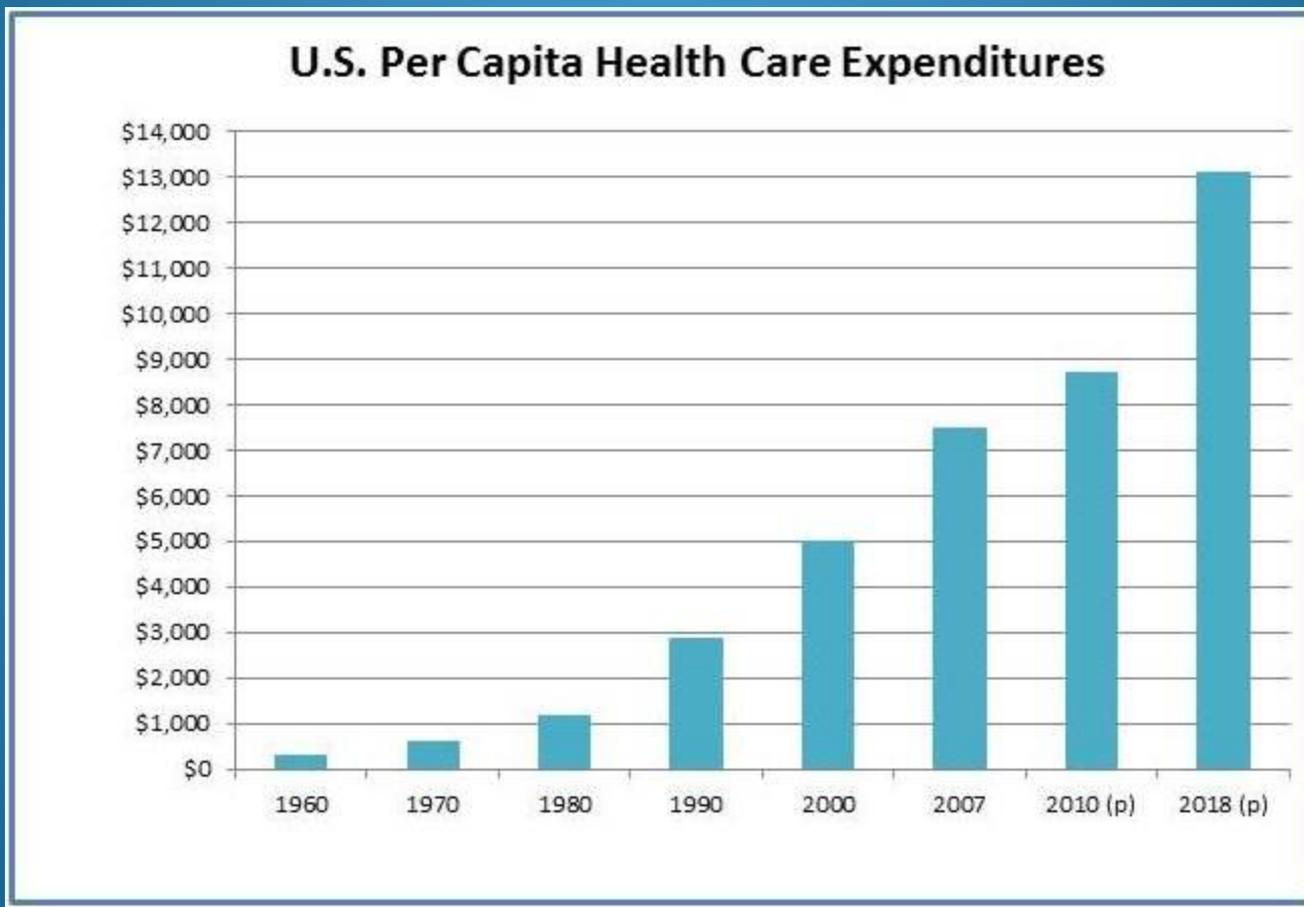
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Regional Anesthesia & Acute Pain Management  
Department of Anesthesiology  
Kaiser Permanente Riverside, CA

## Disclosure

- Consultant- Pacira Biopharmaceuticals

Serious <https://www.youtube.com/watch?v=GYHidecGy2U>

# Cost of Healthcare



Center for medicare and medicaid services, 2011

# Chronic pain

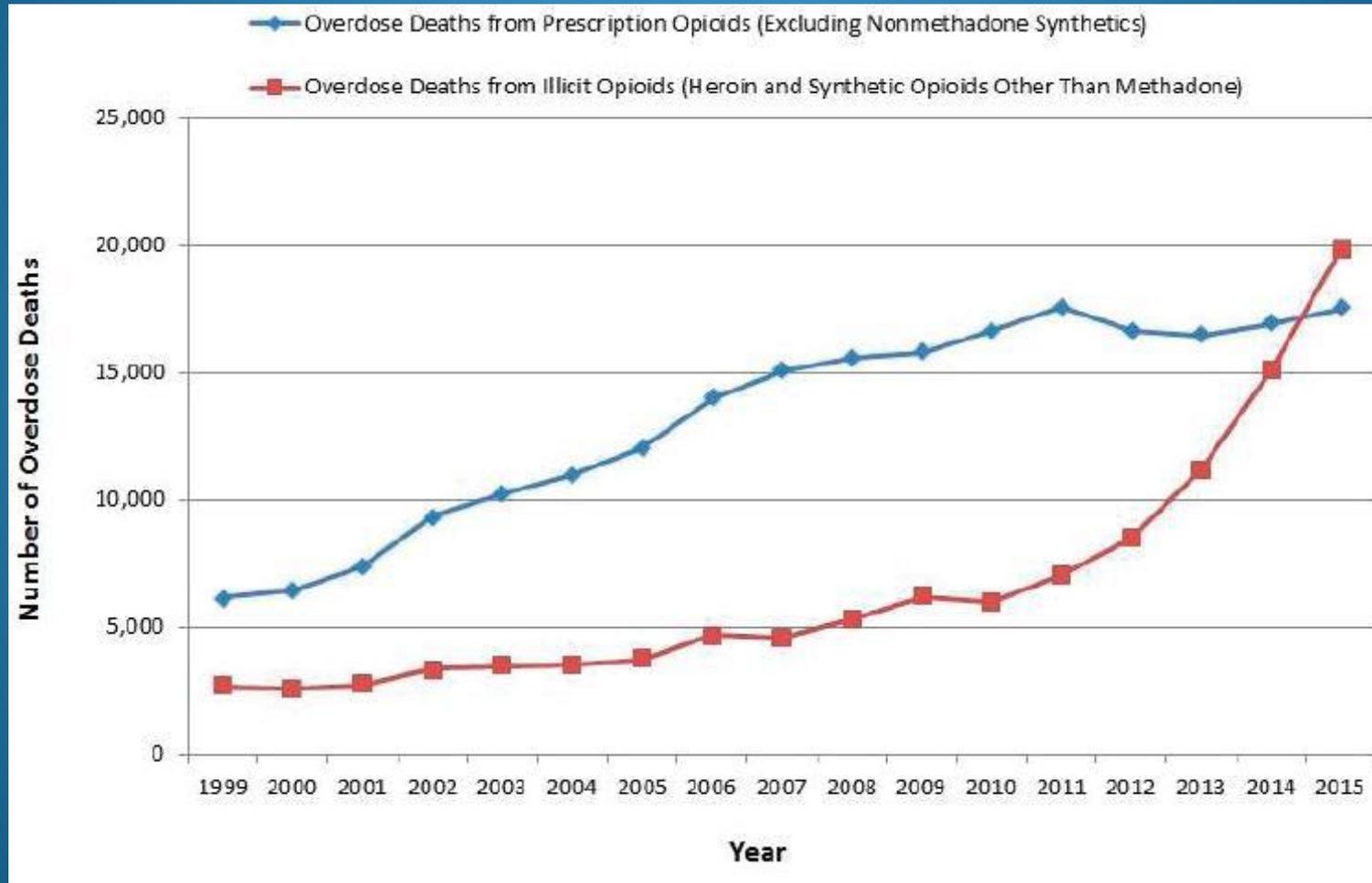
- Persistent pain impacts 100 million adults
- Cost is more than \$500 billion annually
- Chronic pain costs exceed the economic costs of the six most costly major diagnoses—cardiovascular diseases (\$309 billion); neoplasms (\$243 billion); injury and poisoning (\$205 billion); endocrine, nutritional, and metabolic diseases (\$127 billion); digestive system diseases (\$112 billion); and respiratory system diseases (\$112 billion)

# Opioid Epidemic

- 1990's- pharmaceutical companies: told the medical community that **patients would not become addicted to opioid pain relievers** and healthcare providers began to prescribe them at greater rates
- 2000's- Increased prescription of opioid medications led to widespread misuse of both **prescription and non-prescription opioids** before it became clear that these medications could indeed be highly addictive.
- 2016- Opioid overdoses accounted for more than **42,000 deaths**, more than any previous year on record. An estimated 40% of opioid overdose deaths involved a **prescription opioid**.
- 2017- U.S. Department of Health and Human Services declared the opioid epidemic a **national public health emergency**

<https://www.hhs.gov/opioids/about-the-epidemic/index.html>

# Opioid Epidemic



<https://www.nap.edu/read/24781/chapter/2#2>

# #OpioidCrisis



Traumatic & Painful event



PTSD/inflammation & pain/opioids



Chronic pain & opioid addiction

# #OpioidCrisis

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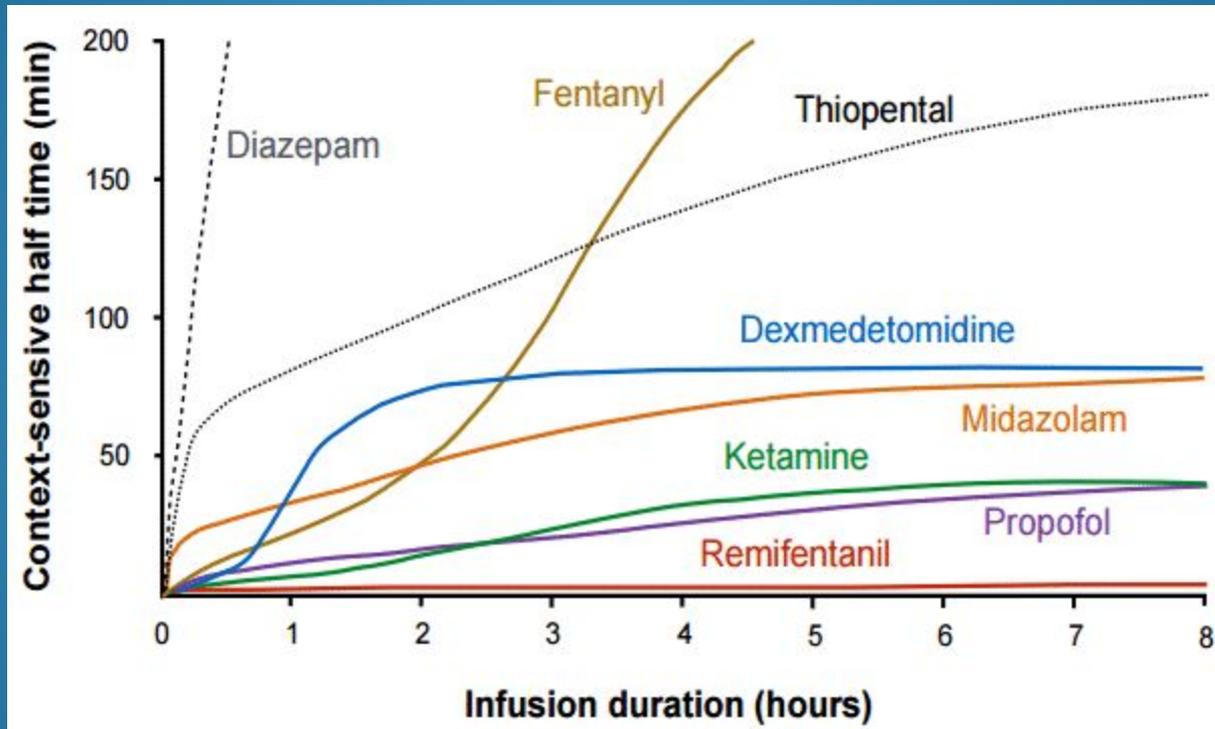
## Late Angels Pitcher Received Drugs From Team Employee

Tyler Skaggs died in July with oxycodone, fentanyl and alcohol in his system. An Angels employee said he p  
abused it with him.



