

# FROM BLOCKS TO BRILLIANCE

54 ACADEMIC TIPS  
IN REGIONAL ANAESTHESIA



**Dr. Kartik Sonawane**

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**From Conception to Confidence: The Gestational Journey of a Regional Anesthesia Fellow**

**On-Arrival Regional Blocks: A Head-to-Toe Strategy for Early Pain Relief**

**Precision Under Pressure: Regional Anesthesia for VIP Patients**

**Don't Be Fooled: Why ESP Block Isn't a Spine Surgery Soloist**

**Rethinking Posterior Knee Blocks in TKA: Lessons from the PPB vs IPACK Trial**

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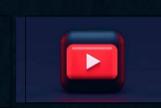
**Pain at the Core: On-Arrival Blocks for Chest and Abdomen**

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💡 From Conception to Confidence: The Gestational Journey of a Regional Anesthesia Fellow 🎓🩺

#BornToBlock #FellowshipJourney #RegionalAnaesthesia  
 #BlockMastery #WombToWisdom #UltrasoundGuidedSuccess #RAFellowship  
 #AnesthesiaEducation #MedTwitter  
 #TipOfTheDay #MyRATips

Tip of the Day:

👋 Before fertilization begins, a spark of intention and ambition marks the true beginning.  
 🧑 Just like pregnancy doesn't start with a fully formed fetus, a regional anesthesia fellowship doesn't start with expertise - it starts with aspiration.

🌀 The Conception: Entering the Fellowship Womb

💡 Decision Phase: Choosing to pursue a RA Fellowship is like preparing the womb - setting your academic & clinical environment for growth.

📄 Application & Acceptance: Like ovulation & fertilization readiness - alignment of goals, mentors, & timing brings the opportunity to life.

🏠 Relocation & Readiness: Arranging accommodation, paperwork, & mindspace. This is the pre-implantation phase - floating but destined.

🔄 Expectant Mindset: Emotional & intellectual preparedness to be shaped, challenged, & transformed.

🥚 Fertilization (Day 1–7) - The Spark of Curiosity

👋 Orientation begins - meeting mentors, machines, & the magic of RA

👁️ Getting familiar with the ecosystem - OTs, scans, anatomy, and terminologies

🌱 The seed is planted: curiosity begins to grow

🌱 Implantation (Week 2–4) - Settling In & Sinking Roots

🏠 Anchoring into the system - adapting to schedules, protocols, and expectations

📚 Establishing foundational concepts - sonoanatomy, physics of ultrasound, basic blocks

🌀 Finding your identity within the fellowship

🧬 Organogenesis (Month 2–3) - Building Blocks of Knowledge

🧠 New neurons fire with every scan and every block - it's intense learning time!

🔍 Discovery phase - tracing fascial planes, learning pharmacology, mapping dermatomes

👨‍⚕️ Guided practice under supervision - every block is a formative event

🦷 Organ Development (Month 4–6) - Skill Structuring & Refinement

👉 Steady hands, sharper eyes - needle control and probe manipulation improve

📊 Confidence in landmarking and LA spread dynamics

😬 Internalising why-where-how behind each block

👉 Early independent attempts begin under safety net

🧠 Higher Function Maturation (Month 7–9) - From Technician to Thinker

🌱 Pattern recognition sharpens - matching clinical scenario with the perfect block

🌟 Personal touch emerges - customizing techniques, troubleshooting challenges

🗣️ Effective communication with surgeons and patients improves

👤 In Vitro Nurturing (Month 10–12) - Becoming Independent

👤 Developing reflexes - selecting, executing, & improvising blocks with minimal supervision

💪 Standing tall - confidence in handling complex cases and teaching juniors

🎓 Ready for real-world delivery - poised for solo practice

👉 6-Month Fellowship? - A Premature Delivery

⚡ Rapid acceleration, compressed learning curve

🧠 Requires high neuroplasticity and self-drive

👤 Confidence is key - some reflexes may still be maturing, but survival is possible with solid mentorship and proactive effort

🌟🏠 Take-Home Summary 🔑

👉 A 1-year RA Fellowship is like a full-term pregnancy - a complete cycle of conception, growth, maturity, & independent functioning.

👉 Every trimester marks a transformation.

👉 6-month fellowships are like Neonates in the NICU - they need more oxygen (support), warmth (encouragement), and early stimulation (practice), but can thrive beautifully with care.

👉 A RA Fellowship isn't just a course - it's a gestational transformation.

👉 From spark to specialist, every phase nurtures your growth.

👉 By the end, you're not just performing blocks - you're thinking, adapting, teaching, & leading with confidence.

🎓 "You weren't just trained. You were born for this 🧡".

# From Conception to Confidence: The Gestational Journey of a Regional Anesthesia Fellow

- Orientation begins - meeting mentors, machines, and the magic of regional anaesthesia
- Getting familiar with the ecosystem - OTs, scans, anatomy, and terminologies
- The seed is planted: curiosity begins to grow

- ✓ Anchoring into the system - adapting to schedules, protocols, and expectations
- ✓ Establishing foundational concepts - sonoanatomy, physics of ultrasound, basic blocks
- ✓ Finding your identity within the fellowship

- New neurons fire with every scan and every block - it's intense learning time!
- Discovery phase - tracing fascial planes, learning pharmacology, mapping dermatomes
- Guided practice under supervision - every block is a formative event

- ❑ Steady hands, sharper eyes - needle control and probe manipulation improve
- ❑ Confidence in landmarking and LA spread dynamics
- ❑ Internalizing why-where-how behind each block
- ❑ Early independent attempts begin under safety net

- ❖ Pattern recognition sharpens - matching clinical scenario with the perfect block
- ❖ Personal touch emerges - customizing techniques, troubleshooting challenges
- ❖ Effective communication with surgeons and patients improves

- Developing reflexes - selecting, executing, and improvising blocks with minimal supervision
- Standing tall - confidence in handling complex cases and teaching juniors
- Ready for real-world delivery - poised for solo practice

**Fertilization**  
(First 7 Days)  
Orientation & Exposure

**Implantation**  
(1 Month)  
Settling into the System

**Organogenesis**  
(3 Months)  
Learning Concepts & Foundations

**Organ Development**  
(6 Months)  
Skill Building through Practice

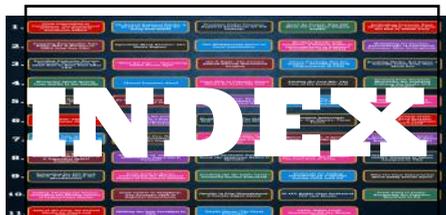
**Higher Function Maturation**  
(9 Months)  
Confidence, Customization & Analytical Thinking

**In Vitro Nurturing**  
(9-12 Months)  
Independent Practice, Reflex Development & Mentoring

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🎯🔴 Targeting Neuropathic Pain Early: Why It Belongs in MMA from Day One! 💡🕒

#NeuropathicPain #SurgicalPain #PainManagement  
 #AntineuropathicDrugs #PostoperativeCare #NerveInjury  
 #NerveRegeneration #AcuteToChronicPain #MultimodalAnalgesia #PainPhysician  
 #ChronicPainPrevention #TipOfTheDay #MyRATips

Tip of the Day:

🧠 The Problem: Chronic Postsurgical Pain (CPSP) is Real & Rising

- ! Up to 50% of patients develop CPSP after high-risk surgeries
- 🔄 Often begins as acute neuropathic pain, not just nociceptive or inflammatory
- 🔥 Signs: Burning, tingling, shooting pain, allodynia
- 🕒 Neuropathic pain can start within 48–72 hours, not weeks later.
- 🚫 Ignoring this early nerve-related pain = missed opportunity for prevention.

💡 What Clinicians Often Miss?

- 🧠 Postoperative pain is not just nociceptive - it may have neuropathic elements due to:
  - ◆ Nerve traction, cutting, or compression
  - ◆ Ischemia-reperfusion injury
  - ◆ Scar entrapment or inflammation of nerve branches

💊 Why Include in MMA?

- ⚠️ Standard MMA often ignores nerve injury-induced pain.
- 📅 Early treatment = modulates central sensitization before it becomes permanent.
- 🧠 Prevents maladaptive plasticity & reduces CPSP risk.

✅ What They Do?

- 🧠 Modulate hyperactive neurons
- 🔧 Reduce abnormal calcium signaling
- 🔄 Prevent central sensitization
- 🛡️ Protect injured nerves from further degeneration
- 🌱 Promote nerve healing & regeneration

📌 Common Antineuropathic Drugs in MMA

🔴 Gabapentinoids (Gabapentin/Pregabalin):

- ◆ Act on  $\alpha_2\delta$  subunit of calcium channels to reduce central sensitization.
- ◆ Pregabalin: better pharmacokinetics, faster onset, fewer CNS side effects.
- ◆ Often started preoperatively & continued for 1–4 weeks.
- SNRIs (e.g., Duloxetine/Venlafaxine): Useful for both neuropathic & myofascial pain components. Particularly beneficial in orthopedic surgeries.
- TCAs (e.g., Amitriptyline/Nortriptyline): Effective, but less preferred acutely due to anticholinergic side effects.
- Topical agents (Lidocaine patches/Capsaicin): Limited role in acute postoperative setting but useful in transition phase.
- NMDA Antagonists (Ketamine):
  - ◆ Considered in opioid-tolerant or high-risk neuropathic pain patients.
  - ◆ May be viewed as an adjunct neuromodulator, particularly IV perioperatively.

### ● Tramadol & Tapentadol in Neuropathic Pain

📊 Traditional opioids don't address neuropathic pathways.

🧠 Neuropathic pain requires modulation of descending inhibitory pathways (noradrenergic & serotonergic).

✅ Tramadol and Tapentadol can help bridge this gap, especially:

- ▲ In early postoperative period
- ▲ In patients who can't tolerate gabapentinoids
- ▲ In settings with overlapping nociceptive + neuropathic pain

### 🕒 When and How Long to Use?

📅 Start early - ideally pre-op/within 24 hours post-op.

⌚ Continue for 1–4 weeks, depending on: Type of surgery (nerve injury risk), Neuropathic signs (allodynia, hyperalgesia)

📉 Taper once pain stabilizes or transitions to chronic team if needed.

### 🧠 What Happens if We Don't Include Them?

😞 Neuropathic pain poorly responsive to NSAIDs or opioids.

🔄 Central sensitization worsens → opioid overuse.

❤️ Poor quality of life, sleep, mobility.

📈 Higher chance of developing chronic, irreversible pain.

### 📝 When to Add?

- ✅ Surgery involving nerve dissection/retraction
- ✅ Early signs of burning, tingling, or shooting pain
- ✅ Opioid-insensitive pain with hyperalgesia/allodynia
- ✅ High risk of CPSP (Thoracotomy, spine, mastectomy, TKA)

### 💡 How Recent Studies Misguide Us?

#### 1. Narrow Endpoints:

📊 Most studies focus only on pain scores (VAS/NRS) or opioid consumption - failing to

capture qualitative neuropathic symptoms like burning/paresthesia/shooting pain.

➡ Result: "No significant difference" is falsely interpreted as "no benefit."

## 2. Wrong Population Selection:

🕒 Many trials include low-risk surgeries (e.g., laparoscopic procedures) where neuropathic injury is minimal, leading to underestimation of benefits.

✗ Rarely stratify patients with high nerve injury risk (e.g., thoracotomy, limb amputation, spine surgeries).

## 3. Inadequate Dosing & Duration:

🕒 Common designs use single/short-term dosing of gabapentinoids - often just one pre-op or immediate post-op dose.

⚠️ This is insufficient for neuromodulation, which typically requires sustained administration (1–4 weeks) to affect neural pathways.

## 4. No Assessment of Neuropathic Pain Tools:

🌿 Few studies use specific neuropathic pain scales like DN4, LANSS, or PainDETECT.

📊 This leads to underreporting of true neuropathic elements, skewing conclusions.

## 5. Ignoring Time-Dependent Effects:

🧠 Neuropathic pain modulation often takes several days to weeks.

🕒 Studies measuring outcomes at 24–48 hours post-op may miss delayed but meaningful nerve healing & central desensitization benefits.

## 🌿 Role in Nerve Healing

### 1. Neuroprotection & Inhibition of Degeneration

🌿 Gabapentinoids reduce excitotoxic calcium influx by binding to the  $\alpha_2\delta$  subunit of voltage-gated calcium channels. This action:

🛑 Inhibits nerve fiber degeneration

🛑 Reduces axon demyelination

🛑 Minimizes microglial & astrocyte activation in the spinal cord

### 2. Promotion of Regeneration

🔄 Animal studies show gabapentin & pregabalin upregulate BDNF (Brain-Derived Neurotrophic Factor) & enhance neurite outgrowth.

🧠 They support axonal sprouting & synaptic stabilization, key to functional nerve recovery.

### 3. Prevention of Maladaptive Plasticity

🔄 By reducing central sensitization early, these agents prevent aberrant reorganization of dorsal horn neurons - the neural basis of CPSP.

### 4. Sustained Use = Better Nerve Outcomes

🕒 Continuing therapy for 2–4 weeks allows time for:

📉 Reduction of inflammatory cytokines (IL-1, TNF-alpha)

🧠 Downregulation of NMDA receptor expression

🌿 Enhanced nerve repair in damaged sensory afferents

💡 Don't wait for pain to become chronic to act.

🧠 Include antineuropathic agents early in MMA - not just for pain relief, but to modulate nerve healing, limit maladaptive rewiring, and prevent long-term pain syndromes.

🕒 Let's shift from pain control to neural recovery - because long-term quality of life starts in the first 48 hours.

❌ Don't be misled by studies, think about crying nerves. ✅ Play a profound role in nerve protection, modulation, and regeneration - benefits that go beyond acute pain relief and into the domain of long-term functional recovery.