Angels pitcher Tyler Skaggs was found dead in his hotel room in July. PHOTO: MARK J. TERRILL/ASSOCIATED PRESS

# Why Fentanyl?



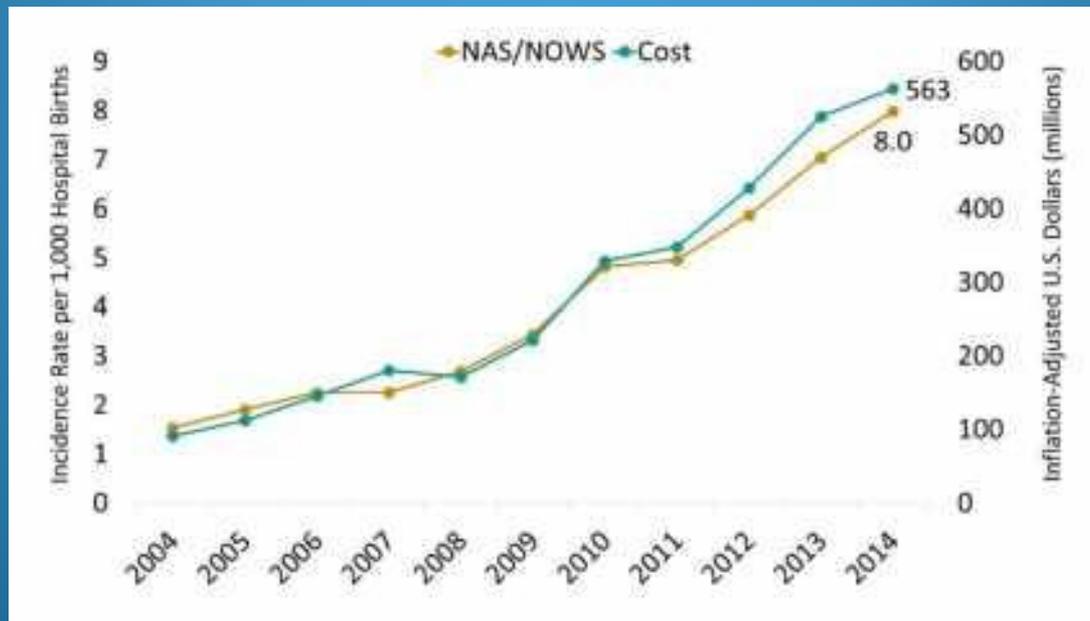
<https://www.e-jnc.org/journal/view.php?number=199>

# Opioid Epidemic

- Department of Health and Human Services (HHS) developed a 5 point plan to combat the opioid epidemic
  - Improving access to treatment and recovery services
  - Promoting use of overdose-reversing drugs
  - Strengthening our understanding of the epidemic through better public health surveillance
  - Providing support for cutting edge research on pain and addiction
  - **Advancing better practices for pain management**

# Neonatal Opioid Withdrawal Syndrome

- Neonatal opioid withdrawal syndrome (NOWS) may occur when a pregnant woman uses opioids during pregnancy
- Fivefold increase in the incidence of NOWS between 2004 and 2014, from 1.5 cases per 1,000 hospital births to 8.0 cases per 1,000 hospital births.
- One baby born with symptoms of NOWS every 15 minutes in the United States.
- During the same period, hospital costs for NOWS births increased from \$91 million to \$563 million, after adjusting for inflation



<https://www.drugabuse.gov/opioid-summaries-by-state/ohio-opioid-summary>

# Cleveland Clinic Opioid Epidemic

- Ohio leads the nation in opioid-related ER visits
- In 2016, Cleveland Clinic alone had more than 2,300 opioid-related ED visits, including 1,200 overdoses
- 75% of addiction related to initial opioid prescription
- Multimodal Strategy
  - Physician
  - Pharmacy
  - Nursing
  - Company wide support & involvement
  - Implementing ERAS, regional & acute pain management techniques
  - Decreased hospital stay, opioid consumption, improved outcomes

<https://my.clevelandclinic.org/health/articles/21127-opioids>

# Persistent postsurgical pain

- Post-surgical pain syndrome (PSPS) has been identified as a major contributor to development of chronic pain in surgical patients
- Persistent pain 3-6 months after surgery
- 10% of certain types of surgeries performed leads to PSPS
- Etiology: nociceptive (trauma or surgery) > inflammatory > neuropathic
- Risk factors: multifactorial

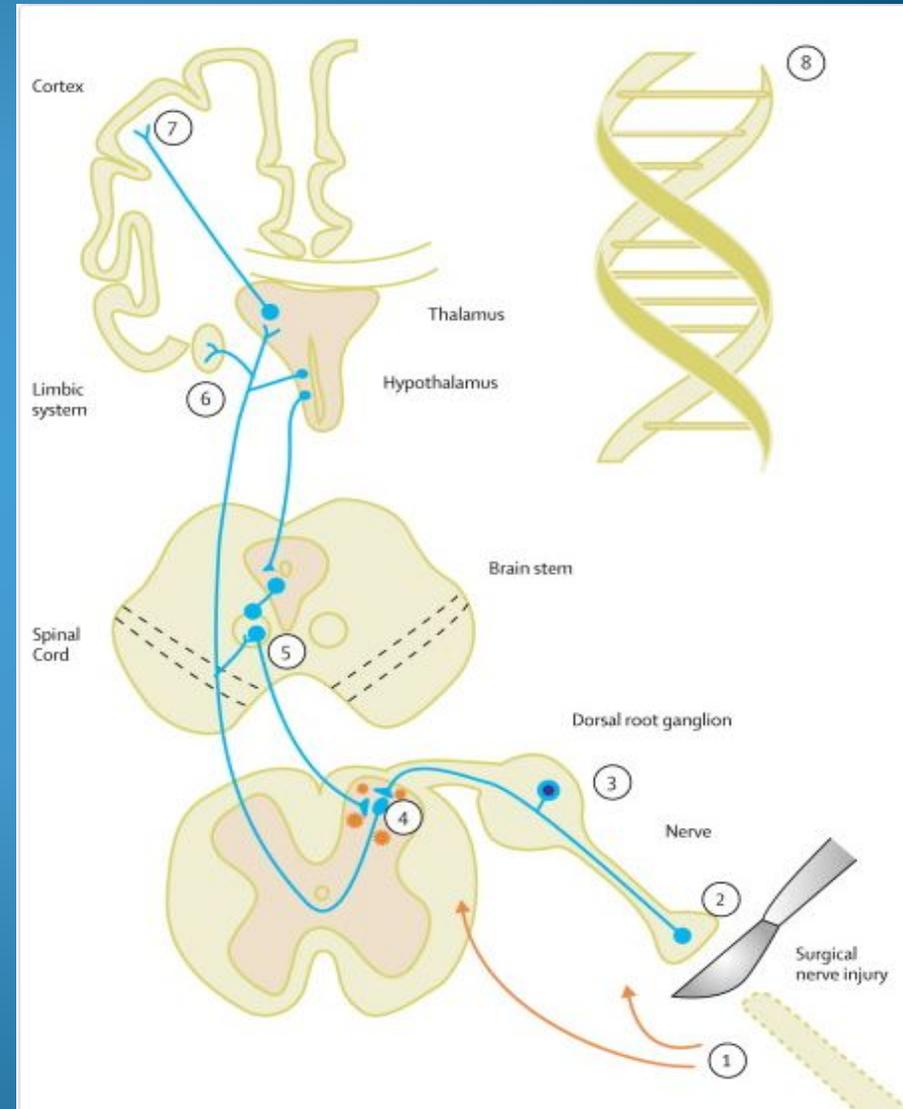
# PSPS Risk Factors

- Genetic susceptibility
  - High COMT activity associated with development of chronic pain.
  - Melanocortin-1 receptor gene (red hair) associated with greater sensitivity to opioid analgesia (PONV?)
- Preceding pain
  - Previous pain correlates with development of chronic neuropathic pain
  - Severe zoster pain leads to severe post-herpetic neuralgia
  - Amputees with severe phantom limb pain had more intense preamputation pain
  - **Acute postoperative pain is associated with chronic pain** after breast surgery, thoracotomy, and inguinal hernia repair.
- Psychosocial factors
  - Social, economic, expectations, memories, environment, etc
- Age & sex
  - Young women are more likely to develop PSPS

Persistent postsurgical pain: risk factors and prevention. Kehlet H, Jensen TS, and Woolf CJ. 2006, The Lancet. 367;9522(13-19)

# Nervous System Signal Transduction

1. Denervated Schwann cell leads to macrophage infiltration and chemical signaling
2. Neuroma leads to ectopic spontaneous excitability of fibers
3. Dorsal root ganglion gene expression alters excitability
4. Dorsal horn produces **CENTRAL SENSITIZATION**, loss of inhibitory interneurons, microglial activation. **AMPLIFIED SIGNAL**
5. Brainstem modulates transmission in spinal cord
6. Limbic system and hypothalamus contribute mood, behavior, autonomic reflex (classic pain patient behavior)
7. Pain sensation generation in cortex
8. Genomic DNA predisposition to chronic pain



# Prevention of PPS

- Surgical technique
  - Minimally invasive techniques (laparoscopy, thoracoscopy, arthroscopy, etc)
  - Avoid nerve damage (intercostal nerve in axillary dissection for mastectomy patients)<sup>1-4</sup>
- Pre-emptive multimodal analgesia
  - Mixed data on whether pre-emptive analgesia reduces PPS<sup>5,6</sup> due to study design, depending on agent used
  - Multimodal approach with anti-inflammatory (COX inhibitors, acetaminophen, steroids), NMDA antagonists, gabapentin, and **regional techniques** may prevent central and peripheral neuroplasticity and sensitization<sup>7</sup>



# Prevention of PSPPS

- Factors
  - Genetic susceptibility
  - Emotional input
  - Societal pressure
  - Patient expectations
  - Traumatic exposure
  - Inflammatory cascade
  - Signal transduction
  - Opioid-induced tolerance & hyperalgesia
- Therapeutic targets
  - Gene therapy?
  - Cognitive therapy
  - Biofeedback
  - Setting & managing expectations
  - Minimally invasive surgical techniques
  - Promoting anti-inflammatory healing (nSAIDS, local anesthetics, etc)
  - Multimodal approach to pain medication
  - **Regional anesthesia & acute pain management**

# Evidence for Regional Anesthesia preventing PSPS

*Anesth Analg.* 2006 Sep;103(3):703-8.

## **Preincisional paravertebral block reduces the prevalence of chronic pain after breast surgery.**

Kairaluoma PM<sup>1</sup>, Bachmann MS, Rosenberg PH, Pere PJ.

### ⊕ Author information

#### **Abstract**

We reported earlier that preincisional paravertebral block (PVB) provides significant immediate postoperative analgesia after breast cancer surgery. In the same patients ( $n = 60$ ), a 1-yr follow-up was performed to find out whether PVB could also reduce the prevalence of postoperative chronic pain. The follow-up consisted of a 14-day symptom diary and telephone interviews 1, 6, and 12 mo after surgery. The 14-day consumption of analgesics was similar in the 30 PVB and the 30 control patients. However, 1 mo after surgery, the intensity of motion-related pain was lower ( $P = 0.005$ ) in the PVB group. Six months after surgery, the prevalence of any pain symptoms ( $P = 0.029$ ) was lower in the PVB group. Finally, at 12 mo after surgery, in addition to the prevalence of pain symptoms ( $P = 0.003$ ) and the intensity of motion-related pain ( $P = 0.003$ ), the intensity of pain at rest ( $P = 0.011$ ) was lower in the PVB group. These findings were independent of whether or not axillary dissection had been performed. The incidence of neuropathic pain was low (two and three patients in the PVB and control groups, respectively). In addition to providing acute postoperative pain relief, preoperative PVB seems to reduce the prevalence of chronic pain 1 yr after breast cancer surgery.

# Evidence for Regional Anesthesia preventing PSPS

Pain. 1988 Jun;33(3):297-301.

## **Phantom limb pain in amputees during the first 12 months following limb amputation, after preoperative lumbar epidural blockade.**

Bach S<sup>1</sup>, Noreng MF, Tjélliden NU.

### **⊕ Author information**

### **Abstract**

The similarities between phantom limb pain and preoperative limb pain have been noted, and this raises the possibility of modulating the pain by a preoperative blockade. The aim of this study was to investigate if it was possible to reduce postoperative phantom limb pain by giving lumbar epidural blockade (LEB) with bupivacaine and morphine for 72 h prior to the operation. 25 patients were interviewed about their limb pain before limb amputation, and about their phantom limb pain 7 days, 6 months and 1 year after limb loss. 11 patients, of mean age 77 years (52-93), received an LEB, so that they were pain-free for 3 days prior to operation. The control group, 14 patients of mean age 73.4 years (63.86), all had preoperative limb pain. Seven days after operation, 3 patients in the LEB group and 9 patients in the control group had phantom limb pain ( $P$  less than 0.10). After 6 months all patients in the LEB group were pain-free, whilst 5 patients in the control group had pain ( $P$  less than 0.05). After 1 year, all the patients in the LEB group were still pain-free, and 3 patients in the control group had phantom limb pain ( $P$  less than 0.20). Preoperative lumbar epidural blockade with bupivacaine and morphine reduces the incidence of phantom limb pain in the first year after operation.

# Evidence for Regional Anesthesia preventing PSPS

*Acta Anaesthesiol Belg.* 2006;57(4):373-9.

## **The use of intraoperative epidural or spinal analgesia modulates postoperative hyperalgesia and reduces residual pain after major abdominal surgery.**

Lavand'homme P<sup>1</sup>, De Kock M.

### **⊕ Author information**

#### **Abstract**

**INTRODUCTION:** The use of intraoperative multimodal analgesia has clearly improved postoperative pain control, mortality and morbidity after major surgical procedures. However, very few clinical trials have studied the longterm impact of intraoperative epidural or spinal analgesia on chronic postsurgical pain (CPSP) development. Even less studies have evaluated the modulatory effect of intraoperative neuraxial analgesia on objective changes (i.e. mechanical hyperalgesia) reflecting central sensitization.

**METHODS:** The present work compares general anesthesia alone (GA group) versus general anesthesia combined to either intraoperative epidural analgesia (EPID group: combination of bupivacaine, sufentanil and clonidine 1 microg/kg) or spinal analgesia (IT group: either bupivacaine or clonidine 300 microg) on the development of secondary mechanical hyperalgesia and the incidence of CPSP after major abdominal surgery. Data analyzed in the present work involve adult patients undergoing surgical resection of rectal adenocarcinoma who participated in three previously published randomized trials.

**RESULTS:** Intraoperative epidural and particularly spinal analgesia reduced both incidence ( $p < 0.05$  between GA alone and spinal analgesia) and extent (area) of secondary mechanical hyperalgesia surrounding the wound at 48h and 72 h after surgery. The use of intraoperative epidural and spinal analgesia also reduced CPSP incidence. Postoperative area of mechanical hyperalgesia seems positively correlated with the incidence CPSP.

**CONCLUSION:** An effective intraoperative neuraxial block of nociceptive inputs from the wound using multimodal analgesia--specifically when involving spinal analgesics and antihyperalgesic drugs--contributes to prevent central sensitization and hence reduces CPSP after major abdominal procedures.

# Evidence for Regional Anesthesia preventing PSPS

Can J Anaesth. 2015 Dec;62(12):1329-41. doi: 10.1007/s12630-015-0499-4. Epub 2015 Oct 19.

## Potential strategies for preventing chronic postoperative pain: a practical approach: Continuing Professional Development.

Richebé P<sup>1</sup>, Julien M<sup>2</sup>, Brulotte V<sup>2</sup>.

### ⊕ Author information

### Erratum in

Erratum to: Potential strategies for preventing chronic postoperative pain: a practical approach: Continuing Professional Development. [Can J Anaesth. 2016]

### Abstract

**PURPOSE:** This manuscript proposes pharmacological strategies that might decrease persistent postsurgical pain (PPSP). These recommendations are based on a review of current publications available in the literature.

**PRINCIPAL FINDINGS:** Persistent postsurgical pain has been defined by the International Association for the Study of Pain as clinical discomfort that lasts more than two months after surgery. Recent reviews reported that 10-50% of patients develop chronic pain after surgery, 2-10% with disabling chronic pain at six months. Preventive interventions should target all types of surgery, but specific attention should be placed on surgical insults that carry a high risk of pain chronicization. Regional anesthesia (RA) should be used whenever feasible, and a continuous perineural/epidural local anesthetic infusion is preferred over a single-shot technique. The RA should be initiated prior to the surgical incision and then continued for at least 24-72 hr after the surgery. Perioperative opioids should be used for nociceptive stimuli not managed by the RA. An intravenous infusion of ketamine, an N-methyl-D-aspartate receptor (NMDA) antagonist, might be added for a further decrease in neuronal sensitization, especially when the procedure is extensive or when RA is not feasible or contraindicated. A multimodal approach is always suggested. The literature still does not strongly support the use of gabapentinoids for PPSP prevention; however, they might be maintained in patients who use them preoperatively.

**CONCLUSIONS:** A winning strategy to reduce the incidence of PPSP may well involve performing minimally invasive surgery, providing adequate perioperative analgesia based on RA, and using a multimodal approach with NMDA antagonists.

PMID: 26481936 DOI: [10.1007/s12630-015-0499-4](https://doi.org/10.1007/s12630-015-0499-4)

## Liposomal Bupivacaine Use in Transversus Abdominis Plane Blocks Reduces Pain and Postoperative Intravenous Opioid Requirement After Colorectal Surgery.

Stokes AL<sup>1</sup>, Adhikary SD, Quintili A, Puleo FJ, Choi CS, Hollenbeak CS, Messaris E.

### Author information

<sup>1</sup>1 Department of Surgery, College of Medicine, Pennsylvania State University, Hershey, Pennsylvania 2 Department of Anesthesiology and Perioperative Medicine, College of Medicine, Pennsylvania State University, Hershey, Pennsylvania 3 Department of Pharmacy, College of Medicine, Pennsylvania State University, Hershey, Pennsylvania 4 Department of Public Health Sciences, College of Medicine, Pennsylvania State University, Hershey, Pennsylvania.

### Abstract

**BACKGROUND:** Enhanced recovery protocols frequently use multimodal postoperative analgesia to improve postoperative outcomes in patients undergoing colorectal surgery.

**OBJECTIVE:** The purpose of this study was to evaluate liposomal bupivacaine use in transversus abdominis plane blocks on postoperative pain scores and opioid use after colorectal surgery.

**DESIGN:** This was a retrospective cohort study comparing outcomes between patients receiving nonliposomal anesthetic (n = 104) and liposomal bupivacaine (n = 303) blocks.

**SETTINGS:** The study was conducted at a single tertiary care center.

**PATIENTS:** Patients included those identified within an institutional database as inpatients undergoing colorectal procedures between 2013 and 2015 who underwent transversus abdominis plane block for perioperative analgesia.

**MAIN OUTCOME MEASURES:** The study measured postoperative pain scores and opioid requirements.

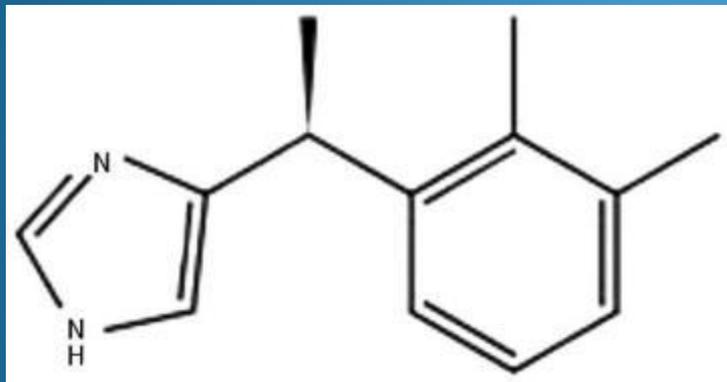
**RESULTS:** Patients receiving liposomal bupivacaine had significantly lower pain scores for the first 24 to 36 postoperative hours. Pain scores were similar after 36 hours. The use of intravenous opioids among the liposomal bupivacaine group decreased by more than one third during the hospitalization (99.1 vs 64.5 mg; p = 0.040). The use of ketorolac was also decreased (49.0 vs 18.3 mg; p < 0.001). In subgroup analysis, the decrease in opioid use was observed between laparoscopic and robotic procedures but not with laparotomies. No significant differences were noted in the use of oral opioids, acetaminophen, or ibuprofen. Postoperative length of stay and total cost were decreased in the liposomal bupivacaine group but did not achieve statistical significance.

**LIMITATIONS:** The study was limited by its retrospective, single-center design and heterogeneity of block administration.

**CONCLUSIONS:** Attenuated pain scores observed with liposomal bupivacaine use were associated with significantly lower intravenous opioid and ketorolac use, suggesting that liposomal bupivacaine-containing transversus abdominis plane blocks are well aligned with the opioid-reducing goals of many enhanced recovery protocols.

# Dexmedetomidine

## (S)-4-[1-(2,3-dimethylphenyl) ethyl]-3H-Imidazole



- 1:1620  $\alpha_1$  to  $\alpha_2$  binding ratio (highly  $\alpha_2$  selective)
- Approved by FDA in 1999 for short term sedation
- Off-label uses include
  - anxiolytic<sup>1</sup>
  - Analgesic<sup>2</sup>
  - Blunt sympathetic response to intubation<sup>3</sup>
  - Decreases need for anesthetic agents<sup>4</sup>
  - Cardiovascular stability<sup>5</sup>
  - Neuro/renal protection<sup>6</sup>
  - Minimal respiratory depression<sup>7</sup>
  - Reduced post-op shivering<sup>8</sup>
  - Early ventilator weaning, reduced ICU stay<sup>9</sup>
  - Blocks- peripheral, neuraxial<sup>10</sup>

# Neuraxial Mechanism of Action

- Analgesic effects via spinal  $\alpha_2$  adrenoceptor agonism, depressing release of C-fiber neurotransmission, hyperpolarization of postsynaptic dorsal horn neurons<sup>11-14</sup>
  - Reduced onset time of motor & sensory block
  - Increased duration of sensory block
  - Delayed motor regression
  - Prolonged postop analgesia, reduced total dose of analgesics
  - Delayed need for first opioid
  - Decreased post-op shivering

# Dexmedetomidine versus other adjuvants

- Compared to equipotent dose of clonidine, DEX showed prolonged postop analgesia with delayed and decreased need of rescue analgesics<sup>15</sup>
- DEX decreases anesthetic requirements, prevents awareness, improves oxygenation, and postop analgesia<sup>16,17</sup>
- DEX along with LA for epidural analgesia during labor pains shows good maternal satisfaction without deleterious effect on uteroplacental circulation and newborns outcome<sup>18</sup>
- DEX has also been used as an adjuvant in peripheral nerve blocks and has shown to prolong the sensory and motor block duration<sup>19,20</sup>

# Disadvantages of intrathecal opioids

- Delayed respiratory depression (for up to 24 hours!) morbidly obese and severe OSA patients
- Pruritis refractory to anti-histamines
- Nausea/emesis requiring multiple doses of anti-emetics which may make the patient more somnolent and potentially extra-pyramidal symptoms
- For opioid-induced pruritis and nausea refractory to ondansetron, diphenhydramine, buprenorphine, etc consider low dose naloxone.

# Intrathecal DEX vs Morphine

## Comparison of Intrathecal Dexmedetomidine with Morphine as Adjuvants in Cesarean Sections

Xiaofei Qi, Daili Chen, Gehui Li, Xiaolei Huang, Yuantao Li,\* Xiaoguang Wang, and Yong Li

*Department of Anesthesiology, Shenzhen Maternity and Child Healthcare Hospital, Southern Medical University; Shenzhen, Guangdong 518028, China.*

Received February 15, 2016; accepted June 10, 2016; advance publication released online June 28, 2016

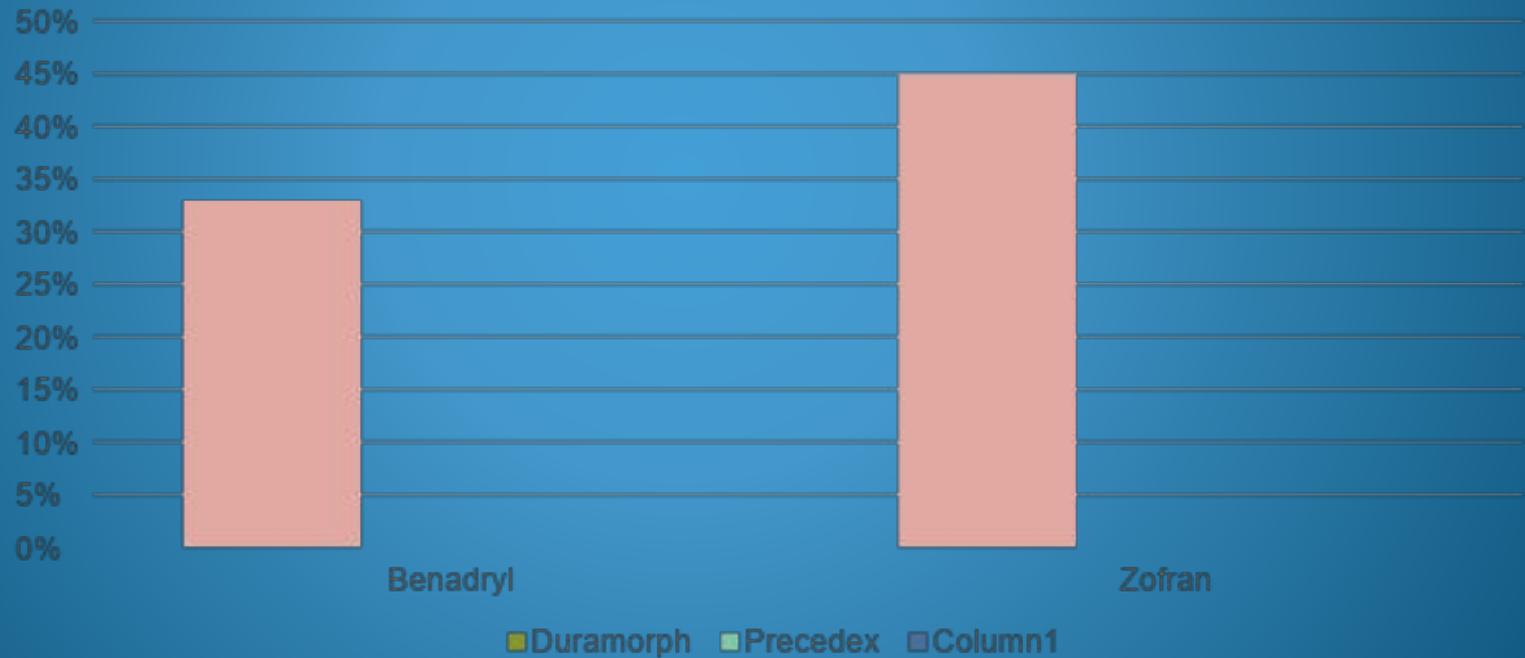
To compare the effects of intrathecal dexmedetomidine and intrathecal morphine as supplements to bupivacaine in cesarean sections under spinal anesthesia. Full-term parturients ( $n=120$ ) undergoing elective cesarean sections under spinal anesthesia were randomly allocated into three groups: Group B received 10 mg bupivacaine, Group BD received 10 mg bupivacaine plus 5  $\mu\text{g}$  dexmedetomidine, and Group BM received 10 mg bupivacaine plus 100  $\mu\text{g}$  morphine. The onset and regression time of sensory and motor blockade, postoperative analgesia, and side effects were recorded. Group BD showed quicker onset time and a longer sensory and motor blockade than other groups (BD vs. B and BD vs. BM,  $p<0.05$ ). The mean time of sensory regression to the S1 segment was  $253.21\pm 42.79$  min in group BD,  $192.50\pm 40.62$  min in group BM and  $188.33\pm 37.62$  min in group B ( $p<0.001$ ). Group BD showed an analgesia duration (time to requirement of first rescue analgesic) ( $17.59\pm 6.23$  h) similar to that of group BM ( $16.78\pm 5.90$  h) but longer than that of group B ( $3.53\pm 1.68$  h) ( $p<0.001$ ). The incidence of pruritus was significantly higher in group BM compared with groups BD and B ( $p<0.001$ ). Less shivering was observed in group BD than in groups BM and B ( $p=0.009$ ). So intrathecal dexmedetomidine (5  $\mu\text{g}$ ) prolonged the motor and sensory blockade, provided a similar analgesic effect and reduced pruritus and shivering compared with morphine (100  $\mu\text{g}$ ) in cesarean sections.