✨ "Let's treat the nerve before it becomes the problem." 📢

## Targeting Neuropathic Pain Early

Drug Class	Examples	Mechanism	Use in Acute Pain	Advantages	Side Effects
❖ <b>Gabapentinoids</b>	Pregabalin, Gabapentin	Bind $\alpha 2\delta$ subunit of VGCC → ↓ excitability	✅ Strong evidence in nerve injury	Neuromodulation, opioid-sparing	Dizziness, drowsiness, ataxia
❖ <b>SNRIs</b>	Duloxetine, Venlafaxine	Inhibit 5HT & NE reuptake → ↑ descending inhibition	✅ Effective in myofascial + neuropathic pain	Mood benefit, synergistic with opioids	Nausea, insomnia, dry mouth
❖ <b>TCAs</b>	Amitriptyline, Nortriptyline	Block $Na^+$ channels, 5HT/NE reuptake, anticholinergic	⚠️ Caution in elderly/acute settings	Good for neuropathic pain + sleep	Sedation, dry mouth, constipation
❖ <b>NMDA Antagonists</b>	Ketamine (IV)	Block NMDA receptors → ↓ central sensitization	✅ Used in severe, opioid-resistant pain	Rapid effect, opioid-sparing	Hallucinations, ↑ BP/HR
❖ <b>Topicals</b>	Lidocaine patch, Capsaicin	$Na^+$ channel block / TRPV1 desensitization	⚠️ Useful in chronic/transition stage	Minimal systemic effects	Local irritation, burning
❖ <b>Dual-Mechanism Opioids</b>	Tramadol, Tapentadol	Weak $\mu$ -opioid + 5HT/NE reuptake inhibition  $\mu$ -opioid + selective NE reuptake inhibitor	✅ Mild/moderate pain with neuropathic features ✅ Moderate/severe nociceptive + neuropathic pain	Cheap, oral, multi-pathway  Better tolerated than tramadol, less nausea	Nausea, dizziness, seizure risk, serotonin syndrome  Drowsiness, less serotonergic risk

📌 **Drugs for Acute Phase Neuropathic Modulation**

Class	Examples	Action
📌 <b>Gabapentinoids</b>	Pregabalin, Gabapentin	• Reduce excitability, protect neurons
📌 <b>SNRIs</b>	Duloxetine, Venlafaxine	• Enhance descending inhibition
📌 <b>TCAs</b>	Amitriptyline	• Suppress spontaneous discharges
📌 <b>Topicals</b>	Lidocaine patches	• Help in transition to chronic stage
📌 <b>NMDA Antagonists</b>	Ketamine	• Prevent central sensitization

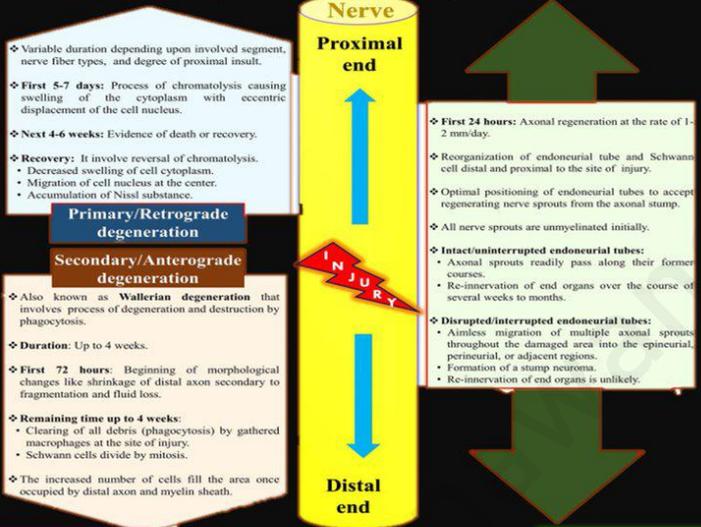
**Neuropathic Pain Treatment Ladder**

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# Nerve Insults

# Antineuropathic Drugs

## Degeneration (5-7 Days - 4-6 Weeks) → Regeneration (24 hours - Months)



### What Happens When a Nerve is Injured During Surgery

- Immediate Disruption of Neural Integrity**  
Axonal damage (neurotmesis) → Wallerian degeneration → Inflammatory cytokines released
- Neuroinflammation and Sensitization**  
Macrophage invasion → Spontaneous discharges → Burning, shooting pain, allodynia
- Failed or Aberrant Nerve Regeneration**  
Neuroma formation, incorrect reinnervation → Chronic postsurgical neuropathic pain

Drug Class	Benefit in Post-Injury Phase
♦ <b>Gabapentinoids</b>	<ul style="list-style-type: none"> <li>Inhibit ectopic discharges</li> <li>Suppress central sensitization</li> </ul>
♦ <b>SNRIs</b>	<ul style="list-style-type: none"> <li>Restore balance in spinal modulation</li> </ul>
♦ <b>TCAs</b>	<ul style="list-style-type: none"> <li>Broad suppression of hyperexcitability</li> </ul>
♦ <b>Ketamine</b>	<ul style="list-style-type: none"> <li>Prevents wind-up and plasticity in dorsal horn</li> </ul>
♦ <b>Tapentadol</b>	<ul style="list-style-type: none"> <li>Modulates both nociceptive &amp; neuropathic pathways</li> </ul>

### How Antineuropathic Drugs Help Prevent Symptoms

**Protective Role of Antineuropathic Meds (Key Actions)**

- Neuroprotection**
  - Inhibit ectopic discharges
  - Reduce mitochondrial stress
- Prevent Central Sensitization**
  - Downregulate NMDA receptors
  - Reduce glial activation
- Support Regeneration**
  - Pregabalin promotes axonal regeneration
- Avoid Opioid Dependence**
  - Allow early opioid-sparing analgesia

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🎯🧠 Decoding Genicular Nerves: Anatomy, Nociception, & Their Role in Knee Pain After TKA  
🔍

#GenicularNerves #KneeAnatomy #PostTKAPain  
#NeuropathicPain #RegionalAnesthesia #PainMechanisms #TargetedBlocks  
#UltrasoundGuidedBlocks #AnatomyDecoded  
#ClinicalAnatomy #Neuroanatomy #PainAfterTKA  
#AnatomyMatters #TipOfTheDay #MyRATips

Tip of the Day:

1. 🔍 What Does "Genicular" Mean?

- ◆ The term "genicular" comes from the Latin "genu", meaning knee.
- ◆ These nerves supply the area around the knee, particularly its capsular, ligamentous, & periarticular structures.
- ◆ Also influences vascular control and pain transmission.
- ◆ Approximately 14 genicular nerves (mixed sensory/motor/autonomic) from 5 major nerves (FN, OBN, SCN, TN, CPN).
- ◆ They follow a predictable course, often accompanying genicular arteries.
- ◆ Essential target in modern-day pain management strategies, such as genicular nerve blocks (GNB) and radiofrequency ablation (RFA).

2. ❓ Is the Infrapatellar Branch a Genicular Nerve?

- 🚫 No, the IPBSN is not classified as a genicular nerve.
  - ◆ Primarily a cutaneous nerve, but may contribute to the inferomedial anterior capsule, alongside the IMGN.
  - ◆ Not traveling with genicular arteries or through periosteum.
  - ◆ Responsible for selective anterior knee pain syndromes.
  - ◆ Usually not targeted in GNB/RFA unless for cutaneous neuroma or peripatellar pain

3. 🎯 Genicular vs Articular Branches

⚡ Genicular Nerves:

- 📍 Location: Periarticular soft tissues (around bones, ligaments)
- 🎯 Function: Involved in pain transmission, proprioception, & autonomic vascular tone
- 🔥 Nociceptor Density: High density – major contributors to persistent pain
- 🧠 Clinical Targetability: Precisely located & often ultrasound-visible for blocks or RFA
- 🛠️ Role Post-TKA: Remain active and relevant even after joint replacement

### 🌿 Articular Branches:

- 📍 Location: Confined to joint capsule & synovial lining
- 🎯 Function: Transmit pain only; minimal role in proprioception or autonomic function
- 🔥 Nociceptor Density: Variable – may be low in some areas
- 🧠 Clinical Targetability: Less consistently found; harder to visualize or block directly
- 🔪 Role Post-TKA: Often resected or disrupted during surgery, limiting their postoperative contribution

### 4. 🔄 Genicular Nerves Contribute to the Plexuses!

📍 Think of genicular nerves as the named highways, and the plexuses as local neighborhood streets formed by their fine branches or communicating fibers.

📍 Genicular nerves don't just function independently - they feed into articular plexuses through tiny terminal branches

#### 🔴 Peripatellar Plexus

- ◆ Formed by: saphenous, LFCN, SMGN, SLGN
- ◆ Supplies: skin, retinacula around the patella

#### 🟡 Subsartorial Plexus

- ◆ Formed by: saphenous, NVM, PDOBN, SMGN
- ◆ Supplies: medial periosteum & anteromedial capsule

#### 🟢 Popliteal Plexus

- Formed by: MGN, IMGN, ILGN, tibial & sciatic articular branches
- Supplies: posterior capsule, cruciate ligaments

➡ Thus, genicular nerves are not isolated but functionally interwoven into these plexuses via communicating fascicles - important for both superficial & deep pain transmission.

### 5. 🧠 Nociceptors in Genicular Nerves?

Nociceptors are pain-sensing free nerve endings strategically located at,

#### 🔴 Periarticular Soft Tissue

- ▲ Subsynovial tissue
- ▲ Joint capsule (especially anterior)
- ▲ Periosteum around femoral & tibial condyles
- ▲ Retinacula and meniscal horns

#### 🟡 Infrapatellar Fat Pad (Hoffa's fat pad)

- ◆ Highly innervated and richly vascularized
- ◆ Nociceptors from the femoral & tibial nerves are abundant here
- ◆ One of the most pain-sensitive areas in the knee

#### 🟡 Perivascular Plexus of Genicular Arteries

- \* Genicular nerves travel with genicular arteries, forming neurovascular bundles.
- \* These perivascular networks carry autonomic & nociceptive fibers

\* The mechanical stretch, chemical irritation, or hypoxia here can generate significant pain

### ● Intracapsular Ligaments (MGN)

- ✦ Enters joint via posterior capsule
- ✦ Supplies ACL, PCL, & synovial membrane
- ✦ Nociceptors are densely populated in cruciate ligament insertions

## 6. 🛠️ Post-TKA Changes?

### 🛠️ Anatomical & Functional Changes:

- ◆ Anterior capsule and fat pad often removed
- ◆ Periosteum traumatized or replaced by prosthesis
- ◆ Genicular nerve endings may be transected → neuroma formation

### 🧠 Resulting Pain Mechanisms:

- 🔥 Neuropathic pain from cut genicular nerves
- 🔄 Central sensitization
- 🧠 Residual nociception from posterior capsule, cruciate remnants, collateral ligaments

## 7. ? So, Do These Genicular Nerves Transmit Pain After TKA?

✅ Yes – but with altered roles.

Despite the resection of anterior nociceptive zones, genicular nerves may still:

- 🔄 Transmit neuropathic signals from neuroma formation
- 🔥 Relay inflammatory pain from residual structures
- 🧠 Participate in central sensitization & altered pain processing

## 8. 🎯 Clinical Implication

GNBs/RFA can still significantly reduce pain, especially in:

- ◆ Post-TKA patients with persistent anterior knee pain
- ◆ Patients with neuropathic elements or residual inflammation
- ◆ Those with failed prosthetic integration or chronic pain syndromes

💡 But, No Role in Immediate Post-TKA PAIN.

### 🏠✅ Take-Home Messages 🔑

⚡ Genicular nerves are periarticular sensory twigs involved in pain, proprioception, & vascular regulation.

🧠 14 genicular nerves arising from 5 major nerves, targeting anterior, posterior, and periosteal regions.

🔥 Nociceptors reside in the joint capsule, retinaculum, ligaments, and periosteum - not just the synovium.

🛠️ Even after TKA, genicular nerves remain active contributors to residual or phantom knee pain.

🧠 Articular branches mainly serve pain-only functions and are often excised or disrupted during TKA.

🌿 Genicular nerves contribute to plexuses like peripatellar, subsartorial, and popliteal,

explaining diffuse pain patterns.

DSB offers the broadest motor-sparing coverage - anterior, medial, posterior genicular innervation.

FTB covers anterior-medial capsule (SMGN, NVM, IPBSN) but misses deep/posterior contributors.

No single block covers all 14 genicular nerves - multimodal or dual-injection strategies are key.

Targeting genicular nerves via ultrasound or RFA is clinically precise and meaningful for chronic/post-TKA knee pain. But, Not for Acute Post-TKA pain.

Distinction:

⚡ Genicular nerves = high nociceptive density, easy to target

🌿 Articular branches = limited pain role, inconsistent anatomy

“Post-TKA pain isn't always mechanical or inflammatory - it's neuropathic, & geniculars are the source code.”

### Decoding Genicular Nerves: Anatomy, Nociception, & Role in Post-TKA

SN	Genicular Nerves	Parent Nerve	Target Point	Supplied Area
1	Superior Medial Genicular Nerve (SMGN)	Nerve to Vastus Medialis	Anterior to adductor tubercle	Anteromedial capsule
2	Articular branch to Vastus Intermedius	Femoral nerve	Suprapatellar pouch	Anterior midline capsule
3	Articular branch to Vastus Lateralis	Femoral nerve	Lateral suprapatellar	Anterolateral capsule
4	Inferior Medial Genicular Nerve (IMGN)	Tibial nerve / long articular branch	Between medial tibial condyle and medial collateral ligament	Inferomedial capsule
5	Middle Genicular Nerve (MGN)	Tibial nerve	Posterior capsule	Cruciate ligaments
6	SMGN variant	Tibial nerve (variant)	Medial shaft-condyle	Anteromedial capsule (variant)
7	Superior Lateral Genicular Nerve (SLGN)	Sciatic articular branch / CPN	Lateral shaft-condyle junction	Anterolateral capsule
8	Inferior Lateral Genicular Nerve (ILGN)	CPN near fibular neck	Posterolateral tibial condyle	Posterolateral capsule
9	Recurrent Genicular Nerve	CPN	Ascends to tibial plateau	Lateral capsule & retinaculum
10	Posterior Articular Branch	Sciatic trunk	Popliteal plexus	Posterior capsule
11	Long Articular Branch	Sciatic/Tibial nerve	Forms IMGN	Posterior capsule
12	Short Transverse Branch	From SLGN	Posterior femur	Posterolateral condyle
13	Obturator Genicular Branch	Posterior Obturator nerve	Postero-medial joint	Postero-medial capsule
▲	Infrapatellar Branch of Saphenous Nerve (IPBSN)	Saphenous nerve	Inferomedial knee, travels with IMGN	Skin + Inferomedial anterior capsule (variable)

Likely Genicular Nerves Covered				
❖ Adductor Canal Block (ACB) <20 ml Volume > 20 ml Volume	IPBSN, PDON			
❖ Femoral Triangle Block (FTB) 15-20 ml Volume	IPBSN, PDON, IMGN, MGN, ILGN, SMGN, Posterior Articular Branch, Popliteal Plexus, Long Articular Branch			
❖ Dual Subarticular Block (DSB)	SMGN, NVM, NVI, IPBSN, Subarticular Plexus			
1st Injection	SMGN, NVM, NVI, IPBSN, Subarticular Plexus			
2nd Injection	IPBSN, PDON, IMGN, MGN, ILGN, SMGN, Posterior Articular Branch, Popliteal Plexus, Long Articular Branch			
❖ IPACK	IMGN, MGN, ILGN, Posterior Capsule, Popliteal Plexus			
❖ Femoral Nerve Block	NVM, NVI, NVL, Partial SMGN			
❖ Obturator Nerve Block	Obturator Genicular Twig			
❖ Sciatic Nerve Block	SLGN, ILGN, MGN, Posterior Articular Branch, Popliteal Plexus			

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Jul 5, 2025 · 2 tweets · [KartikBSonawane/status/1941496239213973632](https://twitter.com/KartikBSonawane/status/1941496239213973632)

## 🌟 Mastering Spinal Dosing: From Babies to the Elderly! 🌟

#SpinalAnesthesia #SafeSpinals

#RegionalAnesthesia #SpinalBlock

#NeuraxialAnesthesia #AnesthesiaMatters #PediatricAnesthesia #GeriatricAnesthesia

#AnesthesiaTips #FellowshipLearning #TipOfTheDay #MyRATips

Tip of the Day:

A simple guide to make spinal anesthesia less confusing and more confident!