**Key words** dexmedetomidine; spinal anesthesia; cesarean section; morphine

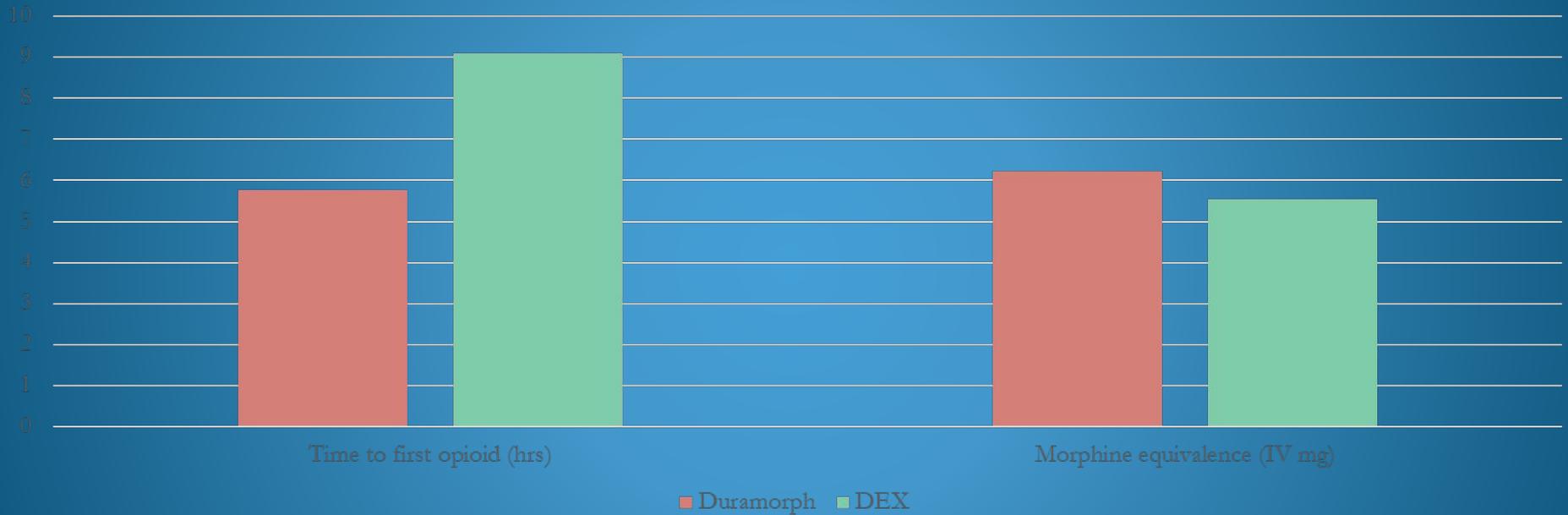
# KP Riverside Chart Review February & March

- 80 patients (50 morphine, 30 DEX)
- Similar background characteristics (age, BMI, ASA status, etc)
- Same surgeons, anesthesiologists/CRNAs, order sets, nursing, etc
- Collected data on time to first opioid, opioid requirement, incidence of nausea or pruritis requiring medication

# Dexmedetomidine decreases pruritis & nausea



# Dexmedetomidine provides prolonged analgesia



# Future area of research: new techniques & pharmaceutical agents

Anesth Analg. 2009 Dec;109(6):1963-71. doi: 10.1213/ANE.0b013e3181bdc8a0.

## The early and delayed analgesic effects of ketamine after total hip arthroplasty: a prospective, randomized, controlled, double-blind study.

Remérand F<sup>1</sup>, Le Tendre C, Baud A, Couvret C, Pourrat X, Favard L, Laffon M, Fusciardi J.

### ⊕ Author information

#### Abstract

**BACKGROUND:** Ketamine has been shown to have a morphine-sparing effect soon after surgery. Nevertheless, whether this effect still exists after being combined with nonsteroidal antiinflammatory drugs and acetaminophen, and whether ketamine can decrease chronic pain after nononcologic surgery remain unclear. Thus, we designed a study to assess ketamine's effect on acute and chronic postoperative pain when combined with multimodal analgesia after total hip arthroplasty (THA).

**METHODS:** Patients scheduled for primary nononcologic THA using standardized general anesthesia were randomized. They received IV ketamine before incision (0.5 mg/kg), and a 24-h infusion (2 microg x kg(-1) x min(-1)) or a similar blinded saline bolus and infusion. Postoperative analgesia included IV acetaminophen, ketoprofen, plus morphine/droperidol patient-controlled analgesia for 48 h. Data pertaining to pain scores, morphine consumption, and need for crutches were collected for 6 mo after THA. Our primary outcome was 24-h morphine consumption.

**RESULTS:** One hundred fifty-four patients were included (placebo, 75; ketamine, 79). Patients and operative data were similar in both groups. Ketamine decreased morphine consumption at 24 h from 19 +/- 12 mg to 14 +/- 13 mg (P = 0.004). At Day 30, ketamine decreased the proportion of patients needing 2 crutches or a walking frame from 56% to 31% (P = 0.0035). From Day 30 to Day 180, ketamine decreased the proportion of patients with persistent pain at rest in the operated hip (P = 0.008). At Day 180, 21% of placebo group patients (15 of 70) experienced pain at rest in the operated hip versus 8% (6 of 72) in the ketamine group (P = 0.036, odds ratio 0.33, 95% confidence interval 0.12-0.91, risk reduction 67%).

**CONCLUSIONS:** Ketamine had a morphine-sparing effect after THA, even when morphine was combined with multimodal systemic analgesia. It also facilitated rehabilitation at 1 mo and decreased postoperative chronic pain up to 6 mo after surgery.

# Future area of research: new techniques & pharmaceutical agents

Br J Anaesth. 2016 Oct;117(4):497-503. doi: 10.1093/bja/aew227. Epub 2016 Oct 17.

## **Magnesium sulphate attenuates acute postoperative pain and increased pain intensity after surgical injury in staged bilateral total knee arthroplasty: a randomized, double-blinded, placebo-controlled trial.**

Shin HJ<sup>1</sup>, Kim EY<sup>1</sup>, Na HS<sup>1</sup>, Kim TK<sup>2</sup>, Kim MH<sup>3</sup>, Do SH<sup>4</sup>.

### ⊕ Author information

#### **Abstract**

**BACKGROUND:** We evaluated the effect of magnesium sulphate on increased pain in 44 patients undergoing staged bilateral total knee arthroplasty (TKA).

**METHODS:** The magnesium group (n=22) and the control group (n=22) received magnesium sulphate and isotonic saline, respectively, throughout the surgery. Postoperative pain (visual analogue scale, VAS) at rest and the amounts of patient-controlled analgesia (PCA, fentanyl) and rescue analgesia (ketoprofen) administered during the first 48 h were compared between the two groups and within each group between the first and second TKA.

**RESULTS:** The VAS scores were significantly higher in the control group than in the magnesium group not only after the first TKA [29 (11) vs 19 (9) at 24 h and 33 (8) vs 24 (10) at 48 h;  $P=0.001$ ] but also after the second TKA [44 (17) vs 20 (10) at 24 h and 43 (14) vs 25 (10) at 48 h;  $P<0.001$ ]. In the control group, VAS scores were significantly higher for the second than for the first operated knee [44 (17) vs 29 (11) at 24 h and 43 (14) vs 33 (8) at 48 h;  $P<0.001$  and  $P=0.006$ , respectively]. In the magnesium group, there were no significant differences in VAS scores between the first and second TKA. Magnesium significantly reduced the amounts of rescue analgesics and fentanyl administered over the first 48 h postoperatively.

**CONCLUSIONS:** Magnesium sulphate administration significantly reduced postoperative pain and minimized the difference in pain intensity between the first and second operations.

# Future area of research: new techniques &

J Clin Anesth. 2016 Dec;35:70-77. doi: 10.1016/j.jclinane.2016.07.021. Epub 2016 Aug 6.

## **Effect of endovenous lidocaine on analgesia and serum cytokines: double-blinded and randomized trial.**

Ortiz MP<sup>1</sup>, Godoy MC<sup>2</sup>, Schlosser RS<sup>3</sup>, Ortiz RP<sup>3</sup>, Godoy JP<sup>3</sup>, Santiago ES<sup>4</sup>, Rigo FK<sup>5</sup>, Beck V<sup>1</sup>, Duarte T<sup>6</sup>, Duarte MM<sup>7</sup>, Menezes MS<sup>8</sup>.

### ⊕ Author information

#### **Abstract**

**STUDY OBJECTIVE:** This trial aimed to compare postoperative analgesia, opioid consumption, duration of ileus and hospital stay, and cytokine levels in patients undergoing laparoscopic cholecystectomies who received intravenous lidocaine in comparison with a control group.

**DESIGN:** Prospective, longitudinal, double-blind, and randomized study.

**SETTING:** Operating room and postoperative recovery area.

**PATIENTS:** Forty-four American Society of Anesthesiologists I and II patients older than 17 years, undergoing laparoscopic cholecystectomy, under general anesthesia.

**INTERVENTIONS:** The first group received intravenous lidocaine during the procedure until 1 hour postoperatively, whereas the second group received saline. Both groups received dipyron and morphine patient-controlled analgesia.

**MEASUREMENTS:** Pain was assessed by Visual Numeric Scale at rest and when coughing at different times after the end of the surgery. Blood samples were taken at the end of procedure and 24 hours later. The total morphine patient-controlled analgesia demand, the time for the first flatus, and the length of hospital stay were also recorded.

**MAIN RESULTS:** Groups were similar in relation to sex ( $P = .2$ ), age ( $P = .5$ ), weight ( $P = .08$ ), and length of surgery ( $P = .6$ ). No differences were observed regarding the intensity of postoperative pain between the groups, either at rest ( $P = .76$ ) or when coughing ( $P = .31$ ), in morphine consumption ( $P = .9$ ), and in the duration of ileus ( $P = .5$ ) or length of hospital stay ( $P = .9$ ). The inflammatory markers interleukin (IL)-1 ( $P = .02$ ), IL-6 ( $P < .01$ ), interferon- $\gamma$  ( $P < .01$ ), and tumor necrosis factor  $\alpha$  ( $P < .01$ ) showed significant reduction in the lidocaine group against the placebo group, except IL-10 ( $P = .01$ ), that, because of its anti-inflammatory effects, increased its concentration.

**CONCLUSIONS:** Intravenous lidocaine was not able to reduce postoperative pain, opioid consumption, and duration of ileus or length of hospital stay. However, its anti-inflammatory effect was noticeable.

# Future area of research: new techniques & pharmaceutical agents

Anesthesiology. 2008 Sep;109(3):484-90. doi: 10.1097/ALN.0b013e318182c2a1.

## Antiinflammatory effect of peripheral nerve blocks after knee surgery: clinical and biologic evaluation.

Martin F<sup>1</sup>, Martinez V, Mazoit JX, Bouhassira D, Cherif K, Gentili ME, Piriou P, Chauvin M, Fletcher D.

### ⊕ Author information

#### Abstract

**BACKGROUND:** Nerve blocks provide analgesia after surgery. The authors tested whether nerve blocks have antiinflammatory effects.

**METHODS:** Patients had combined sciatic (single-shot) and continuous femoral block (48 h) (block group) or morphine patient-controlled analgesia after total knee arthroplasty. Pain at rest and upon movement was monitored at 1 (D1), 4 (D4), and 7 days (D7) and 1 (M1) and 3 months (M3) after surgery. Knee inflammation was evaluated (skin temperature, knee circumference) before surgery and at D1, D4, D7, M1, and M3. Plasma cytokine concentrations (interleukin [IL]-6, IL-1beta, tumor necrosis factor [TNF], IL-10, soluble receptor 1 of TNF [sTNF-R1]) were measured before surgery and at 4 h, D1, D4, and D7 after surgery. Capsule and synovial membrane cytokines were measured (IL-6, TNF, IL-1, IL-10). Knee flexion was evaluated before surgery and at D1, D4, D7, M1, and M3. Morphine use and recovery time to autonomy were monitored.

**RESULTS:** Pain at rest and upon movement was lower in the block group than in patient-controlled analgesia patients between D1 and D7 (analysis of variance,  $P < 0.005$ ). Knee flexion was improved in the block group for D1 to M1 (analysis of variance,  $P < 0.0001$ ). Block group patients recovered nonassisted mobilization (t test,  $P = 0.04$ ) and toilet use (t test,  $P = 0.03$ ) more rapidly. Knee circumference and skin temperature were lower in the block group between D1 and D7 (analysis of variance,  $P < 0.05$ ). Synovial membrane IL-1 ( $P < 0.05$ ) and IL-10 ( $P < 0.01$ ) increased, and plasma IL-6 and sTNF-R1 peaked at 24 h, with no difference between groups.

**CONCLUSION:** Nerve blocks inhibited clinical inflammation after total knee arthroplasty, with no change in tissue and plasma cytokine concentrations.

# Future area of research: new techniques & pharmaceutical agents

J Anaesthesiol Clin Pharmacol. 2015 Jul-Sep;31(3):365-9. doi: 10.4103/0970-9185.161674.

## Clonidine as an adjuvant to ropivacaine-induced supraclavicular brachial plexus block for upper limb surgeries.

Patil KN<sup>1</sup>, Singh ND<sup>1</sup>.

### ⊕ Author information

#### Abstract

**BACKGROUND AND AIMS:** Ropivacaine is a new amide, long acting, pure S-enantiomer, local anesthetic, with differential blocking effect. The addition of clonidine to local anesthetic improves the quality of peripheral nerve blocks. This study was conducted to evaluate the effect of clonidine on characteristics of ropivacaine-induced supraclavicular brachial plexus block.

**MATERIAL AND METHODS:** A total of 60 adult patients were randomly recruited to two groups of 30 each: Group I: 30 ml 0.75% ropivacaine + 1 ml normal saline. Group II: 30 ml 0.75% ropivacaine + 1 mcg/kg clonidine diluted to 1 ml with normal saline.

**RESULTS:** The onset of sensorimotor block was earlier in Group II ( $4.36 \pm 0.81$  min for sensory block and  $9.83 \pm 1.12$  min for motor block) than in Group I ( $4.84 \pm 0.65$  min for sensory block and  $10.85 \pm 0.79$  min for motor block). The duration of both sensory and motor block were significantly prolonged by clonidine ( $P < 0.001$ ). The duration of analgesia was also prolonged in patients receiving clonidine ( $613.10 \pm 51.797$  min vs.  $878.33 \pm 89.955$  min). Although incidence of hypotension and bradycardia was higher in Group II when compared to Group I, it was not clinically significant.

**CONCLUSIONS:** Ropivacaine 0.75% is well-tolerated and provides effective surgical anesthesia as well as relief of postoperative pain. Clonidine as an adjuvant to ropivacaine significantly enhances the quality of supraclavicular brachial plexus block by faster onset, prolonged duration of sensory and motor block and improved postoperative analgesia, without associated adverse effects at the dose used.

# Opioid-Free Anesthesia Facilitates Same Day Total Joint Surgery

## Amir Shbeeb, MD

Kaiser Permanente Medical Center- Riverside, CA

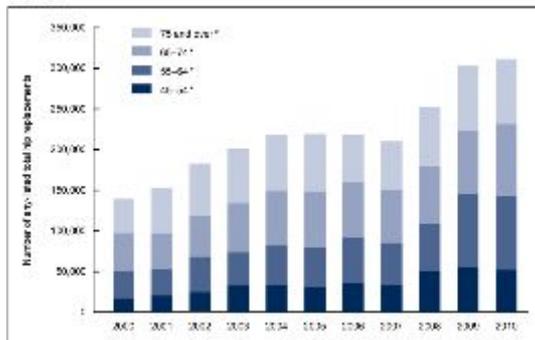


44th Annual Regional Anesthesiology & Acute Pain Medicine Meeting  
April 11-13, 2019 | Las Vegas, Nevada

### Introduction

- 700,000 total knee arthroplasty (TKA) procedures are performed annually in the US. This number is projected to increase to 3.48 million procedures per year by 2030<sup>1</sup>
- 400,000 total hip arthroplasty procedures (THA) are performed annually<sup>2</sup>
- Hospital costs for joint replacement increased from 2002 to 2013, but less than anticipated (\$23k vs \$25k) due to decreased length of stay<sup>3</sup>
- Major barrier to same day discharge is pain, nausea, and hypotension<sup>4</sup>
- Outpatient total joints may be a safe and effective practice in select patients with anesthetic management that facilitates earlier discharge and recovery<sup>5</sup>

Figure 1. Number of total hip arthroplasties (THA) and total knee arthroplasties (TKA) performed annually from 2002 to 2016.



1. Kurtz S, Ong K, Lau E, Mowat F, Halpern M. J Bone Joint Surg Am. 2007 Apr;89(4):780-5.  
2. CDC/NCHS, National Hospital Discharge Survey, 2000-2010.  
3. Effects of the Length of Stay on the Cost of Total Knee and Total Hip Arthroplasty from 2002 to 2013. Molloy, Ilda, Martin, Brook; Moschetti, Wayne E., MD; Jevsevar, David S. JBJS: March 1, 2017  
4. The Shift to Same-Day Outpatient Joint Arthroplasty: A Systematic Review. J Arthroplasty. 2018 Apr. Hoffmann, Kusnezov, Dunn, Zarkadis, Goodman, Berger.  
5. Complications Following Outpatient Total Joint Arthroplasty: An Analysis of a National Database. J Arthroplasty. 2017

### Perioperative Management

- Pre-op optimization of chronic conditions (hypertension, diabetes, discontinuing opioids, smoking cessation, home health referral to ensure safe home discharge), anesthesia pre-op clinic visit
- Day of surgery: apple juice 2 hours prior, pre-op acetaminophen, gabapentin, ketorolac/meloxicam
- Intra-op spinal, sedation, fluids
  - 0.5% ropivacaine; 1.8mL for knee, 1.6mL + 0.6mL sterile water for hip (hypobaric mixture), adjust for height variation. This regimen allows for rapid motor recovery with prolonged sensory analgesia, allowing for early physical therapy without associated hyperalgesia
  - 25cc/kg IV fluids intra-op, adjust based on clinical factors
  - No opioids, diphenhydramine or benzodiazepines
  - propofol drip titrated, ketamine 40mg IV, consider dexmedetomidine 0.5mcg/kg IV for obstructive sleep apnea
- Recovery: Early physical therapy, Robaxin/magnesium as needed for pain
  - adductor canal block with liposomal bupivacaine, dexmedetomidine, epinephrine, and dexamethasone (~48 hours of pain relief for TKA vs standard 16 hour block)
- Patients sent home once discharge criteria met, no baseline long-acting opioid, only hydrocodone/acetaminophen as needed (typically minimal first 48 hours).

### Discussion

Opioids have many undesired effects perioperatively: nausea, ileus, sedation, as well as hyperalgesia and opioid addiction. With the focus of improving efficiency and enhancing the recovery process, we eliminated opioids and focused on shorter-acting sedation and spinal anesthetic regimen in addition to a longer acting peripheral nerve block. This facilitated our patients early recovery, quicker physical therapy participation, and enhanced our medical center's ability to perform same-day total joints. The effects were pronounced and appreciated from administration, surgeons, perioperative nursing, as well as our physical therapists. Our patients satisfaction has also been realized. Same day total joints is a team effort and reducing opioids will help promote our role in enacting this effect.

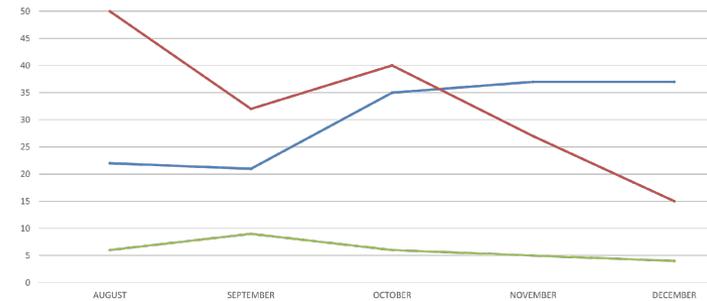


Figure 2. Illustration of number of total joints at our medical center by same day (blue), 1 day (red), and 2 days or more (green) hospitalization after surgery since implementation of opioid-free anesthesia. Kaiser Permanente Riverside, CA.

### Conclusions

As the number of total joint replacement surgery continues to rise along with associated increased cost of healthcare, advocating and supporting same day joint surgery for select patients becomes more critically important for sustainable healthcare in a systems-based practice. Opioid-free anesthesia may increase the success of same day total joint surgery for THA and TKA.

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- CDC/NCHS, National Hospital Discharge Survey, 2000-2010.
- Effects of the Length of Stay on the Cost of Total Knee and Total Hip Arthroplasty from 2002 to 2013. Molloy, Ilda, Martin, Brook; Moschetti, Wayne E., MD; Jevsevar, David S. JBJS: March 1, 2017
- The Shift to Same-Day Outpatient Joint Arthroplasty: A Systematic Review. J Arthroplasty. 2018 Apr. Hoffmann, Kusnezov, Dunn, Zarkadis, Goodman, Berger.
- Complications Following Outpatient Total Joint Arthroplasty: An Analysis of a National Database. J Arthroplasty. 2017

# Cedars-Sinai hip fracture protocol

- Avoid benzodiazepines & opioids perioperatively
- Fascia iliaca block catheter vs single shot injection
- Acetaminophen, gabapentin, NSAIDs around the clock
- Tramadol as needed for breakthrough pain
- Drastically improved pain control, decreased incidence of delirium, POCD

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Pain Medicine



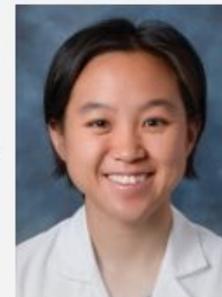
SEPTEMBER 18, 2019



## Fascia Iliaca Block for Geriatric Hip Fracture Reduces Length of Hospital Stay, Compared With Opioid Protocol

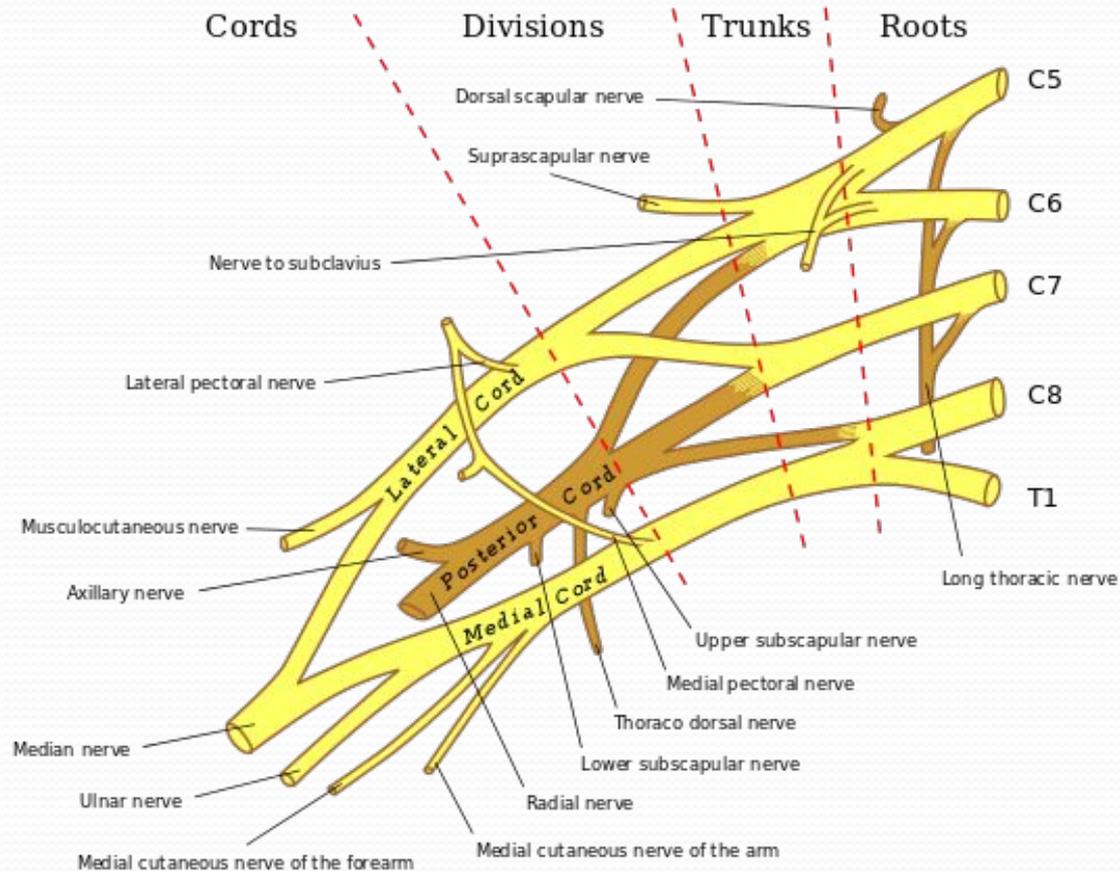
Administering early preoperative and perioperative fascia iliaca blocks in geriatric patients with hip fractures resulted in one less day of hospitalization compared with a standard opioid protocol, according to a new study.