### A. 🧠 How Do We Decide the Spinal Dose?

- ◆ The dose of spinal anesthetic isn't "one-size-fits-all."
- ◆ Customize it based on the patient's profile, surgery site, and local anesthetic characteristics.

### B. 📌 Tips for Beginners

✅ Ask 2 things:

- 💡 "What level of block do I need?"
- 💡 "Can this patient tolerate high spinal spread?"

✅ Start with the standard dose:

💡 Adjust up or down based on: Height, Age, Comorbidities (like kyphosis, obesity, severe AS, scoliosis)

✅ When unsure – Use spinal opioid adjuvants to reduce LA dose but maintain analgesia.

✅ Keep a quick "SPINAL DOSING QUICK REFERENCE CARD " in your pocket.

✅ When in doubt - start conservatively, observe, and document spread.

### C. 🗝️ Key Factors That Influence Spinal Dose

#### 1. 🧑 Height

- ◆ Short (<150 cm): Slightly lower dose
- ◆ Tall (>180 cm): May need full dose
- ◆ Rationale: Taller people have a longer spinal column, so drug may spread less unless compensated.

#### 2. ⚖️ Weight & BMI

👉 Obese patients have reduced CSF volume → increased spread → use less

👉 Very thin: May also need lower dose

### 3. 🎂 Age

✖️ Elderly have less CSF + increased nerve sensitivity → use 10–20% less

✖️ Young adults: standard dose

✖️ Infants/children: strictly weight-based

### 4. 🏥 Surgery Site

📌 Perineal: S2–S4 → ~1.2–1.5 mL

📌 Lower limb ortho: T10–T12 → ~2.0–2.5 mL

📌 LSCS/Gyn: T6–T8 → ~1.6–2.0 mL

📌 Lower abdominal: T4–T6 → ~2.5–3.0 mL

### 5. 🤰 Pregnancy

💡 Less CSF, increased vascularity → reduce dose

### 6. 📏 Baricity & Position

📌 Hyperbaric: spreads with gravity (adjust table tilt)

📌 Hypobaric/Isobaric: less predictable; position critical

### D. 🧒 Pediatric (esp. <8 years):

✅ CSF volume is higher per kg than adults → requires more mL/segment

✅ General rule: 0.05–0.07 mL/kg/spinal segment (for hyperbaric bupivacaine) Or overall dose: 0.4–0.5 mg/kg

✅ Example, a 10-kg child needing T10 block (around 6–8 segments): ~0.7 mL total of 0.5% bupivacaine.

### E. 🧑 Adults:

➡️ Not commonly taught as mL/segment because dosing is not linear.

➡️ 0.1–0.15 mL/segment can give some approximation, only in average-sized adults

➡️ Example, for a T4 level (approx. 14 segments from S5): 2.0–2.5 mL of 0.5% hyperbaric bupivacaine.

➡️ Remember LA spread is governed by gravity, baricity, CSF volume, and patient factors, not just volume.

### F. 🧓 Elderly:

👉 Decreased CSF volume, increased sensitivity to LA, less compliance.

👉 Need less volume/segment → 0.08–0.1 mL/segment

👉 Example, in an 80-year-old, 1.2–1.4 mL may be enough for a T8 level

### G. ✅ Safe Geriatric Dosing (Bupivacaine 0.5% Heavy)

🦴 Hip Surgery (T10–T12 level)

◆ Dose: 1.2–1.5 mL

- ◆ Use adjuvants (e.g., fentanyl 15–20 mcg) to enhance effect with reduced LA volume.

### 📌 Knee/Lower Limb Ortho (T10–T12 level)

- ◆ Dose: 1.0–1.4 mL
- ◆ Reduce to as low as 0.8–1.0 mL if frail or kyphotic.

### 📌 Tips for Geriatric Safety:

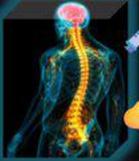
- 🎯 Use smaller gauge needle (25G/27G pencil-point)
- 🎯 Keep head slightly elevated to avoid high spinal
- 🎯 Monitor for bradycardia, hypotension more closely
- 🎯 Consider preloading + gentle vasopressor titration
- 🎯 Maintain MAP = Age of the Patient

### H. 🚀🏠 Take-Home Messages 🎯

- 📌 Spinal dose is never fixed — always tailor to the patient.
- 👶 Pediatrics: Use 0.08–0.1 mL/kg of 0.5% bupivacaine.
- 👤 Adults need 1.5–3.0 mL based on surgery level.
- 👴 Elderly? Go low — 1.0 to 1.4 mL is often enough.
- 👩 Pregnant or obese? Reduce dose by 10–20%.
- 📏 Baricity and position guide your block spread.
- 💊 Opioid adjuvants = lower LA, longer relief.
- 📏 No fixed mL/segment - think clinically, not mathematically.
- 🧠 Ask: What level do I need? Can the patient tolerate it?
- 🚨 Watch for high spinal signs - and act fast.

"When it comes to spinal dosing — think smart, dose small, and aim precise!"

## SPINAL ANESTHESIA QUICK REFERENCE CARD



**Drug:** Bupivacaine 0.5% heavy (hyperbaric)

Use 1–3 mL depending on patient/surgery factors.

### STANDARD ADULT DOSES (as per Surgery)



Surgical Site	Upper Dermatomal Level	Typical Dose (mL)
> Perineal/Uro	S2–S4	1.2–1.5
> Lower Limb Ortho	T10–T12	2.0–2.5
> LSCS / Gynae	T6–T8	1.6–2.0
> Lower Abdominal	T4–T6	2.5–3.0

### MODIFICATIONS BASED ON PATIENT FACTORS

Factors	Effect	Action
❖ Elderly (>70 yrs)	↓ CSF, ↑ sensitivity	Reduce dose 10–20%
❖ Obese	↓ CSF volume	Reduce dose slightly
❖ Pregnant	↓ CSF + ↑ epidural veins	Reduce dose 10–20%
❖ Short (<150 cm)	Shorter spinal canal	Reduce dose
❖ Tall (>180 cm)	Longer spinal column	May need full dose

### PEDIATRIC SPINAL DOSING

- ❖ Dose: 0.4–0.5 mg/kg (i.e., 0.08–0.1 mL/kg)
- ❖ Max volume: 1.0–1.2 mL (usually)



Weight (KG)	Dose (mg/kg)	Anticipated Duration (mins)
☐ > 5	0.2 – 0.6	65 – 90
☐ 6 – 10	0.4 – 0.5	75
☐ 11 – 20	0.3 – 0.4	80
☐ > 20	0.2 – 0.3	85 – 90

**Less is More: Elderly Spinal Dosing**  
(for Hip & Lower Limb Surgeries)

### Formula “mL/ Segment”

Group	Dose per Segment	Total Volume
❖ Pediatrics	0.05–0.07 mL/kg/segment	0.4–0.5 mg/kg
❖ Adults	0.1–0.15 mL/segment	1.5–3.0 mL
❖ Elderly	0.08–0.1 mL/segment	1.0–1.5 mL

Age (Years)	Total Volume
> 60 – 69	1.8 mL
> 70 – 79	1.6 mL
> 80 – 89	1.2 mL
> 90 – 94	1.0 mL
> 95 – 100	0.8 mL
> 101 – 110	0.6 mL

### Tips

- ✓ Use fentanyl 15–25 mcg as adjuvant to reduce LA requirement
- ✓ Always check block level after 5–10 min
- ✓ Watch for signs of high spinal: bradycardia, hypotension, dyspnea
- ✓ Maintain MAP = Age of the Patient in Geriatric population.

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Jun 24, 2025 · 2 tweets · [KartikBSonawane/status/1937450901213782022](https://twitter.com/KartikBSonawane/status/1937450901213782022)

🧠 “A Nerve Never Wanders Alone – It Follows Its Muscle to the End”

#RegionalAnesthesia #UltrasoundGuidedBlocks  
 #NervePlexusMatters #ThinkBeyondTheTrunk  
 #CutaneousBlockFallacy #ArticularInnervation  
 #TipOfTheDay #MyRATips

Tip of the Day:

A nerve is like a loyal companion,  
 Wherever its muscle travels, It walks beside.

🎯 Thought-Provoking Questions to Trigger Deeper Understanding

- ◆ Why does targeting a single nerve with limited volume often fail in achieving complete analgesia?
- ◆ Why is blocking just a cutaneous nerve often illogical in regional anesthesia?
- ◆ Why should we care about plexuses formed under fascia and subcutaneous tissue?
- ◆ Why is bony innervation often patchy and not predictable by dermatome maps?
- ◆ Why do some patients still feel pain after a perfectly placed single-shot block?

🔄 General Rule: Muscle Determines the Nerve's Fate

🦾 Muscle Body → Motor Branches

🦴 Muscle Insertion on Bone → Periosteal/Osteotomal Supply

🦶 Muscle Crossing Joint → Articular (genicular) Branches

👐 Muscle Near Skin/Ending Superficially → Cutaneous Branches

🌱 ✨ Nerve Pathways and Examples

#### ◆ 1. Obturator Nerve – A Story of Dual Division

##### ◆ Anterior Division

👤 Follows adductor longus and brevis (superficial muscles)

👐 When these end at linea aspera, the nerve becomes cutaneous

👉 Joins subsartorial plexus to supply medial thigh skin

##### ◆ Posterior Division

👤 Travels with adductor magnus (deep muscle)

👉 Passes through adductor hiatus

⚙️ Contributes to popliteal plexus and genicular supply

 Sends branches to femoral condyle, following the muscle's bony insertion

◆ 2. Saphenous Nerve – A Sensory Nerve with a Hidden Motor Gift

 Terminal branch of posterior division of femoral nerve, classically sensory

 In adductor canal:

 Gives motor twig to sartorius

 Making it a mixed nerve in its early course

 Exits canal via vastoadductor membrane, turns purely sensory

 Supplies:

Infrapatellar region (via infrapatellar branch)

Medial leg and ankle (along great saphenous vein)

Sometimes periosteum of tibia and medial knee joint capsule

◆ 3. Radial Nerve – The Master of Posterior Compartment

 Supplies triceps → once muscle ends at olecranon,

 Gives periosteal twigs to elbow

 Sends articular branches to posterior elbow capsule

 After crossing lateral intermuscular septum,

 Divides into superficial branch (sensory) and posterior interosseous (motor)

 Superficial branch becomes cutaneous nerve of dorsum of hand

◆ 4. Tibial Nerve – Through Soleus to Sole

 Travels with gastrocnemius, soleus, and tibialis posterior

 Sends periosteal branches to posterior tibia and ankle

 Gives articular twigs to ankle and knee joint capsules

 Ends as medial and lateral plantar nerves

Supplies intrinsic foot muscles

Becomes cutaneous over sole of foot

 Clinical Pearls to Remember

 Cutaneous branches often emerge only after motor duty is over

 In nerve blocks, knowing this principle helps predict:

✓ Muscle weakness

✓ Periosteal pain

✓ Joint coverage

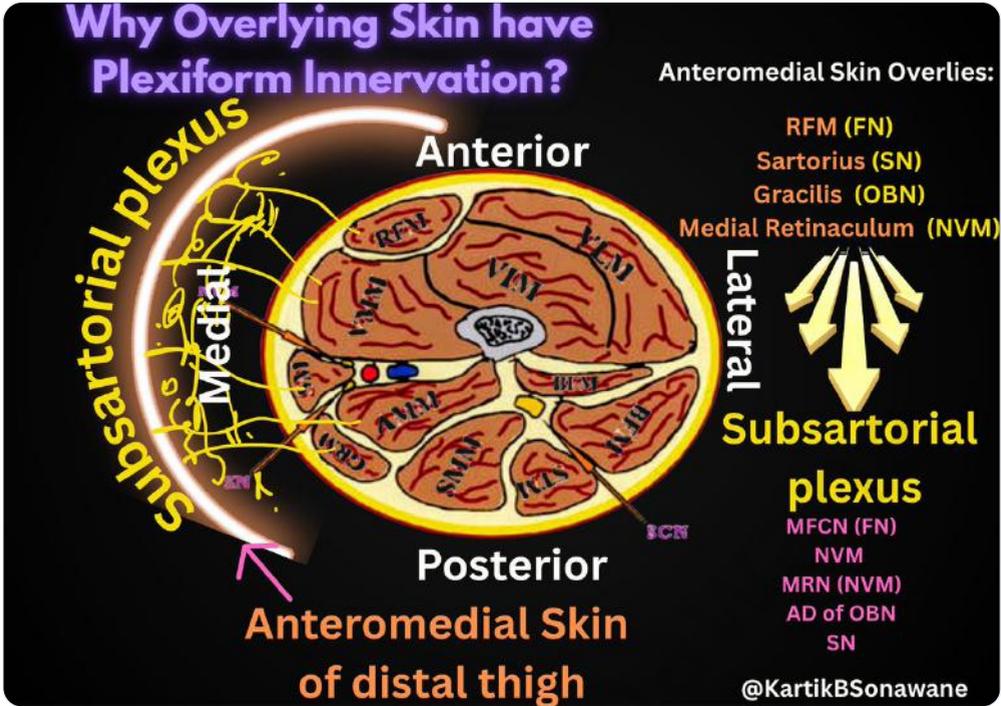
✓ Skin anesthesia

 Dermatomes, myotomes, and osteotomes often overlap → Because they stem from the same nerve-muscle-bone journey

“Where the muscle leads, the nerve proceeds -

Giving strength, then sensation, then articular deeds.

From motor roots to skin so fine,  
The nerve follows faithfully, line by line."



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1. Anterior	2. Medial	3. Lateral	4. Posterior
5. Anteromedial	6. Medial	7. Lateral	8. Posterior
9. Anteromedial	10. Medial	11. Lateral	12. Posterior
13. Anteromedial	14. Medial	15. Lateral	16. Posterior
17. Anteromedial	18. Medial	19. Lateral	20. Posterior
21. Anteromedial	22. Medial	23. Lateral	24. Posterior
25. Anteromedial	26. Medial	27. Lateral	28. Posterior
29. Anteromedial	30. Medial	31. Lateral	32. Posterior
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59. Anteromedial	60. Medial	61. Lateral	62. Posterior
65. Anteromedial	66. Medial	67. Lateral	68. Posterior
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179. Anteromedial	180. Medial	181. Lateral	182. Posterior
185. Anteromedial	186. Medial	187. Lateral	188. Posterior
191. Anteromedial	192. Medial	193. Lateral	194. Posterior
197. Anteromedial	198. Medial	199. Lateral	200. Posterior

# The Illusion of Simplicity: When Single Nerve Block Falls Apart

(Why Single Nerve Block in Complexly Innervated Regions Won't Work?)