“While taking care of these patients, we noticed that their opioid intake can be quite high, both before and after surgery,” said co-principal investigator Carol Lin, MD, an assistant professor of orthopedic surgery at Cedars-Sinai Medical Center,

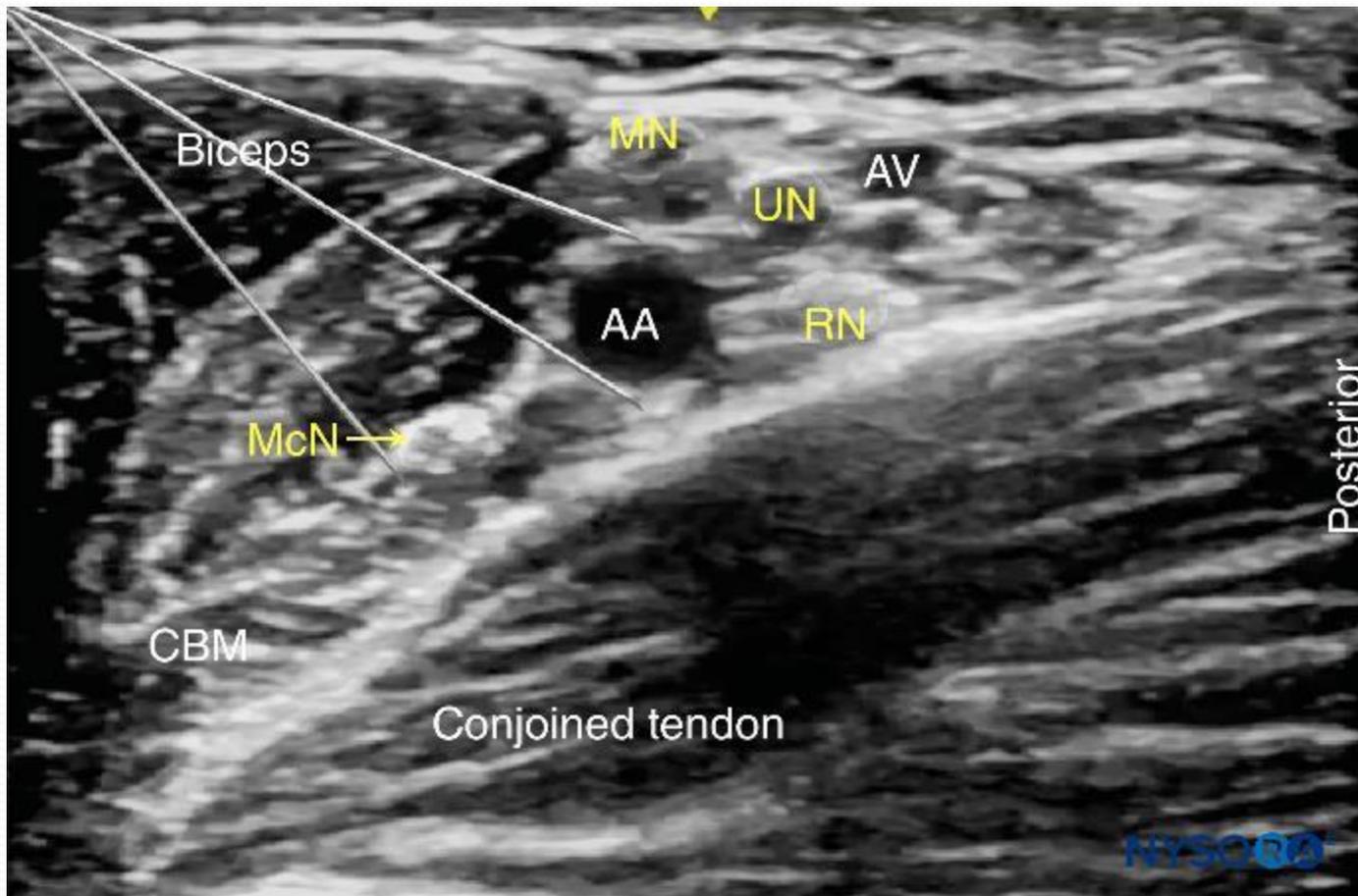


Carol Lin, MD

# Brachial Plexus



# Axillary Block



# Axillary Block



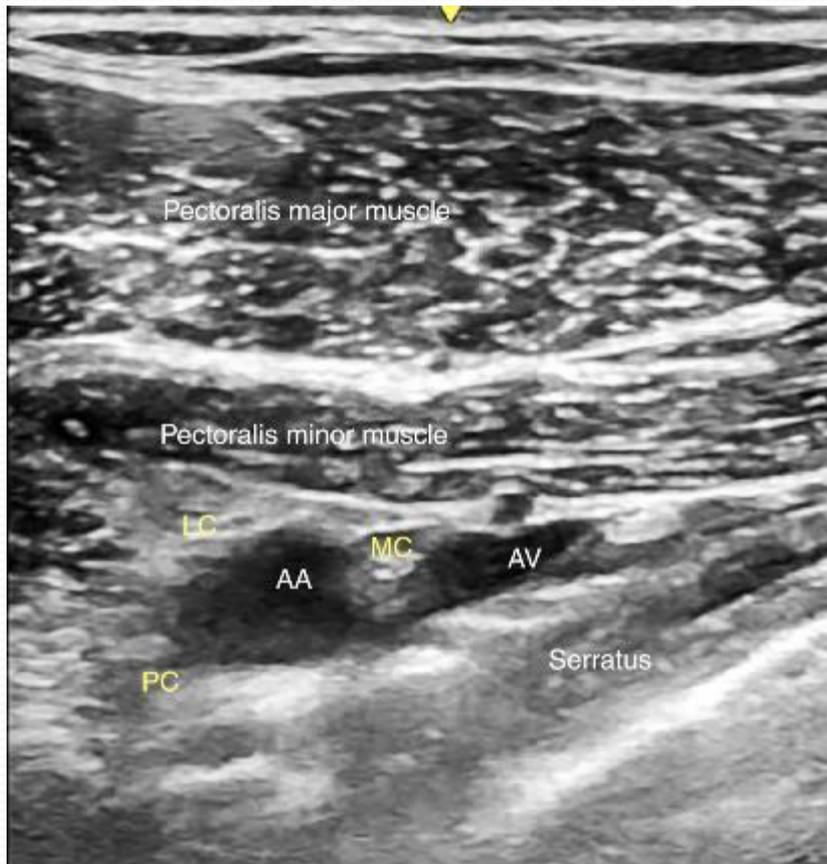
# Axillary Block



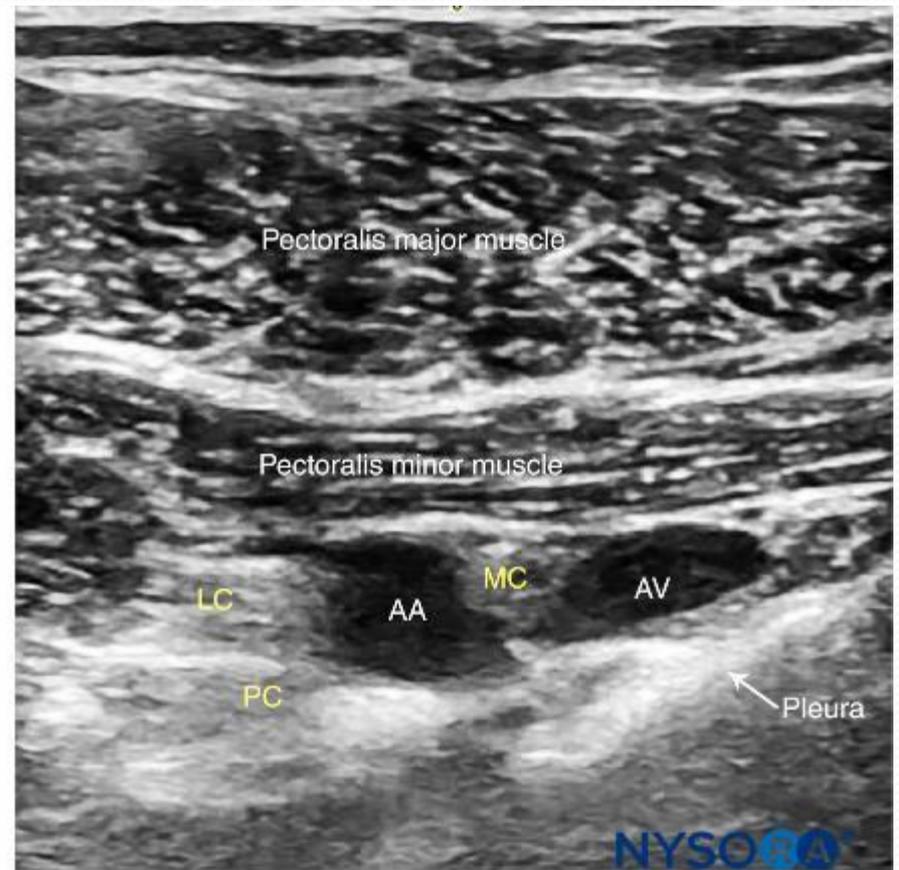
# Axillary Block



# Infraclavicular Block

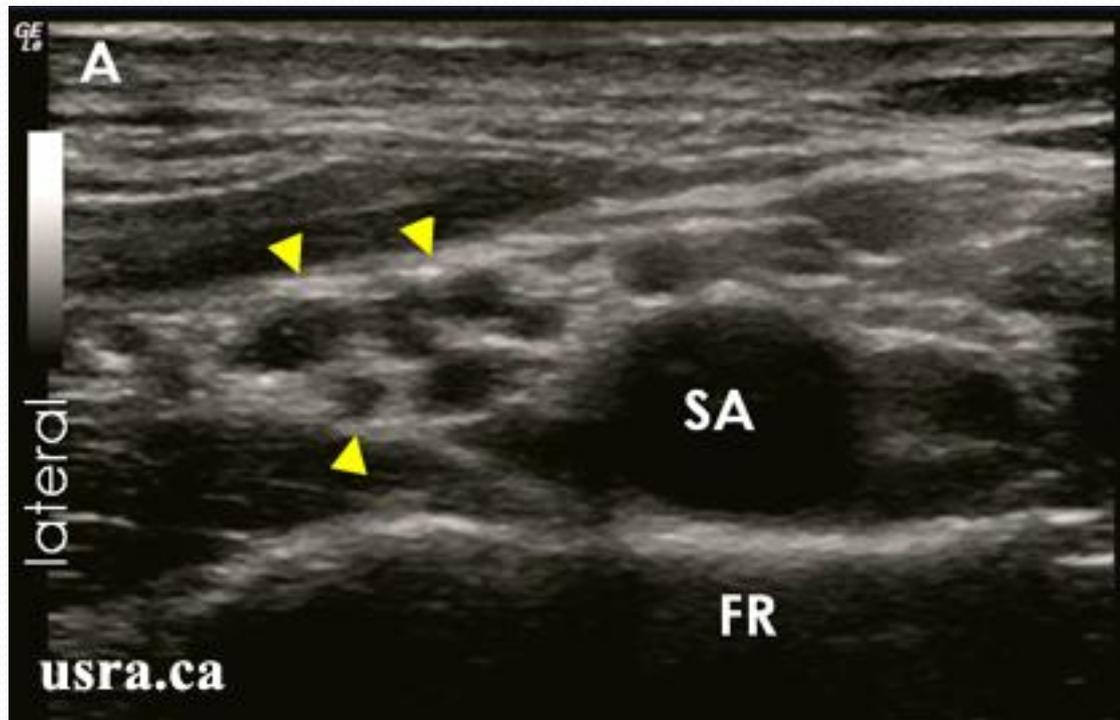


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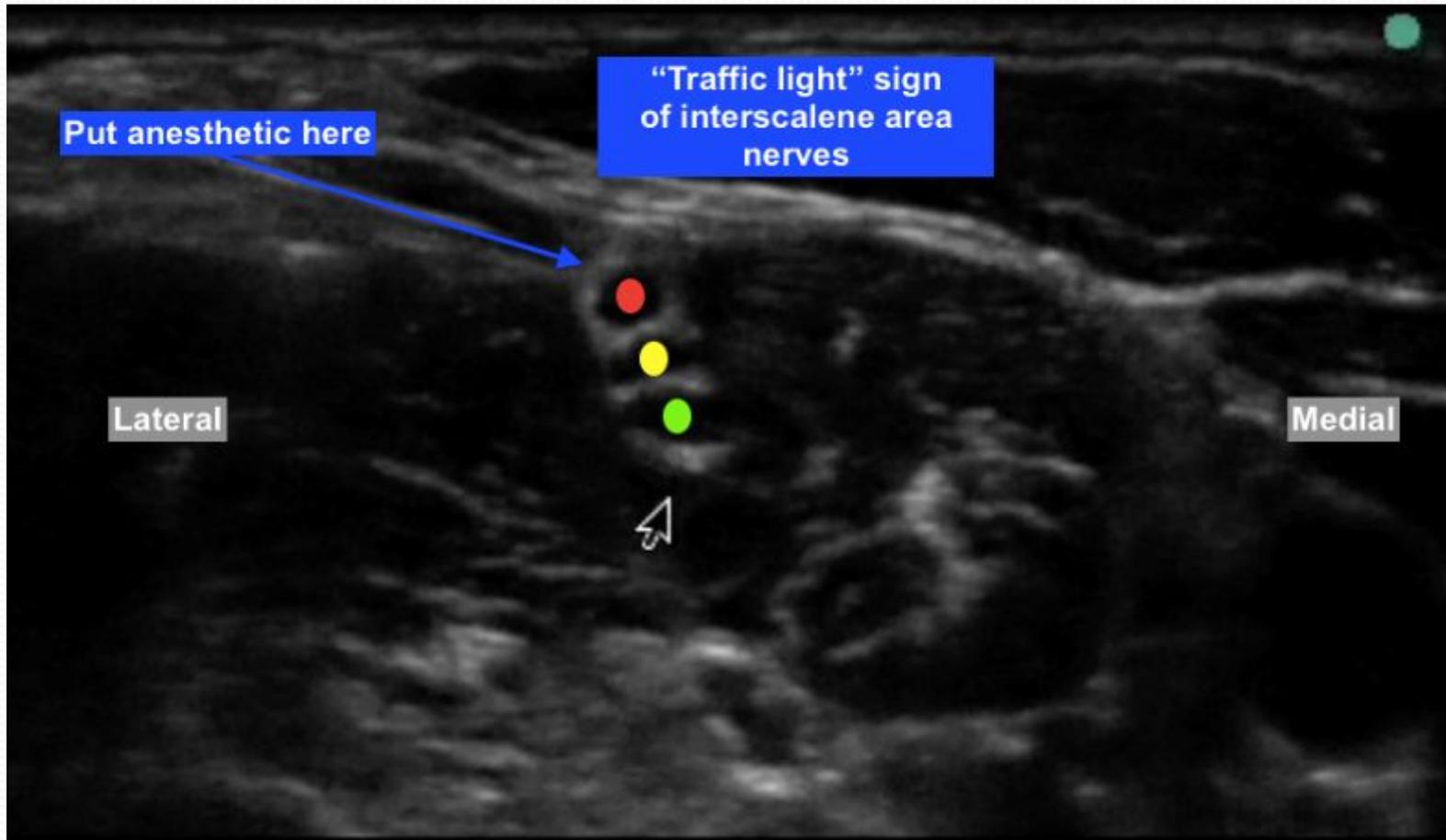