**"I Am the Nerve – The Silent Companion"**

I am the nerve – not seen, not loud,  
But I walk with strength, never bowed.  
I do not choose a path alone,  
I follow the muscle, flesh, and bone.

From spinal roots I rise with pride,  
Through plexus gates, I twist and glide.  
To every muscle, deep or thin,  
I whisper strength from deep within.

When my muscle lifts or flexes tight,  
I serve in silence, day and night.  
And when it anchors to the bone,  
I tap the cortex – a signal thrown.

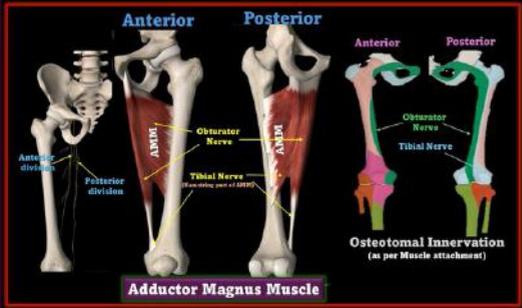
When tendons cross the silent joint,  
I send a branch to guard the point.  
So when there's strain or aching crack,  
The joint can call – and I'll call back.

And when my muscle fades to skin,  
I shift again, and journey in.  
I touch the dermis, soft and bare,  
And bring the world's feel to your care.

Oh yes, they call me motor first –  
But I am more, for best and worst.  
Periosteal, articular, skin –  
I'm the quiet code that flows within.

So next you block me – pause and see,  
I carry more than just one key.  
From power to pain, from bone to touch,  
I hold it all – I hold so much.

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**Knee Innervation**

Why Overlying Skin have Plexiform Innervation?

Anteromedial Skin Overlies:

- RFM (FN)
- Sartorius (SN)
- Gracilis (OBN)
- Medial Retinaculum (NVM)

Lateral Subsartorial plexus

- MFCM (FN)
- NVM
- MRN (NVM)
- AD of OBN
- SN

Anterior, Posterior, Medial, Lateral, Anteromedial Skin of distal thigh

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Jun 21, 2025 · 2 tweets · [KartikBSonawane/status/1936468004717686831](https://twitter.com/KartikBSonawane/status/1936468004717686831)

## 🔍 Branching Out: The Neural Maze of Vastus Medialis

#RegionalAnesthesia #MotorSparingBlocks #NerveBlockScience  
 #AdductorCanalBlock  
 #PrecisionPainControl  
 #UltrasoundGuidedBlocks  
 #AnatomyInPractice #SensoryVsMotor #LivingAnatomy  
 #ClinicalAnatomy #TipOfTheDay  
 #MyRATips

Tip of the Day:

### 📖 What the Study Shows

#### 🧠 1. Dual Origin of Innervation

Vastus medialis (VM) is consistently innervated by two nerves from the posterior division of the femoral nerve:

- ◆ Lateral branch – short and slender.
- ◆ Medial branch (classic NVM) – long and thick, traditionally associated with the adductor canal.

#### 🌿 2. Tripartite Muscle – Triple Strategy

VM isn't uniform -it has three distinct anatomical and functional zones:

- 🟠 Upper third → Supplied by lateral branch; shares characteristics with vastus intermedius.
- 🟤 Middle third → Supplied by branches from medial trunk.
- 🟡 Lower third (VMO) → Receives a dense spray of terminal branches, playing a key role in patellar alignment.

#### 🧬 3. Nerve Supply Details

##### ⚡ A. Lateral Branch Highlights:

Commonly divides into 3 terminal branches (range: 1–5).  
 May also send:

 Twigs to middle third (in 10%).

 A distal branch to vastus intermedius and knee joint capsule.

 Origin varies: in 17%, it arises from the nerve to vastus intermedius.

 B. Medial Branch (NVM) Highlights:

- ◆ Supplies the middle and lower thirds of VM.
- ◆ Forms a branching spray in the lower third.

 In 10% of limbs, lower third supply came from a separate trunk, which continued as the saphenous nerve.

 4. Segmental Innervation

 Lateral branch → L3 & L4 (like vastus intermedius).

 Medial branch (NVM) → L1, L2 & L3 - showing a broader segmental input.

 5. Why This Matters Clinically

 Selective Motor-Sparing Blocks:

Knowing that VM gets multiple muscular branches, some bypassing the adductor canal, helps in:

- ◆ Tailoring fascial plane blocks.
- ◆ Avoiding unintentional motor weakness (esp. VMO) during sensory-only blocks.

 6. Spread Matters:

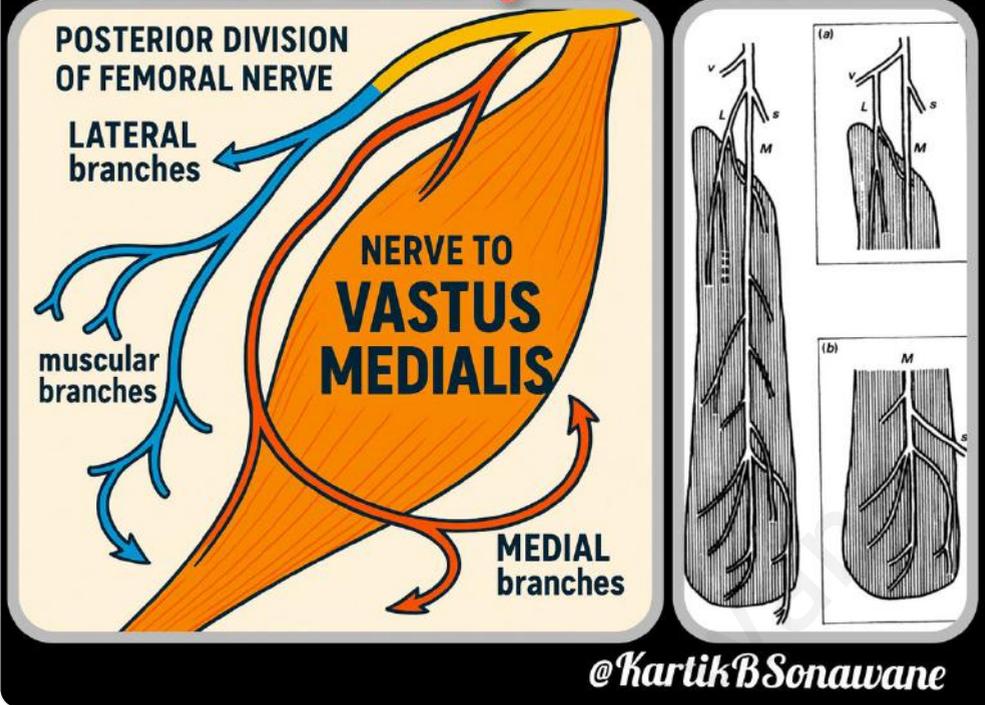
- ◆ Blocks at or above the femoral triangle apex may miss deeper or distal VM branches.
- ◆ Accurate identification of VM zones and entry points is key for targeted LA delivery.

 7. Cadaver ≠ Clinic:

◆ Staining shows path, not function.  
◆ True innervation patterns and motor outcomes can only be confirmed in living systems through EMG or response mapping.

 "One muscle, two nerves, three zones - Vastus Medialis isn't simple, and neither should your block be!"  

# The Neural Maze of Vastus Medialis



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Jun 21, 2025 · 2 tweets · [KartikBSonawane/status/1936282278633894008](https://twitter.com/KartikBSonawane/status/1936282278633894008)

🔥 Anatomy Tells Where to Inject - Physics Tells Where It Will Go 🔥

#TKAtruth 🏹 #FTBisNotACB 🚫 #RespectAnatomyAndPhysics  
 #FascialFlowMatters 💧 #UltrasoundIntegrity 🔍 #EvidenceWithPrecision  
 #TipOfTheDay #MyRATips

Tip of the Day:

👉 If you truly understand the anatomy, you'll know this:

👉 True ACB never worked for Total Knee Arthroplasty (TKA) ❌

Let's break the illusion, layer by layer, nerve by nerve 👉

🧠 1. Most "ACBs" in Literature Are Misclassified

📖 Fan Chiang et al., 2023 (Healthcare) analyzed 130 RCTs and found ~50% mislabeling: blocks were done in the Femoral Triangle (FT) but termed ACB.

⚠️ Mislabeling has led to the false belief that these blocks represent true ACB and that their effects are reproducibly motor-sparing.

➡️ Most so-called ACBs are actually extended FTBs, and their analgesic benefits are due to broader coverage - not precision.

📍 2. Real ACB = Pure Saphenous Nerve Block

👉 Administered within the adductor canal (AC) - a musculoaponeurotic tunnel - true ACB targets only the Saphenous Nerve (SN).

✅ Sensory only

❌ No reliable action on NVM or anterior/ posterior capsule innervation.

💧 3. Why It Matters: LA Spreads in FT, Flows in AC

◆ FT is a subfascial space → LA SPREADS radially & multidirectionally

◆ AC is a narrow tunnel → LA FLOWS longitudinally, with limited spread

👉 This difference dictates nerve coverage and explains why FT injections can reach NVM, while true ACBs rarely do.

🏹 4. TKA Pain Comes from What ACB Can't Reach

👉 Anteromedial Extraarticular surgical dissection area.

👉 Posterior knee (popliteal plexus)

✗ ACB doesn't cover these - leading to inadequate analgesia unless supplemented

## 5. Meta-Analyses Are Statistically Strong but Anatomically Weak

Many meta analyses lumped together true ACBs with FT injections.

→ Overestimated efficacy

→ Underreported motor involvement

⊘ Statistical rigor doesn't fix anatomical inaccuracy

## 6. Methodology Can't Replace Anatomy + Physics

📌 A beautifully designed RCT still fails if:

✓ Sono landmarks are vague

✓ No validation of needle position

✓ Fascial plane dynamics ignored

🧠 Anatomy tells you where to inject - physics tells you where LA will go.

⚠️ Both matter. Ignore either, and you MISINTERPRIT the result.

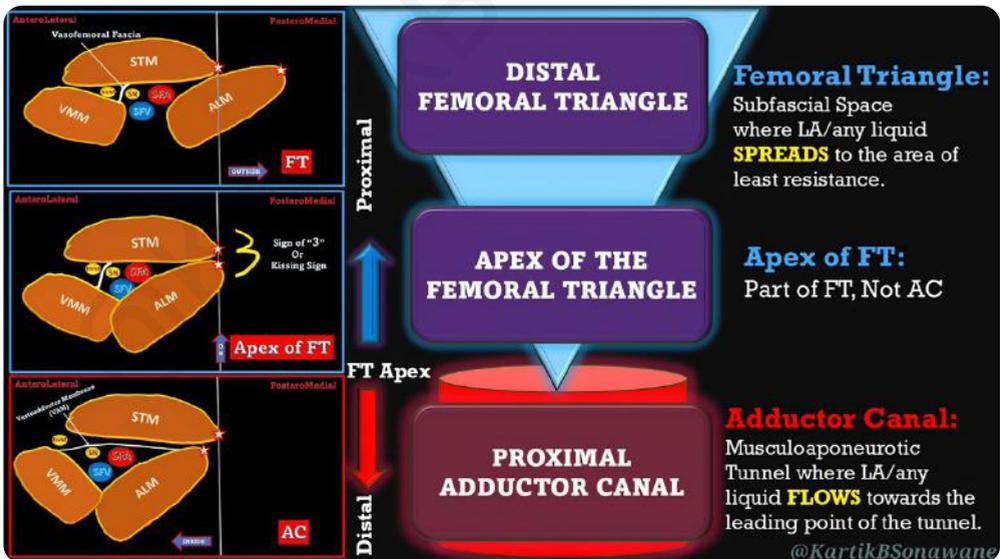
🌟 Conclusion: Time to Redefine, Reclassify, and Respect Anatomy

✓ No more mislabeling FTBs as ACB

✓ Meta-analyses must be anatomically filtered

✓ Protocols must respect both fascial architecture and fluid dynamics.

📌 LA doesn't follow study labels. It follows anatomy and physics.



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May 15, 2025 · 2 tweets · [KartikBSonawane/status/1923004061260869711](https://twitter.com/KartikBSonawane/status/1923004061260869711)

🧠 "Demystifying Neuraxial Anesthesia: Spinal, Epidural & Segmental Spinal Simplified"

#NeuraxialAnesthesia #SpinalAnesthesia #EpiduralAnesthesia #SegmentalSpinal  
 #RegionalAnesthesia #AnesthesiaEducation  
 #PainManagement #CaudaEquina #CSFSpread #AnatomyMatters #SafeNeedlePractice  
 #AnesthesiaTips  
 #NeuroAnatomy #BlockWithPrecision #MedTwitter #SpinalCordAnatomy #TipoftheDay  
 #MyRATips

Tip of the Day:

#### ★ Spinal Anesthesia (Conventional)

- 📌 Injected into the subarachnoid space below L2 -usually at L3–L4 or L4–L5.
- 🧠 Acts directly on the cauda equina (bundle of spinal nerve roots), not the spinal cord.
- ⚡ Blocks voltage-gated sodium channels on nerve roots → prevents action potentials.
- 🎯 Produces rapid, dense sensory, motor, and sympathetic block.
- 📦 Small volume can have wide coverage, depending on position and baricity.

#### ★ Epidural Anesthesia

- 📌 Administered into the epidural space, outside the dura mater.
- 🔄 LA must diffuse across dura and arachnoid to reach nerve roots.
- 🕒 Slower onset and segmental spread, ideal for controlled or continuous anesthesia.
- 📦 Requires larger volume due to indirect diffusion route.

#### ★ Segmental Spinal Anesthesia

- 📌 Aimed above the conus medullaris (any level above L1), targeting specific nerve roots.
- 🖋️ Very low volume (0.5–1.5 mL) remains localized in CSF.
- 🎯 Produces focused block with minimal motor and sympathetic involvement.
- 👨‍⚕️ Great for high-risk patients needing short, localized anesthesia.

🚀 How LA Reaches higher levels in Spinal anesthesia?

- 🌊 LA spreads cranially within CSF along the dural sac.
- 🔄 Reaches upper thoracic roots via passive flow and positioning.
- 📊 Influenced by many factors.

#### ✚ Common Factors Influencing Spread

- 🏠 Baricity: Determines direction of spread with gravity.
- 👤 Positioning: Critical in spinal and segmental spinal techniques.
- 💧 Dose/Volume: Higher = broader spread.
- 🧠 CSF Volume: Less CSF (e.g., elderly, pregnancy) = wider block.
- 🌀 Anatomy: Spinal curvature and fat distribution affect CSF dynamics.
- 🏠 Injection Site: Higher levels = more focused spread.
- 🩸 Epidural Fat & Veins: Alter space dynamics (epidural only).

### 🧠 Why Spinal Anesthesia Doesn't Affect the Cord?

- 🔴 Spinal cord ends at L1–L2 in adults—needle placement is below this level.
- 👤 The pia mater acts as a barrier to LA penetration.
- 🌀 LA in CSF stays diluted and acts on nerve roots, not cord neurons.
- 🌟 It's a "conduction block" (electrical), not a chemical synapse block - Not a Chemical transection of the spinal cord.

### 🌀 Traversing vs. Exiting Nerve Roots?

- 🏠 Traversing Root: Travels within the thecal sac to exit one level below.
- Exiting Root: Leaves the spinal canal at the same vertebral level.

### 🏠 Take-Home Messages:

- ✅ Spinal anesthesia offers rapid, dense block with minimal volume, acting on cauda equina in CSF.
- ✅ Epidural anesthesia requires larger volume, spreads segmentally, and allows gradual, titratable control.
- ✅ Segmental spinal anesthesia delivers targeted, localized blocks with low dose, ideal for high-risk cases.
- ✅ Spread is influenced by baricity, patient position, volume, CSF dynamics, and spinal anatomy.
- ✅ LA acts by blocking conduction, not synaptic transmission—nerve roots, not spinal cord, are the target.
- ✅ Understanding spinal levels, barriers, and root anatomy ensures safer, smarter neuraxial anesthesia.

For More details, Plz Click the following link,

### Segmental Spinal Anesthesia:

<https://x.com/KartikBSonawane/status/1786688878679830792?t=u5asr8H7q8WYatC2Sw-kLg&s=19>

### CSA:

<https://x.com/KartikBSonawane/status/1816542399155310812?t=yo5lDZyqvgOBMM4jipRulQ&s=19>

# Comparison of Neuraxial Techniques

Feature	Spinal Anesthesia	Epidural Anesthesia	Segmental Spinal Anesthesia
❖ Injection Site	Subarachnoid space (L3–L5)	Epidural space (varies)	Subarachnoid space (any level above L1)
❖ Target Area	Cauda equina nerve roots	Nerve roots via dura diffusion	Specific spinal nerve roots
❖ Volume Required	Low (1.5–3.5 mL)	High (10–20 mL or more)	Very low (0.5–1.5 mL)
❖ Onset Time	Fast (2–5 min)	Slow (10–20 min)	Fast (2–5 min)
❖ Block Type	Dense sensory & motor	Segmental sensory ± motor	Localized sensory ± motor
❖ Sympathetic Block	Yes (extensive)	Yes (segmental)	Minimal
❖ Motor Block	Yes (complete)	Variable (dose-dependent)	Minimal to none
❖ Dose Precision	Moderate	High (via titration)	High
❖ Clinical Use	Short procedures, lower body	Labor, prolonged surgeries	High-risk or short segmental blocks
❖ Risk of High Spread	Yes (depending on influencing factors)	Low (controllable)	Minimal (localized by design)
❖ Dermatomal Coverage	Extensive (T2–S5 possible)	Segmental, controllable	Localized (4–6 segments)
❖ Hemodynamic Stability	Less stable (due to sympathetic block)	More stable (gradual onset)	Highly stable (minimal sympathetic block)
❖ Catheter Use	Yes in Continuous Spinal Anesthesia (CSA)	Yes in Continuous Epidural Infusion (CEA)	No (single-shot)/ can be converted to CSA
❖ Use in Obstetrics	Less preferred due to fixed duration	Widely used (especially for labor)	Rare but useful in high-risk cesarean
❖ Risk of PDPH	Moderate to high (especially with large needles)	Low (dura not punctured)	Low to moderate (smaller needles, less volume)

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Jun 20, 2025 · 2 tweets · [KartikBSonawane/status/1935957914113679866](https://twitter.com/KartikBSonawane/status/1935957914113679866)

🔍 Debunking the ESP Block Myth: It's Not About the Bloodstream! 🚫📌

"ESP block works via systemic absorption" - Sounds clever, but let's break it down with science and logic.

#ESPBlock #RegionalAnesthesia  
 #PainManagement #LocalAnesthetics #SpineSurgery  
 #TipOfTheDay #MyRATips

Tip of the Day:

♦ 🧠 Local Action, Not Global Confusion

🎯 Local anesthetics (LAs) block voltage-gated sodium channels at nerve membranes, halting nociceptive transmission.

This requires proximity to nerves, not floating around in the bloodstream.

♦ 🚰 Systemic Absorption ≠ Mechanism of Action

All LAs are absorbed systemically over time - it's their natural metabolic fate.

💡 But their analgesic effect is local, right where they're injected. No different for ESP.

♦ ⚡ Systemic = Non-Selective = Toxicity

Sodium channels are everywhere: brain 🧠, heart ❤️, GI tract 🌀.

⚠️ Systemic LA can't "choose" to act only on pain pathways - it may cause side effects, not targeted pain relief.

♦ 📍 ESP Block Mechanism: Fascial Magic

Injected deep to the erector spinae muscle, LA spreads in the interfascial plane.

🌀 It reaches dorsal rami, ventral rami, and sometimes even the paravertebral space → segmental analgesia from behind.

🌀 The block is multi-dermatomal and longitudinally extensive, ideal for posterior thoracolumbar coverage.

♦ 🎯 Why It's Perfect for Spine Surgeries

Dorsal rami (DR) innervate:

Skin and muscles of the back

Facet joints

Posterior elements of the vertebrae

👉 ESP block, by consistently involving DR, provides excellent posterior analgesia - making it highly useful in:

Lumbar decompressions

Posterior fusions

Laminectomies

Minimally invasive spine surgeries

♦ 📌 The IV Lignocaine Fallacy

If systemic LA were truly effective for ESP-like analgesia, IV lignocaine would deliver the same effect.

⚡🧠 It doesn't. Why? Because location matters. Proximity is power.

✅ Bottom Line

📌 ESP block works locally by targeting dorsal and ventral rami through interfacial spread - not systemically via bloodstream circulation.

📌 It's anatomically sound, clinically effective, and perfectly suited for back surgeries.

🔒 It's not about the blood - it's about the block.

# Debunking the ESP Block Myth: It's Not About the Bloodstream!

## Local Action, Not Global Confusion

Local anesthetics (LAs) block voltage-gated sodium channels at nerve membranes, halting nociceptive transmission.

## Systemic Absorption ≠ Mechanism of Action

Yes, all LAs are absorbed systemically over time – It's their **natural metabolic fate**. But their analgesic effect is **local**, right where they're injected.

## Systemic = Non-Selective = Toxicity

Sodium channels are everywhere: brain ❤️, heart 🌀, GI tract 🍷. Systemic LA can't "choose" to act only on pain pathways – it may cause side effects, not targeted pain relief

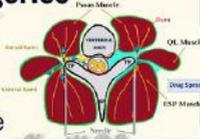
## ESP Block Mechanism: Fascial Magic

Injected deep to the erector spinae muscle, LA spreads in the interfascial plane. It reaches **dorsal rami**, **ventral rami**, and sometimes even the paravertebral space → segmental analgesia from behind

## Why It's Perfect for Spine Surgeries

Dorsal rami (DR) innervate:

- Skin and muscles of the back
- Facet joints
- Posterior elements of the vertebrae



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Jun 19, 2025 · 2 tweets · [KartikBSonawane/status/1935621361902489688](https://twitter.com/KartikBSonawane/status/1935621361902489688)

  Gliding Through the Planes: Unlocking the Hidden Powers of Fascial Plane Blocks ✨

#FascialPlaneBlocks #RegionalAnesthesia  
 #UltrasoundGuidedBlocks #PainManagement  
 #AnatomyMatters #NerveBlocks #ClinicalAnatomy  
 #BlockMechanisms #TipOfTheDay #MyRATips

Tip of the Day:

📌 Fascial plane blocks (FPBs) represent a new frontier in RA - shifting focus from direct nerve contact to anatomical insight and intelligent spread.

📌 They harness the dynamic behavior of LA within connective tissue planes, influencing pain pathways in ways that are often indirect, yet remarkably effective.

A. MECHANISMS OF FPBs:

### 1. Anatomical Pathway Dissemination

- ◆ LA spreads along natural fascial planes reaching:
  - 🎯 Somatic nerves (e.g., in ESP, PECS, QL, TAP blocks),
  - 🎯 Mixed nerve plexuses (e.g., lumbar plexus components in QL blocks),
  - 🎯 Visceral fibers (e.g., splanchnic nerves in ESP or SAP blocks).
- 📌 Example: In the ESP block, LA spreads medially into the paravertebral space via costotransverse foramina, affecting both dorsal and ventral rami.

### 2. Volume-Mediated Pressure Gradient

- ◆ Large-volume injections generate pressure that:
  - 🔑 Dissects tight fascial layers
  - 🔑 Promotes multidirectional LA migration
  - 🔑 Enables extended spread across planes
- 💡 A millimetric change in needle position can make a clinical difference, because in FPBs, pressure drives success.

### 3. Indirect Nerve Contact

- ◆ LA reaches neural targets not by direct injection, but by:
  - 🛡 Soaking through loose areolar tissue
  - 🛡 Flowing toward nerve trunks or plexuses

📌 Example: The QL block's anterior spread may engage the lumbar plexus via the transversalis fascia.

#### 🔗 4. Sympathetic Chain & Visceral Modulation

◆ Some FPBs impact autonomic pathways via:

📌 Rami communicantes

📌 Paravertebral sympathetic fibers

📌 Example: ESP and SAP blocks have shown visceral analgesia, possibly through indirect sympathetic blockade.

#### 🧠 5. Neuroimmune and Anti-inflammatory Action

◆ LA in fascia-rich environments may:

☀️ Modulate inflammatory cytokines

☀️ Reduce neurogenic inflammation

☀️ Desensitize peripheral nociceptors

💡 This could explain why analgesia sometimes outlasts the sensory block.

#### 📌 6. Systemic Absorption: Metabolic Reality, Not a Mechanism

◆ While LAs are eventually absorbed into systemic circulation:

⚡ This is a clearance process, not an analgesic strategy.

⚡ Plasma LA levels post-FPBs are subtherapeutic for systemic analgesia.

📌 Key Point: Unlike controlled IV infusions (e.g., lidocaine drips), LA absorbed from FPBs doesn't contribute meaningfully to analgesia.

#### B. 🏗️ FASCIAL ARCHITECTURE & FENESTRATIONS

◆ Fascial design governs:

📌 Spread direction

📌 Block predictability

📌 Example: Natural fenestrations in the vastoadductor membrane influence LA spread during adductor canal blocks.

#### C. ⚙️ CLINICAL VARIABILITY & TECHNICAL FACTORS

◆ Block performance depends on:

💡 Ultrasound technique

💡 Patient anatomy & positioning

💡 Needle orientation & bevel angle

💡 Continuous infusions via catheters may enhance duration but add variability in spread.

#### 🧠 CONCLUSIONS:

✅ Fascial plane blocks are not just "volume blocks" - they are precision tools that demand anatomical mastery and conceptual clarity. Understanding where the LA flows, binds, and acts unlocks their full potential.

✓ Fascial plane blocks are not just about depositing anesthetic in a "safe zone" - they are a dance between fluid dynamics, fascial architecture, neuroanatomy, and immunology.

✓ To master them, one must understand where the drug goes, what it touches, and what it modulates - both locally and systemically.

✓ While systemic absorption is inevitable, it plays no significant role in the analgesic benefit of fascial blocks - the true power lies in anatomical and functional targeting within the fascial ecosystem.

☀ Final Thought:

🔒 "In fascial plane blocks, it's not just what you block - it's what you unlock." ✨

## Gliding Through the Fascial Planes

*In Fascial Plane Blocks, Its Not Just What You Block, Its What You Unlock*

### 1. Anatomical Pathway Dissemination

- LA Spreads along potential fascial planes, using them as low resistance channels.
- These pathways guide LA towards somatic nerves, plexuses, or even PV regions

### 2. Volume-mediated Pressure Gradient

- High volume injections generate a hydrostatic pressure gradient/
- It enables LA to open tight fascial layers/transverse compartments to reach neural targets.

### 3. Indirect Nerve Contact

LA reaches nerve NOT through direct deposition, but via:

- Diffusion through connective tissues
- Percolation into neural neighborhoods.

### 4. Sympathetic Chain & Visceral Modulation

Some FPBs can spread medially/ Posteriorly to influence:

- Rami communicantes,
- Reach sympathetic ganglia

Resulting in visceral analgesia.

### 5. Systemic Absorption

LAs eventually enter systemic circulation,

- Plasma levels from FPBs are too low for central analgesia
- Systemic action is not therapeutic, merely metabolic

### 6. Neuroimmune & Anti-inflammatory Action

LA may act beyond nerves by modulating:

- Cytokine release
- Neuroinflammation

*@NantikBSonawane*

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1. Anatomical Pathway Dissemination	2. Volume-mediated Pressure Gradient	3. Indirect Nerve Contact	4. Sympathetic Chain & Visceral Modulation	5. Systemic Absorption	6. Neuroimmune & Anti-inflammatory Action
LA Spreads along potential fascial planes, using them as low resistance channels.	High volume injections generate a hydrostatic pressure gradient/	LA reaches nerve NOT through direct deposition, but via:	Some FPBs can spread medially/ Posteriorly to influence:	LAs eventually enter systemic circulation,	LA may act beyond nerves by modulating:
These pathways guide LA towards somatic nerves, plexuses, or even PV regions	It enables LA to open tight fascial layers/transverse compartments to reach neural targets.	Diffusion through connective tissues	Rami communicantes,	Plasma levels from FPBs are too low for central analgesia	Cytokine release
		Percolation into neural neighborhoods.	Reach sympathetic ganglia	Systemic action is not therapeutic, merely metabolic	Neuroinflammation



**Dr. Kartik Sonawane** @KartikBSonawane

May 23, 2025 · 2 tweets · [KartikBSonawane/status/1925999410594394352](https://twitter.com/KartikBSonawane/status/1925999410594394352)

🔥🫁 "Pain at the Core: On-Arrival Blocks for Chest and Abdomen" 👤 🛡️

#PainAtTheCore #OnArrivalBlock  
 #TruncalAnalgesia #ChestWallBlock #AbdominalBlock  
 #RegionalAnesthesia #ESPBlock #TAPBlock  
 #SAPBlock #UltrasoundGuidedRA  
 #PointOfCareBlocks #OnArrivalRA #TipoftheDay #MyRATips

Tip of the Day:

#### 📌 Why FOCUS on Truncal Pain Early?

🫁 Chest and abdominal injuries often compromise vital functions - especially breathing, coughing, and cooperation.

🔥 Pain in these regions is often deep, diffuse, and distressing, and opioids alone may not suffice or may cause respiratory depression.

🔧 Regional blocks offer site-specific, opioid-sparing relief that improves immediate care and downstream outcomes.