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# Supraclavicular Block



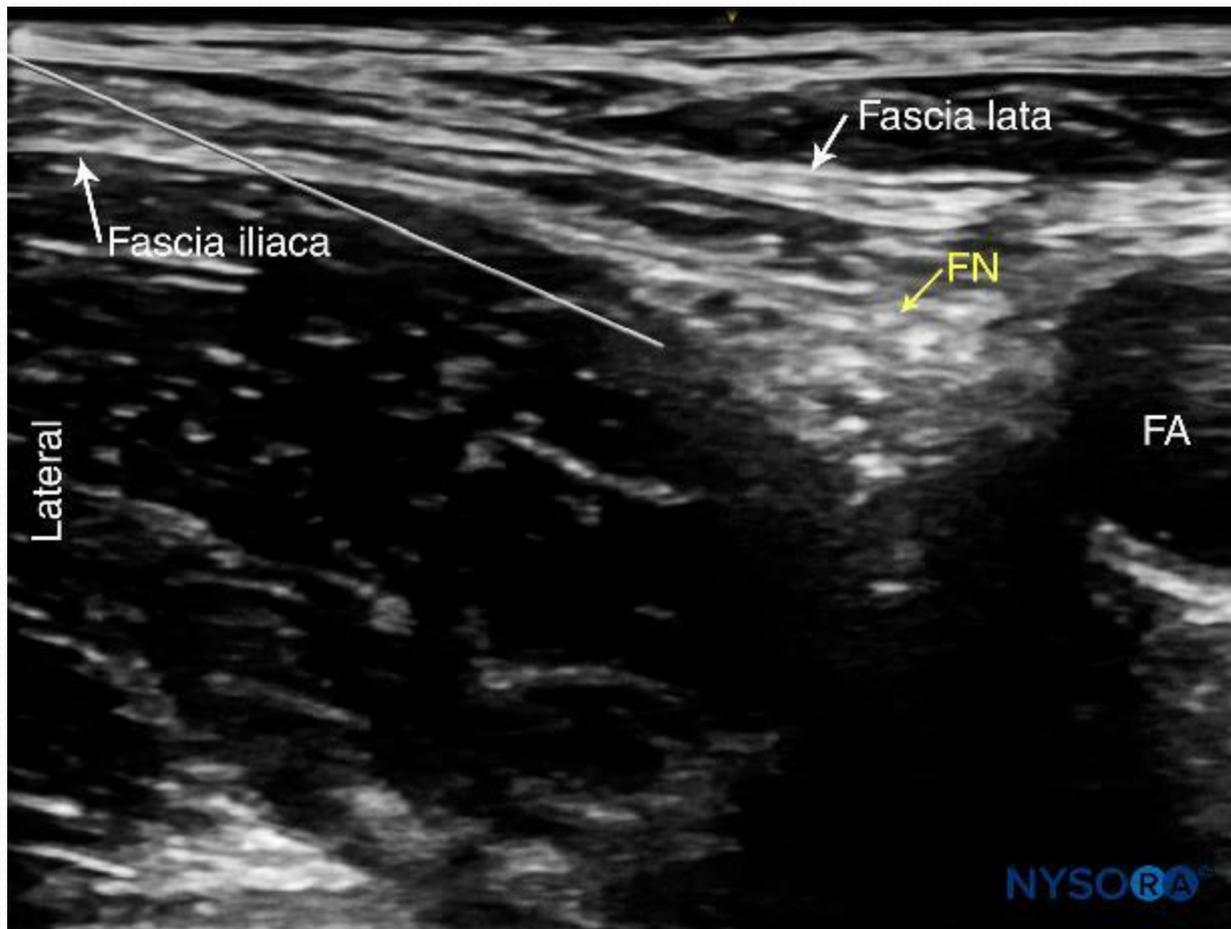
# Interscalene Block



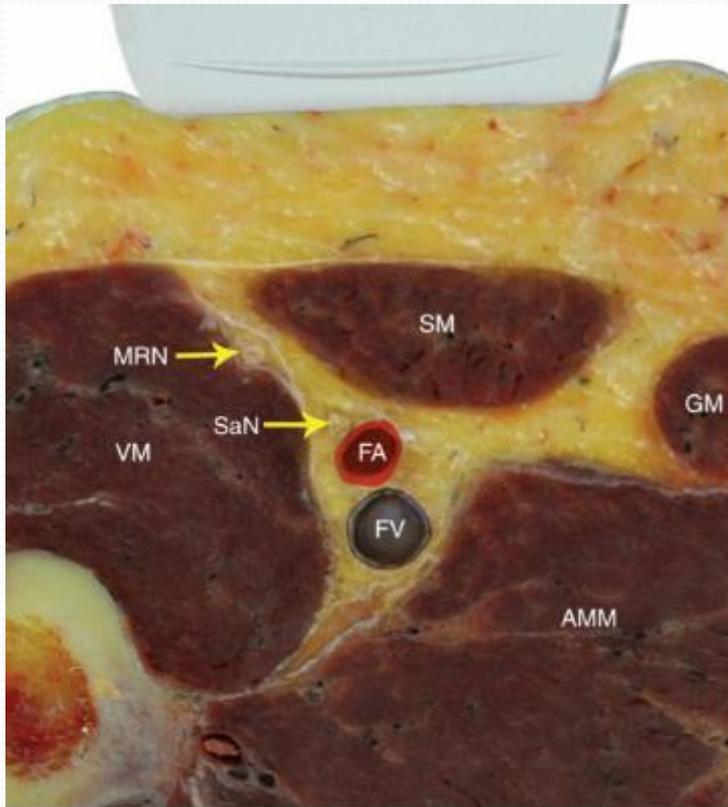
# Sciatic Block



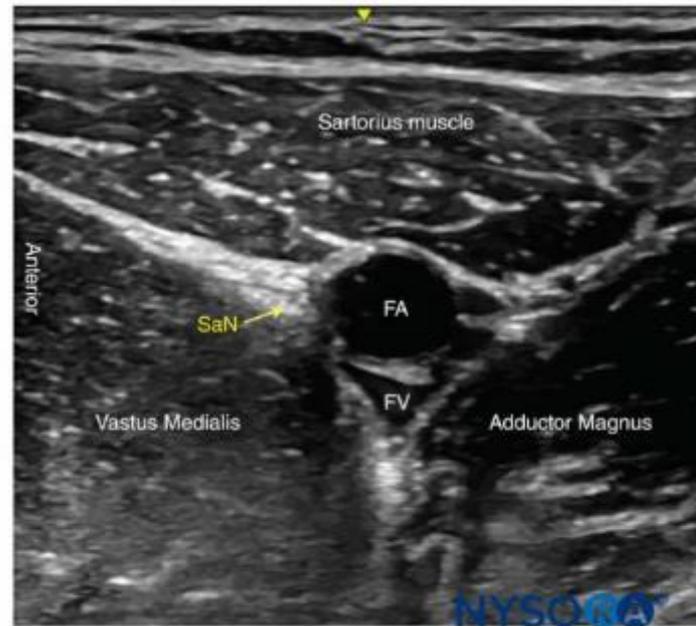
# Femoral & fascia iliaca block



# Saphenous Block

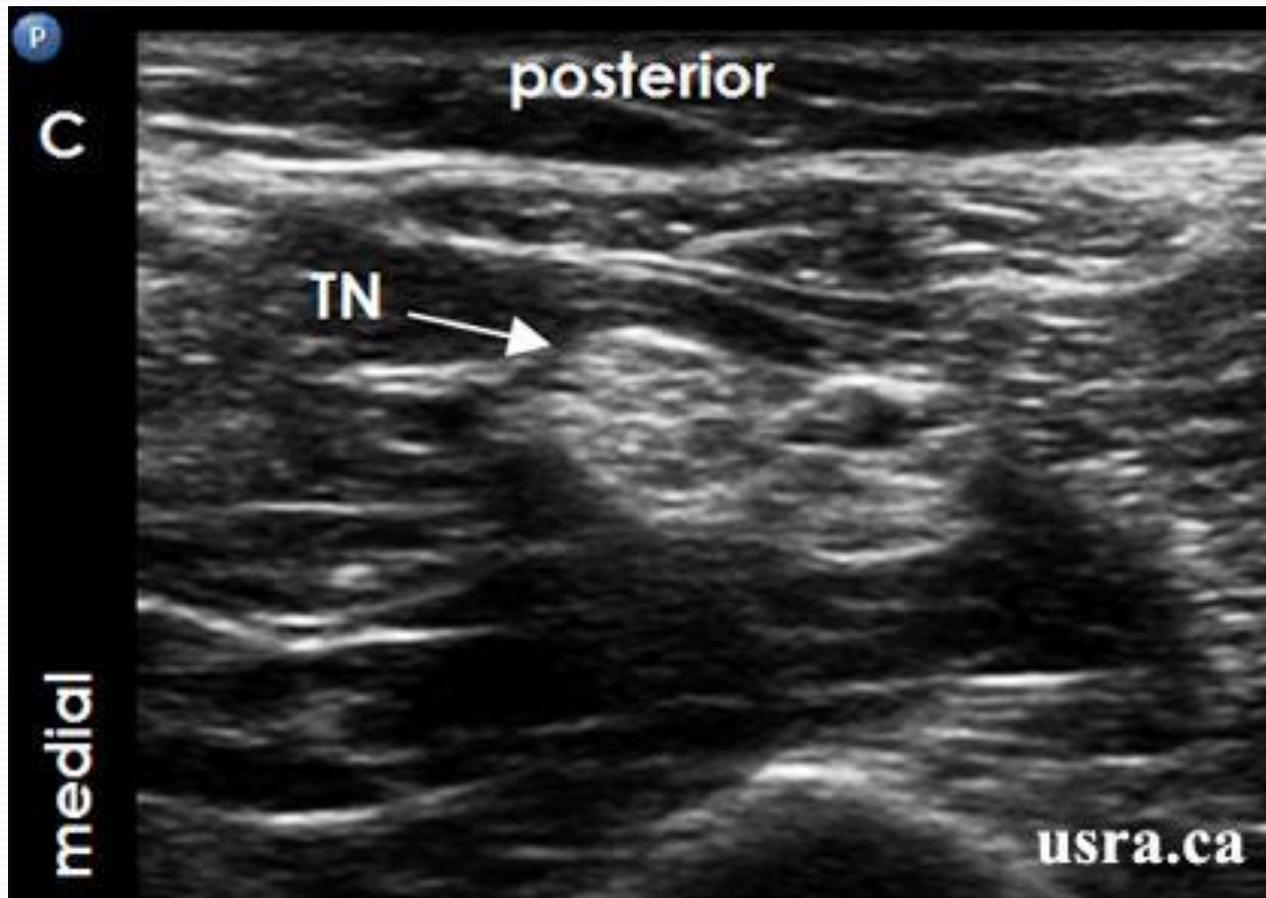


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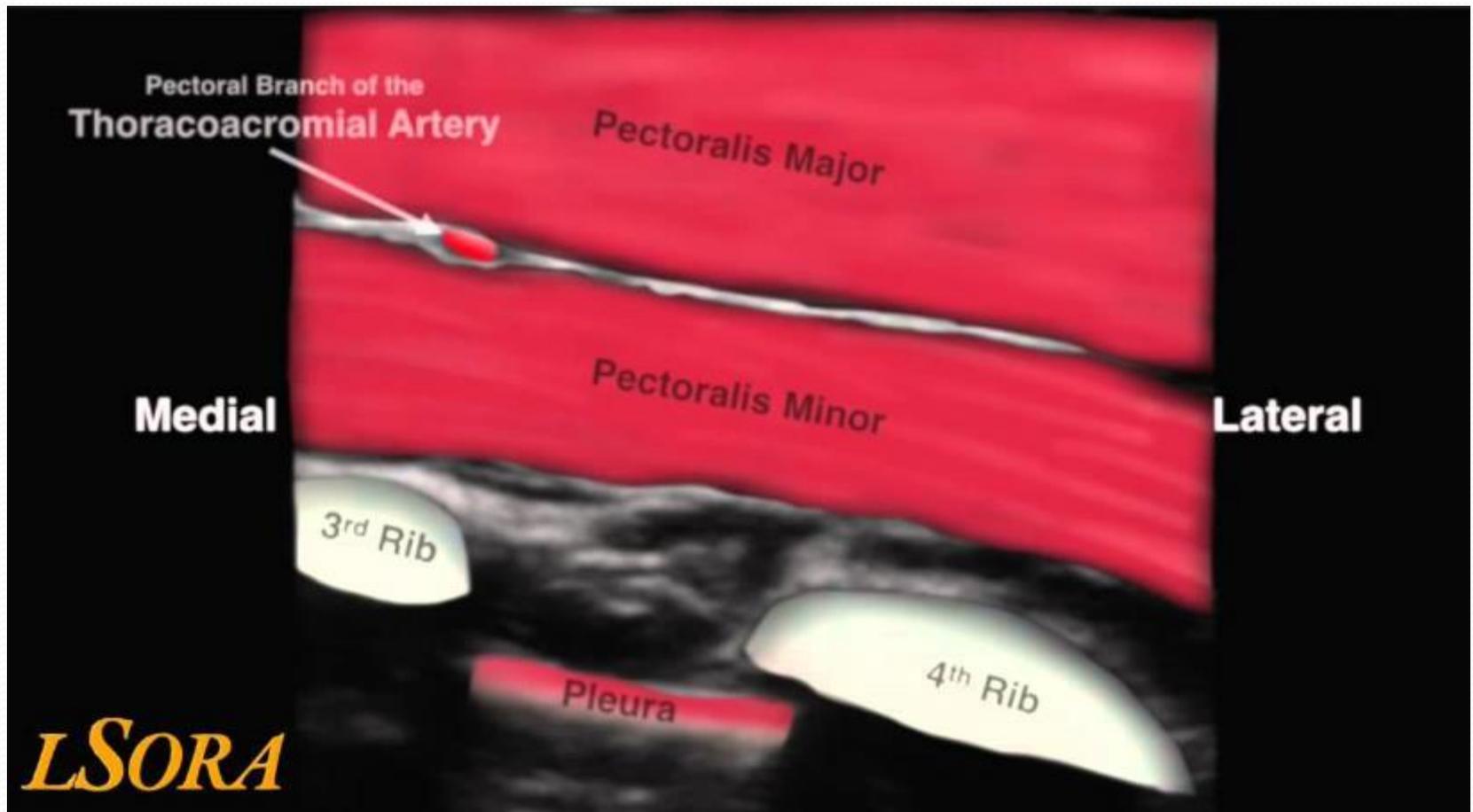


B

# Popliteal Block



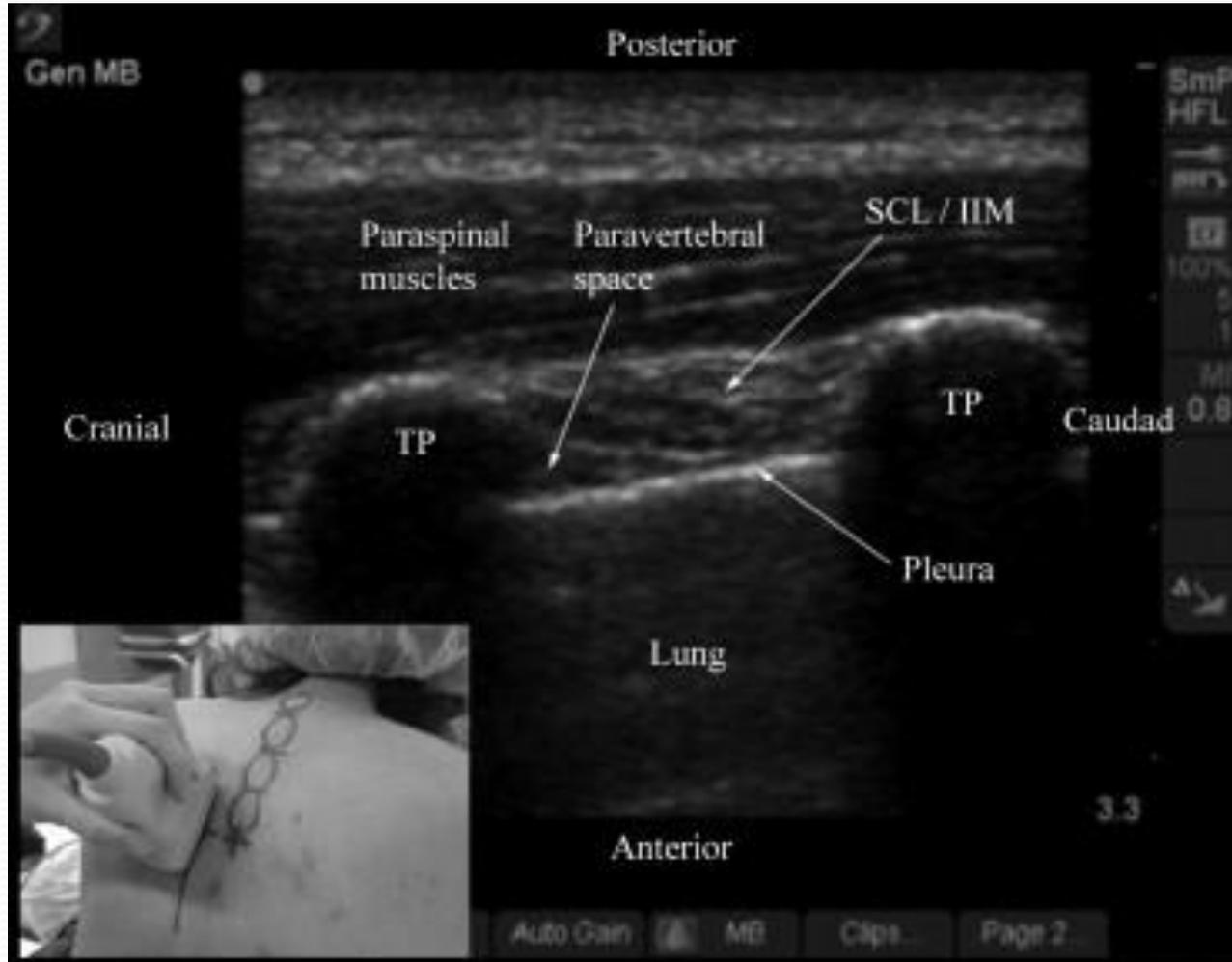
# PECS Block



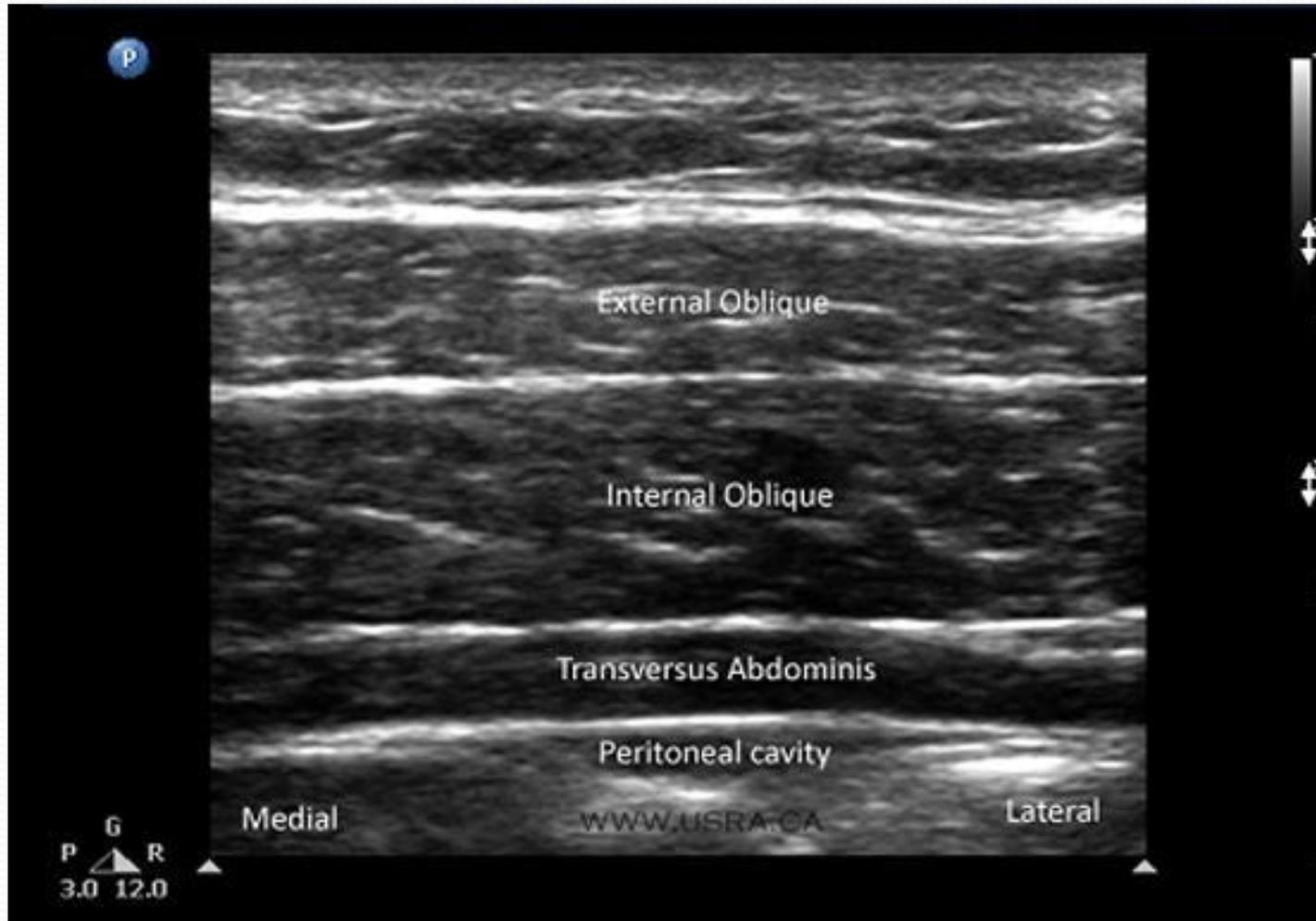
# PECS Block



# Paravertebral Block



# TAP Block



# TAP Block

**Flowsheets**

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Point of Care Tests A... PREGNANCY POCT REPORT... Pain L&D Epidural Complications and Pro... Labor OB Patient Profile Cervical Exam Preop Checklist OB Shift Pain

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Admission (Current) from 10/10/2019 in FCC

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**OTHER**

Pain Scale								
Acceptable	7	7	7	7				
Location								
Duration	Continuous							
Character	Sharp,Throbbin...							
Aggravating	Activity							
Alleviating								
Pain	Medication							
Pasero Opiate	1	1	1	1				

**Pain Management**

Pain Score	10	8	7	6	SLEEPING	SLEEPING	SLEEPING
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# Benefits of Regional Anesthesia

- Decreased perioperative opioids
- Decreased anesthetic requirement (less nausea, sore throat, decreased PACU/recovery time, improved perioperative efficiency... same day joints)
- Improved pain score
- Decreased hospital length of stay
- Decreased ileus/earlier return of bowel & urinary function
- Decreased risk of post-operative cognitive dysfunction
- Decreased risk of respiratory depression
- Decreased risk of opioid dependence
- Decreased risk of over-sedation/somnolence