#### 📌 CLINICAL GOALS of Truncal On-Arrival Blocks

🫁 Restore respiratory efficiency (chest trauma, rib fractures)

🚑 Facilitate imaging, positioning, and transport

👤 Relax abdominal guarding (peritonitis, pancreatitis)

📊 Reduce sympathetic overdrive in trauma

👉 Enhance cooperation for procedures or airway planning

#### 📌 COMMON INDICATIONS

##### 📌 Chest Wall:

Rib fractures (especially multiple)

Flail chest

Post-thoracostomy or chest tube placement

Chest wall contusions in blunt trauma

##### 📌 Upper Abdomen:

Blunt abdominal trauma

Acute pancreatitis

Upper GI perforation or distension

Postoperative laparotomy or laparoscopy pain

### Lower Abdomen:

Inguinal hernia (painful or strangulated)

Appendicitis with guarding

Abdominal wall hematomas or incisional pain

### BEST CHOICES

#### For Chest Wall Injuries:

ESPB, SAPB, or ICNB.

Provide broad dermatomal coverage.

Safe to perform away from critical structures like the pleura.

Ideal for rib fractures, flail chest, and chest tube insertion pain.

#### For Upper Abdominal Pain:

ESPB at T6–T9 levels or TAP Block.

Relieve guarding and improve respiratory effort in conditions like pancreatitis or blunt abdominal trauma.

#### For Lower Abdominal Conditions:

TAP Block, RSB, IIN/IHN Block.

Provide localized anterior abdominal wall analgesia. Suitable for inguinal hernia, appendicitis, or post-incisional pain.

### ESPB: CHAMPION?

✓ Superficial and safe (away from pleura/major vessels)

✓ Wide craniocaudal spread

✓ Suitable for non-sterile or semi-sterile environments

✓ Excellent for rib fractures and abdominal wall pain

✓ Can be done quickly with or without USG

### KEY PEARLS

Basic aseptic precautions suffice in emergency use

USG is ideal but can be landmark-based if skilled

Document block site, volume, drug, and response

Reassess for conversion to longer-acting block or catheter if needed

### CHEST WALL BLOCKS: RULE

“Hit the Rib, Deposit the Drug”

◆ Deep SAP Block – Needle hits the rib, inject deep to serratus

◆ External Oblique Intercostal Plane Block – Target rib at anterior/mid-axillary line, inject above EO

◆ Parasternal Block – Identify rib near sternum, inject in intercostal plane

🎯 A safe, reproducible approach - perfect for emergency or limited-resource settings.

## ABDOMINAL WALL BLOCKS: RULE

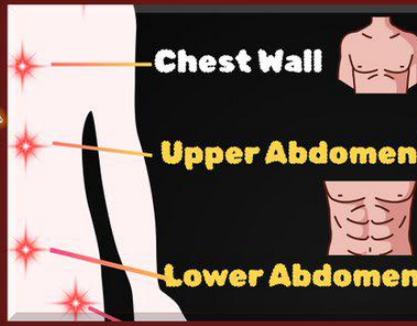
“Follow the Muscle, Find the Plane”

- ◆ TAP Block – Feel or visualize the abdominal wall → insert between internal oblique & transversus abdominis
  - ◆ Rectus Sheath Block – Palpate the rectus muscle → inject posterior to it, above posterior sheath
  - ◆ Ilioinguinal/Iliohypogastric Block – Palpate ASIS → inject in plane between internal oblique and transversus abdominis near the iliac crest
- 🎯 Key Tip: Identify the muscle → follow its plane → deposit where spread flows freely.
- ✅ Reliable, reproducible, and effective for anterior abdominal wall analgesia.

"When pain impairs breathing or masks diagnosis, a timely On-Arrival Block for the trunk may be your best intervention - not just for comfort, but for survival."

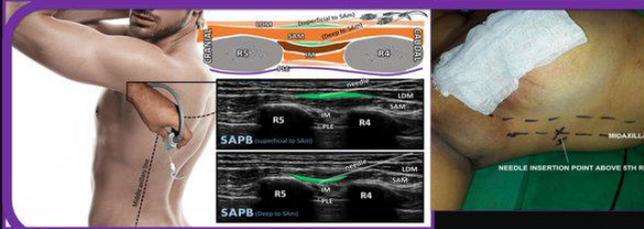
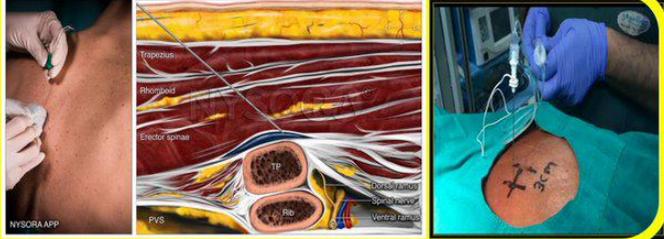


# ON-ARRIVAL BLOCKS (TRUNK)



- When:** Rib fractures, flail chest, chest tube insertion.
  - Why:** Pain restricts ventilation, causing hypoxia, atelectasis, and distress.
  - Blocks:** ESP Block, SAP Block, ICN block.
- 
- When:** Blunt trauma, acute pancreatitis, or laparotomy pain.
  - Why:** Visceral and somatic pain impairs breathing and exam; opioids alone may be inadequate.
  - Blocks:** ESP Block (T6-T9), TAP Block.
- 
- When:** Inguinal hernia/surgical abdomen with severe pain.
  - Why:** Pain worsens during transport and evaluation; early relief improves tolerance.
  - Blocks:** TAP Block, IIN/IHN Block, RSB.

## ESP Block (USG & Landmark-guided)

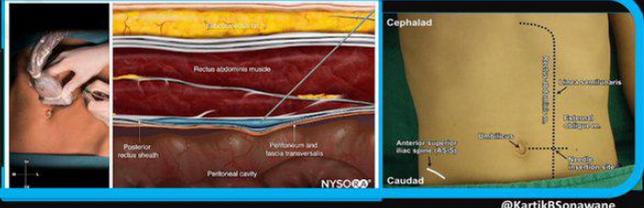


## SAP Block (USG & Landmark-guided)



## TAP Block (USG & Landmark-guided)

## Rectus Sheath Block (USG & Landmark-guided)



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✈️ "On-Arrival Regional Blocks: A Head-to-Toe Strategy for Early Pain Relief"

#OnArrivalBlock #RegionalAnesthesia

#AcutePainManagement #EmergencyRA #HeadToToeBlocks #TraumaPainRelief

#UltrasoundGuidedRA #PointOfCareBlocks

#GangaModel #PainFreeED #PreoperativeCare #BlockToBuildTrust #RAMatters

#SmartBlockStrategy

#AnesthesiologyEducation #RAInTriage #FirstLinePainRelief #FromArrivalToRelief

#MEDTwitter #TipoftheDay #MyRATips

Tip of the Day:

📖 INTRODUCTION:

🕒 An On-Arrival Block: Early administration of a RA technique in the emergency department (ED) or triage area - typically done immediately upon patient arrival, before definitive surgical or procedural care begins.

🛡️ The concept of the On-Arrival Block was introduced by **Ganga Hospital, Coimbatore, INDIA**, as an innovative approach to provide early RA in the emergency or triage setting - well before surgery or definitive care begins.

🎯 The goal is simple yet powerful: Treat pain at the DOOR, not the OR.

🎯 PRIMARY GOALS:

- 🔥 Provide rapid and effective analgesia
- 🧠 Improve respiratory mechanics (especially in chest trauma)
- 📷 Facilitate imaging and physical examination
- 🚑 Ease patient transfer and positioning
- 📌 Reduce opioid use and side effects
- 👉 Build early rapport and trust with the patient
- 🤝 Promote cooperation throughout the perioperative course

✅ INDICATIONS:

- 🔥 Pain is severe and hinders exam, breathing, or movement
- 🧑 Positioning is difficult (e.g., hip/femur injuries)
- 🫁 Breathing is compromised due to rib fractures or flail chest
- 🧠 Opioid-sparing strategies are beneficial (elderly, frail, respiratory risk)

## ⚠️ WHEN TO AVOID?

- 🧠 Head injuries needing serial neuro exams
- 🦴 Cervical spine trauma (await clearance)
- ❤️ Cardiac tamponade, MI, aortic dissection
- 📊 Unexplained or ongoing hemorrhagic shock
- 🚑 Polytrauma with uncertain injury zones
- 🦠 Overlying infection or open wounds at block site
- 🩸 Coagulopathy or anticoagulation status unknown

## 🧰 TIPS FOR SAFETY:

- 🧠 No need for full OR sterility - basic aseptic precautions suffice
- 🏠 Ultrasound guidance improves safety and precision
- 📄 Always document the block: indication, technique, drugs, and patient response
- 🚦 Use blocks to facilitate care, not delay it

## 📄 PRE-REQUISITES:

- ✅ Rapid verbal consent (if possible)
- 🩸 Bleeding/clotting risk assessment
- 🏠 Ultrasound availability
- 🧠 Aseptic preparation with basic precautions (chlorhexidine, gloves, mask)
- 📄 Document site, drug, volume, technique, and response

## 🧰 IDEAL LOW-RISK BLOCKS:

- 🟢 ESP Block — For chest, upper abdomen, flank
- 🔴 Fascia Iliaca Block — For hip/femur pain
- 🟡 SAP Block — For lateral chest wall trauma
- 🔵 TAP Block — For anterior abdominal wall pain
- 🟠 Adductor Canal Block — For anterior knee pain
- 🟣 IIN/IHN Block — For groin or inguinal hernia

## 📌 FINAL PEARLS FOR SAFE PRACTICE:

- 🧠 No need for full OT sterility — basic aseptic technique is enough
- 🏠 Ultrasound-guided blocks preferred for accuracy and safety
- 📄 Always document: indication, site, drugs used, and response
- 🚑 Use On-Arrival Blocks to improve care efficiency, not delay definitive treatment

🧩 "Not every injury needs a block - 🦴 splinted limbs are quiet, but 🫁 breath and 🦵 movement come first." 🟩

# Blocking Pain Before It Begins: On-Arrival RA from Head to Toe

@KartikBSonawane

**Head & Neck**

- ✗ No routine need for early block
- ⚠ Reason: Neurologic signs must be monitored clearly; blocks may mask deterioration.

**Clavicle & Shoulder**

- ✔ When: Dislocations or fractures with severe pain.
- 🔍 Why: Pain limits movement, hampers imaging, and makes reduction difficult.
- 📌 Blocks: Interscalene Block, Supraclavicular Block.

**Chest Wall**

- ✔ When: Rib fractures, flail chest, chest tube insertion.
- 🔍 Why: Pain restricts ventilation, causing hypoxia, atelectasis, and distress.
- 📌 Blocks: ESP Block, SAP Block, ICN block.

**Upper Abdomen**

- ✔ When: Blunt trauma, acute pancreatitis, or laparotomy pain.
- 🔍 Why: Visceral and somatic pain impairs breathing and exam; opioids alone may be inadequate.
- 📌 Blocks: ESP Block (T6-T9), TAP Block

**Lower Abdomen**

- ✔ When: Inguinal hernia/surgical abdomen with severe pain.
- 🔍 Why: Pain worsens during transport and evaluation; early relief improves tolerance.
- 📌 Blocks: TAP Block, IIN/IHN Block, RSB

**Pelvis & Hip**

- ✔ When: Hip fracture or dislocation.
- 🔍 Why: Even minimal movement causes severe pain; delays imaging and increases distress.
- 📌 Blocks: Fascia Iliaca Block, PENG Block, Femoral Nerve Block

**Thigh**

- ✔ When: Femoral shaft fractures.
- 🔍 Why: Pain worsens with any leg movement; early block eases transport and evaluation.
- 📌 Blocks: Femoral Nerve/Fascia Iliaca Block

**Knee**

- ✔ When: Patellar dislocation before reduction.
- 🔍 Why: Patient unable to tolerate manipulation; block eases reduction with/without sedation.
- 📌 Blocks: Adductor Canal/Femoral Nerve Block

**Leg**

- ⚠ Usually not urgent
- 🔍 Why: Most injuries are splinted and pain is stable.
- 📌 Optional Block: Sciatic Nerve Block (for unstable/open fractures)

**Ankle & Foot**

- ✗ Rarely needs on-arrival block
- 🔍 Why: Pain well managed with immobilization.
- 📌 Blocks (if needed): Ankle/Popliteal Sciatic Block

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1. Head & Neck	2. Clavicle & Shoulder	3. Chest Wall	4. Upper Abdomen	5. Lower Abdomen	6. Pelvis & Hip	7. Thigh	8. Knee	9. Leg	10. Ankle & Foot
11. Head & Neck	12. Clavicle & Shoulder	13. Chest Wall	14. Upper Abdomen	15. Lower Abdomen	16. Pelvis & Hip	17. Thigh	18. Knee	19. Leg	20. Ankle & Foot
21. Head & Neck	22. Clavicle & Shoulder	23. Chest Wall	24. Upper Abdomen	25. Lower Abdomen	26. Pelvis & Hip	27. Thigh	28. Knee	29. Leg	30. Ankle & Foot
31. Head & Neck	32. Clavicle & Shoulder	33. Chest Wall	34. Upper Abdomen	35. Lower Abdomen	36. Pelvis & Hip	37. Thigh	38. Knee	39. Leg	40. Ankle & Foot
41. Head & Neck	42. Clavicle & Shoulder	43. Chest Wall	44. Upper Abdomen	45. Lower Abdomen	46. Pelvis & Hip	47. Thigh	48. Knee	49. Leg	50. Ankle & Foot
51. Head & Neck	52. Clavicle & Shoulder	53. Chest Wall	54. Upper Abdomen	55. Lower Abdomen	56. Pelvis & Hip	57. Thigh	58. Knee	59. Leg	60. Ankle & Foot
61. Head & Neck	62. Clavicle & Shoulder	63. Chest Wall	64. Upper Abdomen	65. Lower Abdomen	66. Pelvis & Hip	67. Thigh	68. Knee	69. Leg	70. Ankle & Foot
71. Head & Neck	72. Clavicle & Shoulder	73. Chest Wall	74. Upper Abdomen	75. Lower Abdomen	76. Pelvis & Hip	77. Thigh	78. Knee	79. Leg	80. Ankle & Foot
81. Head & Neck	82. Clavicle & Shoulder	83. Chest Wall	84. Upper Abdomen	85. Lower Abdomen	86. Pelvis & Hip	87. Thigh	88. Knee	89. Leg	90. Ankle & Foot
91. Head & Neck	92. Clavicle & Shoulder	93. Chest Wall	94. Upper Abdomen	95. Lower Abdomen	96. Pelvis & Hip	97. Thigh	98. Knee	99. Leg	100. Ankle & Foot

## On-Arrival Blocks: What Needs It, Why, and How? (Head-to-Toe Approach)

<b>Regions</b>	<b>Injuries for On-Arrival Block</b>	<b>Rationale</b>	<b>Block Choices</b>
❖ <b>Head &amp; Neck</b>	None routinely	Neurologic monitoring priority; block may mask signs	—
❖ <b>Clavicle/ Shoulder</b>	Dislocations, Fractures	Severe pain; hinders movement/imaging; reduction needed	<ul style="list-style-type: none"> <li>Interscalene Block,</li> <li>Supraclavicular Block</li> </ul>
❖ <b>Chest Wall</b>	Rib fractures, Flail chest, Chest tube insertion	Pain limits breathing; risk of atelectasis, Hypoxia	<ul style="list-style-type: none"> <li>ESP Block,</li> <li>SAP Block,</li> <li>ICNB</li> </ul>
❖ <b>Upper Abdomen</b>	Blunt trauma, Acute pancreatitis, Laparotomy pain	Visceral/somatic pain; aids breathing and examination	<ul style="list-style-type: none"> <li>ESP Block (T6–T9),</li> <li>TAP Block</li> </ul>
❖ <b>Lower Abdomen</b>	Inguinal hernia, Surgical abdomen	Pain worsens on exam/movement; facilitates transport	<ul style="list-style-type: none"> <li>TAP Block,</li> <li>IIN/IHN Block,</li> <li>RSB</li> </ul>
❖ <b>Pelvis/Hip</b>	Hip fractures, Hip dislocation	Severe pain with minimal movement; poor tolerance to repositioning	<ul style="list-style-type: none"> <li>Fascia Iliaca Block,</li> <li>PENG Block,</li> <li>Femoral Nerve Block</li> </ul>
❖ <b>Thigh</b>	Femoral shaft fracture	Movement causes intense pain; early analgesia improves cooperation	<ul style="list-style-type: none"> <li>Femoral Nerve Block,</li> <li>Fascia Iliaca Block</li> </ul>
❖ <b>Knee</b>	Patellar dislocation (pre-reduction)	Pain prevents handling; sedation + block facilitates reduction	<ul style="list-style-type: none"> <li>Adductor Canal Block,</li> <li>Femoral Nerve Block</li> </ul>
❖ <b>Leg (Below Knee)</b>	Not urgent unless unstable or open fracture	Often splinted; pain relatively controlled	<ul style="list-style-type: none"> <li>Sciatic Nerve Block (if needed)</li> </ul>
❖ <b>Ankle/ Foot</b>	Not needed early unless reduction planned	Pain controlled with immobilization; block for procedure timing	<ul style="list-style-type: none"> <li>Ankle Block,</li> <li>Popliteal Sciatic Block (if required)</li> </ul>

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May 14, 2025 · 1 tweets · [KartikBSonawane/status/1922568824995680625](https://twitter.com/KartikBSonawane/status/1922568824995680625)

"🔪 Operation Block Booster: The Battle Begins! 🚀"

#BlockBoosters #RegionalAnaesthesia #Dexamethasone #Dexmedetomidine #Opioids  
#PainManagement #Anesthesia #MedTwitter #MedEd #IVvsPerineuralDexamethasone  
#Adjuvants #AdjuvantsinRA #TipoftheDay #MyRATips

Tip of the Day:

Which perineural adjuvant truly reigns supreme?

Dexamethasone, Dexmedetomidine, or Opioids?

🔍 First up: Perineural Dexamethasone – The Local Hero!

⚡ Direct Action on Nerves:

- Inhibits potassium channels in C-fibers → reduces pain transmission
- Causes vasoconstriction → slows LA uptake → prolonged block
- Suppresses inflammatory cytokines, promotes anti-inflammatory mediators
- Boosts protective enzyme Akt → reduces neurotoxicity of local anesthetics

🆚 IV vs Perineural:

- IV lacks local effect → shorter block duration
- Perineural = targeted, potent, and prolonged

🔍 Next: Dexmedetomidine – The Silent Strength!

- ◆ Alpha-2 agonist → ↓ norepinephrine → prolonged sensory block
- ◆ Offers mild sedation, anxiolysis—great for anxious patients

⚠️ Watch for: Bradycardia, hypotension, sedation

✅ Best when deep, long analgesia + calmness is needed

🔍 Lastly: Opioids – The Veteran Losing Steam

- ❌ Peripheral receptors are sparse → inconsistent block prolongation
- ❌ Side effects galore: Nausea, itching, sedation, respiratory depression
- ❌ Largely replaced by safer, more effective agents in modern practice
- 🛡️ Neurotoxicity Concerns? Mostly Theoretical!

Nerves are protected by multilayered shields (epineurium, perineurium, endoneurium). These act as filters—so clinical neurotoxicity is extremely rare

🎉 Final Results Are In! 🏁

🏆 CROWNED CHAMPION:

Perineural Dexamethasone - unmatched local effects, prolonged analgesia, and excellent safety

🥈 STRONG RUNNER-UP:

Dexmedetomidine - reliable, long-acting with bonus sedation, but needs monitoring

🥉 OUT OF THE RACE:

Opioids - inconsistent effect, higher risk, no longer preferred

💬 Moral of the Block Battle:

If you want long, safe, and powerful pain relief -  
Dexamethasone wears the crown! 🏆

For More Details, click following Links,

<https://x.com/KartikBSonawane/status/1830886475245985853?t=NniyFCqohMDTUmh2Rlijmw&s=19>

<https://x.com/KartikBSonawane/status/1883527430805291070?t=l7dSfdvHEl4vNny9cdUTqA&s=19>



# Choosing the Best Perineural Adjuvant

Features	Dexamethasone (Perineural)	Dexmedetomidine (Perineural)	Opioids (Perineural)
❖ <b>Type of Drug</b>	Corticosteroid	Alpha-2 adrenergic agonist	Mu-opioid receptor agonist
❖ <b>Mechanism of Action</b>	Inhibits K <sup>+</sup> channels, ↓ cytokines, vasoconstriction, ↑ Akt	↓ Norepinephrine release, hyperpolarizes nerves	Binds peripheral opioid receptors, ↓ substance P
❖ <b>Sensory vs. Motor Effect</b>	Predominantly sensory	Sensory > motor	Primarily sensory, variable
❖ <b>Analgesia Duration</b>	Significantly prolonged (2–3x)	Longest among adjuvants	Variable, unpredictable
❖ <b>Onset of Action</b>	No change	May slightly delay	No consistent effect
❖ <b>Sedation</b>	None	Mild to moderate	Common side effect
❖ <b>Hemodynamic Effects</b>	Stable	Bradycardia, hypotension	Systemic effects if absorbed
❖ <b>Neurotoxicity</b>	Extremely low; theoretical	Safe at clinical doses	Systemic toxicity more relevant
❖ <b>Perineural vs. IV Use</b>	Perineural superior (local effects)	Effective only perineurally	Less effective peripherally
❖ <b>Anti-inflammatory Effect</b>	Strong local effect	Minimal	Minimal
❖ <b>Analgesic Synergy</b>	Strong with LA	Synergistic with LA	Mild synergy
❖ <b>Safety Profile</b>	Excellent; minimal side effects	Safe with monitoring	Higher risk of side effects
❖ <b>Monitoring Required</b>	Minimal	Moderate (HR, BP, sedation)	Necessary
❖ <b>Ease of Use</b>	Easy to mix; stable	Requires dose precision	Precipitation risk
❖ <b>Patient Satisfaction</b>	High	High (with sedation)	Often lower
❖ <b>Best Use Case</b>	Outpatient, long blocks	Inpatient, prolonged blocks	Fallback option
❖ <b>Overall Ranking</b>	🏆 <b>Crowned Champion</b>	🥈 <b>Runner-Up</b>	🥉 <b>Least Preferred</b>

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Jun 18, 2025 · 2 tweets · [KartikBSonawane/status/1935210641071194588](https://twitter.com/KartikBSonawane/status/1935210641071194588)

🧠💬 “Mind the Fog” — Unmasking POCD Across Ages 📌🔬

#MindTheFog #POCD #BrainProtection #RegionalAnesthesia #CognitiveRecovery  
#PainMatters  
#Neuroinflammation #SodiumChannels #ElderlyCare  
#TipOfTheDay #MyRATips

Tip of the Day:

🔍 What is POCD?

- Decline in memory, attention, and executive function after surgery
- Can be short-term or long-lasting
- Most common in the elderly but affects all age groups

👤👤 POCD Across Age Groups

👤 Elderly: Highest risk; due to reduced neural plasticity and high inflammation

👤 Middle-aged: Moderate, often reversible; worsened by comorbidities

👤 Children: Rare POCD; emergence delirium more common

💣🧠 Pain-Induced Cognitive Dysfunction

🔥 Pain triggers IL-1 $\beta$ , TNF- $\alpha$  → neuroinflammation

💡 Chronic pain increases cortisol → disrupts memory

🧬 Glutamate overdrive → NMDA receptor fatigue

⚡ Na<sup>+</sup> channel upregulation (NaV1.7, 1.8, 1.9) → cortical hyperexcitability

🧠 Affects hippocampus and prefrontal cortex → mimics POCD

⚙️ Core Mechanisms of POCD

🧠 Neuroinflammation via glial activation

🛡️ BBB breakdown → toxin entry into CNS

☠️ Volatile agent toxicity → amyloid, tau changes

💧 Hypoperfusion → ischemic brain injury

🧴 Cholinergic suppression → reduced attention

⚡ Na<sup>+</sup> channel overactivity → neural overload

📌 Regional Anesthesia: Cognitive Guardian

- 🚫 Avoids volatile anesthetics
- 🚫 Blunts nociceptive input → less inflammation
- 💊 Reduces opioids → lowers delirium risk
- 🩺 Stabilizes hemodynamics → protects perfusion
- 🚫 Blocks Na<sup>+</sup> channels peripherally → prevents central hyperexcitability
- 🔄 Improves sleep, reduces ICU needs

### 💊 What Helps?

#### ✅ Effective Agents

- 🧠 Dexmedetomidine: Sedative + anti-inflammatory, reduces POCD
- 🌙 Melatonin / Ramelteon: Restores circadian rhythm, reduces delirium

#### ⚠️ Use with Caution

- 🚫 Haloperidol: For agitation only; not preventive, may cause side effects

#### 🧠📈 Monitoring & Prevention

- 📄 Screen with MMSE / MoCA preoperatively
- 🩺 Prefer RA in elderly and high-risk surgeries
- 🎯 Avoid deep sedation; use BIS or EEG to titrate
- 💊 Use opioid-sparing multimodal analgesia
- 🏠 Encourage early mobilization and sleep hygiene
- 👥 Use clocks, windows, family for orientation

#### 🎯 Take-Home Message

POCD is predictable and preventable - driven by pain, inflammation, and Na<sup>+</sup> channel dysfunction.

- 📌 Treat pain early.
- 📌 Choose RA when possible.
- 📌 Use brain-friendly drugs.

#### 🧠 Preserve the mind

#### ✅ Empower recovery

- 🎯 Think ahead.
- 📌 Block the pain.
- 🧘 Calm the brain.
- 💡 Mind the fog.



# Post-Operative Cognitive Dysfunction (POCD)



## Various Mechanisms

❖ Neuroinflammation:	• Cytokine release disrupts cognitive circuits.
❖ BBB Disruption:	• Facilitates neurotoxin entry into CNS
❖ Anesthetic Neurotoxicity:	• Amyloid $\beta$ , tau alterations from volatile agents
❖ Hypoperfusion:	• Reduced cerebral blood flow during surgery
❖ Cholinergic Dysfunction:	• Impaired acetylcholine transmission – Attention/Memory Loss
❖ Na <sup>+</sup> Channel Overactivity:	• Pain-induced hyperexcitability, cognitive overload



## Prevention Strategies

<input type="checkbox"/> Pre-op	<ul style="list-style-type: none"> <li>• Cognitive screening.</li> <li>• Comorbidity control.</li> <li>• Avoid polypharmacy</li> </ul>
<input type="checkbox"/> Intra-op	<ul style="list-style-type: none"> <li>• Prefer RA,</li> <li>• Avoid deep GA,</li> <li>• Maintain perfusion,</li> <li>• Short-acting agents</li> </ul>
<input type="checkbox"/> Post-op	<ul style="list-style-type: none"> <li>• Early mobilization,</li> <li>• Pain control,</li> <li>• Sleep promotion,</li> <li>• Cognitive support</li> </ul>

## Investigations & Monitoring

- ✓ **Pre-op Testing:**
  - MoCA, MMSE, neuropsych screening.
- ✓ **Delirium Assessment:**
  - CAM, 4AT.
- ✓ **Intraop Monitoring:**
  - EEG/BIS to avoid over-deep anesthesia.
- ✓ **Biomarkers (experimental):**
  - S100 $\beta$ , NSE, cytokines.

## Treatment **RX**

- ❖ **Supportive Care:**
  - Orientation, hydration, sleep hygiene.
- ❖ **Cognitive Rehab:**
  - Structured therapy for persistent cases.
- ❖ **Pharmacological:**
  - No specific approved drug
  - Cholinesterase inhibitors under study.
- ❖ **Pain Management:**
  - For PREVENTION & REVERSAL of cognitive changes.

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Feb 20, 2025 · 2 tweets · [KartikBSonawane/status/1892485223985623269](https://twitter.com/KartikBSonawane/status/1892485223985623269)

## 🚨 Pleural Puncture Alert! 🚨

Accidental pleural puncture during RA can be serious!

Watch for:

- ◆ Sharp chest pain & cough
- ◆ Dyspnea & decreased breath sounds
- ◆ Worsening hypoxia (pneumothorax risk!)

✅ Prevent it!

- ✓ Use USG guidance
- ✓ Limit needle depth (<2x clavicular breadth)
- ✓ Avoid excessive medial/inferior angulation

#RegionalAnesthesia #PatientSafety #AnesthesiaTips

### INADVERTENT PLEURAL PUNCTURE WITH NEEDLE DURING RA

Immediate  
Symptoms  
(During Block)

- Sudden Sharp Pain (Chest/Shoulder).
- Coughing (due to Pleural irritation).
- "Give Way" due to sudden loss of Resistance.
- Air aspiration in syringe.
- Sudden Dyspnea (Rare).

Early Symptoms  
(Min - Hrs)

- Progressive Dyspnea.
- Pleuritic pain worsening with deep Breathing.
- Unequal chest expansion.
- Decreased breath sounds on affected side.
- Tachycardia & Anxiety due to Hypoxia & Sympathetic response.

Late Symptoms  
(Hrs - Days)

- Worsening Dyspnea.
- Hypoxia & Desaturation.
- Subcutaneous Emphysema (Rare) due to air leaking in Soft Tissue.
- Tension Pneumothorax.
- Severe Respiratory Distress.
- Tracheal Deviation.
- Hypotension.
- Cyanosis.

What to Do Immediately?