- Decreased risk of delirium
- Improved functional status due to less pain
- **Better outcomes... better care... \$\$\$**

# Conclusion

- Chronic pain & opioid crisis are a burden on our healthcare system and society
- Acute postsurgical pain is tightly associated with the development of chronic pain & opioid addiction
- PSPS etiology is **multifactorial**: environmental, social, gender, age and psychological factors
- Acute postsurgical pain is a complex process with multiple signaling pathways consisting of **nociception, inflammation, and ultimately developing neuropathic pain**
- **Peripheral and central sensitization** occurs at the genetic level with **inflammatory transmitters** modulating genetic transcription
- **Proper screening** will allow the physician to identify patients most at risk for developing PSPS and thereby alter treatment appropriately
- A multimodal approach with pharmacotherapy, minimally invasive surgery, **regional anesthesia**, and psychotherapy is likely to be most successful in decreasing the incidence of PSPS

# Discussion

- What I learned from this:
  - Development of chronic postoperative pain is as complex, multifaceted process that requires a complex, **multimodal** approach for treatment
  - Prevention is just as important as treatment (**pre-emptive analgesia**)
  - **Multidisciplinary** approach with surgeon, anesthesiologist, hospitalist, PT/OT, rehab, nursing, etc
- How this will affect my management:
  - Each patient brings variables with them that will require a potentially different anesthetic and perioperative pain medication regimen
  - Risk stratification as well as early identification of **red flags** will lead to better treatment and outcome
  - Use certain **regional techniques and pharmaceutical** adjunctive therapy appropriately

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