- Stop the Procedure immediately & Withdraw the Needle.
- Monitor Vitals, respiratory efforts, SPO2, Breath Sounds.
- Urgent X-Ray with Follow-up X-rays.
- Administer O2 if desaturation & Dyspnea.
- Needle Decompression if Tension Pneumothorax.
- ICD, if significant Pneumothorax.
- Observation vs. Intervention for Small but progressive Pneumothorax.

How to avoid?

- Measure Clavicle Breadth to avoid deep needle insertion.
- Ultrasound guidance to visualize needle trajectory and pleura.
- Avoid excessive Medial/Inferior needle angulation.
- Hydrodissection technique to confirm real-time safe needle placement.

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First lesson:

While giving PNS guided Supraclavicular block;

Measure the breadth of the clavicle.

You should not insert any needle beyond twice this distance from the skin in a supraclavicular block to avoid inadvertent pleural puncture.

Before reaching this depth, you should obtain the desired response. If not, readjust the needle angles accordingly.



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May 14, 2025 · 2 tweets · [KartikBSonawane/status/1922717822033199401](https://twitter.com/KartikBSonawane/status/1922717822033199401)

👉 "Do You Really Need a p-Value for Common Sense?" 🤔

#AnaesthesiaWisdom #CommonSenseMedicine #TrustYourPractice  
 #IVvsPerineuralDexamethasone  
 #ClinicalLogic #OperationBlockBooster  
 #TipoftheDay  
 #MyRATips

Tip of the Day:

Perineural vs. IV Dexamethasone?

It's like cooking on the flame vs. placing the pot nearby.  
 Both generate heat,  
 but one's direct, the other distant.

Still digging for RCTs?

Some truths don't need validation,  
 they just need clinical eyes and logic.

🔥 Key Points:

- ★ Different routes = different mechanisms
- ★ It's not complex—just basic pharmacology + common sense
- ★ Studies on obvious truths often return mixed or diluted results
- ★ That's because common sense rarely fits into a confidence interval

Trust in:

- Your clinical judgment
- Your experience
- Your results
- Your reasoning

Bottom Line:

You don't need a p-value when the truth is this clear.

If you:

☀️ See the sun, you don't need a proof of Day

🌡️ Feel the heat, you don't need a proof of warmth

⚡️ Hear the thunder, you don't need a proof of weather

👃 Smell smoke, you don't need a proof of fire

🍲 Watch food boil, you don't need a recipe

👨🏻‍⚕️ See ur own patient improve, you don't need a proof through meta-analysis

Some things just make sense. Period.



**COMMON  
SENSE**

doesn't need a  
*p-value.*

Because when you study the  
**OBVIOUS**, the results  
will always be **MIXED.**

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Jun 17, 2025 · 2 tweets · [KartikBSonawane/status/1934868778627789141](https://twitter.com/KartikBSonawane/status/1934868778627789141)

🎯 Cracking the Case: Anesthesia in a Non-NPO Child with Supracondylar Humerus Fracture



#PediatricAnesthesia  
 #RegionalAnesthesia  
 #SupracondylarFracture #NonNPO  
 #GastricPOCUS #RSI  
 #AirwayManagement  
 #UltrasoundGuidedBlock  
 #TipOfTheDay #MyRATips

Tip of the day:

Imagine a child rushed in with a supracondylar humerus fracture 🦴 - but here's the twist: they're not NPO! 🚫👄

As regional anesthesiologists, this is where we balance safety ⚠️ with efficacy 🎯 - and every decision counts.

🔍 Step 1: Preoperative Assessment 🧠

Start with two key priorities:

- Airway Examination – anticipate any difficulty
- Gastric POCUS – assess aspiration risk like a pro!

If POCUS is available, it becomes your game-changer tool.

If not — you must assume a full stomach and proceed accordingly. 🎯

🏠 Step 2: Gastric POCUS Grading 📊

- Grade 0 → Empty antrum → ✅ Low aspiration risk
- Grade 1 → Fluid in right lateral view only → ⚠️ Moderate risk
- Grade 2 → Fluid/solid visible in both views → 🚫 High aspiration risk

🚰 No POCUS? Assume Grade 2 until proven otherwise. Don't gamble with the airway.

📌 Step 3: Regional Anesthesia Strategy 🦶

For optimal intraoperative and postoperative pain control:

- Choose Supraclavicular/ Infraclavicular Brachial Plexus Block
- ✓ Use ultrasound guidance
- ✓ Tailor local anesthetic dose carefully based on weight and safety profile

🎯 Helps reduce systemic opioid requirement and aids in faster emergence.

🤖 Step 4: Airway Management Plan 🧠

If POCUS = Grade 2 or not done:

- Perform GA with RSI + ETT
  - Induction: Propofol + Succinylcholine/Rocuronium
  - Maintenance: Sevoflurane/ TIVA
- Empty gastric contents with NG tube.

If POCUS = Grade 0, airway is favorable, and surgery is short:

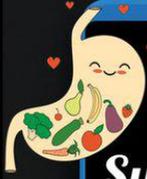
- You may cautiously consider LMA
- ⚠️ Only in selected patients with a secured surgical plan and backup for intubation

🧠 Take-Home Message 📌

- Always assess aspiration risk in a non-NPO child — POCUS if possible.
- When in doubt, treat like a full stomach: RSI + ETT is the gold standard.
- Use regional blocks smartly - not to replace GA, but to complement it.
- 🚫 Never compromise airway safety for convenience - even in emergencies.
- Equip yourself with skill, judgment, and preparation.

The child deserves no less. 🙏





# NON-NPO Child With Supracondylar Humerus #



## Preoperative Assessment

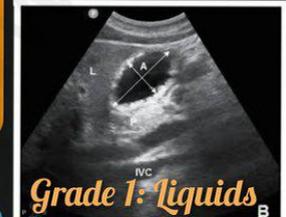
- Airway examination
- Gastric POCUS



## POCUS Grading

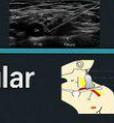


Grade	Aspiration Risk	Suggested
Grade 0	Low	GA + RSI or LMA
Grade 1	Moderate	GA + RSI
Grade 2	High	GA + RSI



## Regional Strategy

Supraclavicular or infracalavicular brachial plexus block



## Airway Plan

GA with RSI + ETT (LMA only if safe)

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“From 😞 Fear to 😊 Fun: Making Regional Anaesthesia 🩺🩸 a Child's Play 🎈🧸”

#PaediatricAnesthesia #RegionalAnesthesia #ChildFriendlyCare #PerioperativeCare  
#PainlessExperience #ComfortInCare #TrustThroughTouch  
#AnaesthesiaMatters #BlocksNotFear #RAForKids  
#FromFearToFun #MakingRACHildsPlay #GentleHandsBigImpact #CalmNotSedate  
#PlayBeforePinch #MedTwitter #TipoftheDay #MyRATips

Tip of the Day:

Delivering RA in children isn't just about Precision - it's about Perception.

The perioperative journey should feel safe, playful, and reassuring, transforming fear into fun and anxiety into trust.

🩺 PREOPERATIVE PHASE: Setting the Stage

- 🧸 Build rapport early: Smile, speak gently, and engage on their level.
- 🎮 Use playful distractions: Toys, cartoons, bubbles, or storytelling work wonders.
- 👪 Involve parents: Their presence provides emotional safety and comfort.
- 🗣️ Watch your words: Avoid "needle" or "injection;" say "magic pinch" or "medicine hug."
- 📖 Explain simply: Turn the plan into a fun, imaginative story.
- 🧊 Numb before you block: Use topical anesthetic or cold spray to reduce discomfort.
- 👕 Use cheerful visuals: Colorful caps, stickers, or fun scrubs can ease tension.

🏠 INTRAOPERATIVE PHASE: Comfort During the Block

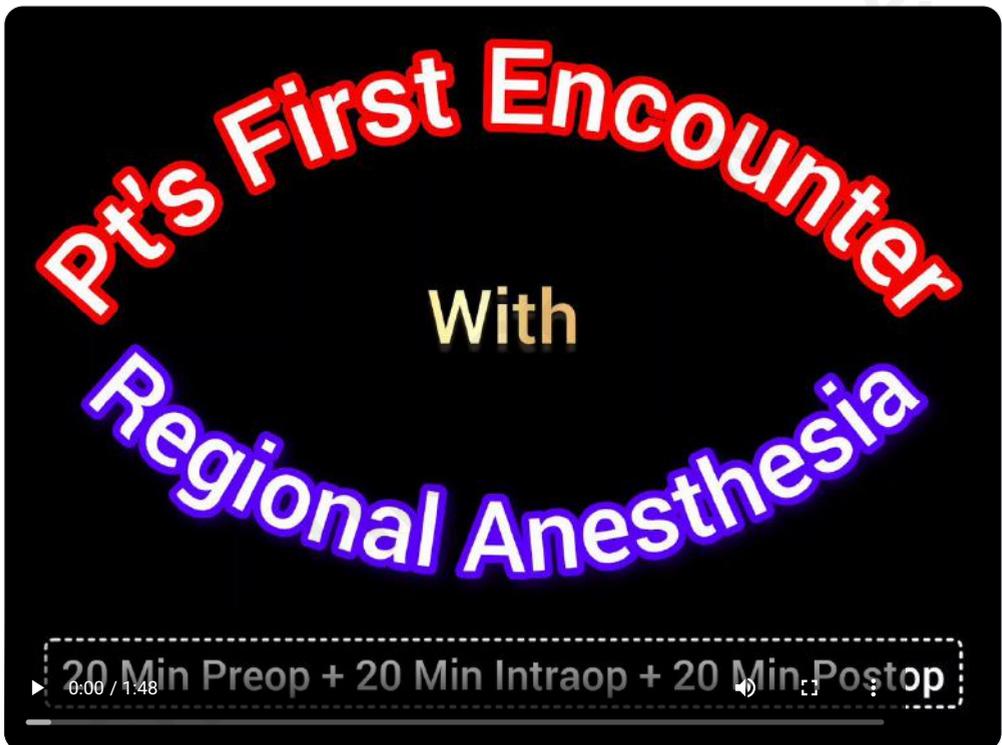
- 📺 Distract with Screens: Cartoons, music, or soft lighting help shift focus.
- 🪟 Use screens or curtains: Block stressful sights like needles or monitors.
- 👋 Stay close: Your calming presence is more powerful than any sedative.
- 🛏️ Ensure gentle positioning: Make them feel physically safe and supported.
- 💬 Keep communicating: Explain gently what they might feel (e.g., "a pinch," "a warm touch").
- ⌚ Be smooth and swift: A quick, confident block minimizes anxiety.

❤️ POSTOPERATIVE PHASE: Comfort After Care

- 🎉 Celebrate bravery: Stickers, high-fives, or a "superhero" certificate work great.
- 🧠 Explain the effects: Describe numbness or tingling in friendly, simple terms.
- 🍵 Reassure parents: Provide clear post-op instructions with empathy.
- 📄 Make it memorable: Let the child leave feeling proud, not afraid.
- 😊 Keep the vibe warm: Even after the procedure, stay kind, curious, and engaged.

🌟 TIPS & TRICKS for Smooth Paediatric RA Care

- 🧸 Use the Power of Play LIKE Toys, bubbles, or cartoons turn stress into smiles.
- 🌈 Create a Kid-Friendly Environment LIKE Bright visuals and soft textures soothe anxiety.
- 🗣️ Mind Your Words LIKE Say “pinch”, “medicine hug”, or “magic drops”, not “needle.”
- 👨👩 Build Trust with Parents LIKE Keep them calm and informed from the start.
- ⌚ Keep It Short & Sweet LIKE Minimize waiting; reduce buildup of fear.
- 🛡️ Use Screens or Curtains LIKE Shield their eyes from syringes and setups.
- 🗣️ Explain Simply LIKE “You’ll feel a tiny pinch or a warm tickle” is enough.
- 📱 Tech is Your Friend LIKE Use music or videos for distraction.
- ❤️ Stay Close, Stay Calm LIKE Your quiet confidence is contagious.
- 🎉 Celebrate Every Success LIKE Small rewards leave lasting impressions.



The image shows a grid of 20 small, colorful icons arranged in 5 rows and 4 columns. Each icon is a small square with a different color and a small graphic or text inside, representing various medical concepts or procedures related to regional anesthesia.

**From  
Fear**



**to Fun**

**MAKING  
REGIONAL  
ANAESTHESIA**



**CHILD'S  
PLAY**

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May 13, 2025 · 1 tweets · [KartikBSonawane/status/1922171765167689824](https://twitter.com/KartikBSonawane/status/1922171765167689824)

"Dermatomes vs. Cutaneous Innervation: Don't Get It Twisted!"

#RegionalAnesthesia #Dermatomes #CutaneousInnervation #PainBlocks #AnatomyMatters  
#NerveBlocks #Neuroanatomy #MedTwitter  
#TipOfTheDay  
#MyRATips

Tip of the Day:

A common confusion in anatomy & regional anesthesia—let's clear it up:

⚡ Dermatomes:

- ◆ Represent dorsal root sensory input from a specific spinal segment
- ◆ Illustrated as band-like zones across the body
- ◆ Helpful for spinal/epidural mapping, but oversimplified in clinical settings

🧠 Cutaneous Innervation:

- ◆ Real-world skin supply by named peripheral nerves
- ◆ These arise from multiple spinal roots via plexuses (e.g., brachial/lumbar)
- ◆ Overlap is common, due to plexiform branching and shared territories

🔄 The Overlap Factor:

- ◆ Neighboring nerves interconnect and share skin areas
- ◆ So blocking one dermatome or a single cutaneous branch often leaves patchy analgesia

📌 Example:

- ◆ The anterior cutaneous nerves of the thigh and its branches (medial & intermediate) come from L2–L3
- ◆ Blocking these nerves targets part of the L2–L3 area
- ◆ However, overlaps with L1 or L4 may cause sparing unless those are also addressed

? The Blocking Dilemma:

Confused about how to effectively block a region? You have three main options:

1. Neuraxial block (e.g., spinal/epidural) that includes the spinal segments involved

2. Peripheral nerve block targeting the parent nerve of the cutaneous branches
3. Field block/infiltration at the site of sensory overlap for localized coverage

Each method has its place—choose based on your target territory, the extent of overlap, and clinical context.

✔ Clinical Wisdom:

- ◆ Never rely solely on dermatome charts—understand nerve distributions
- ◆ For consistent analgesia, consider all contributing nerves, not just root values
- ◆ Precision = combining anatomical knowledge with smart technique selection

Bottom Line:

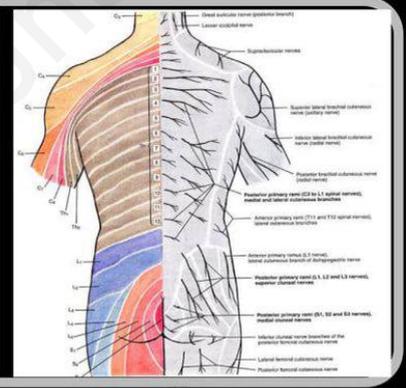
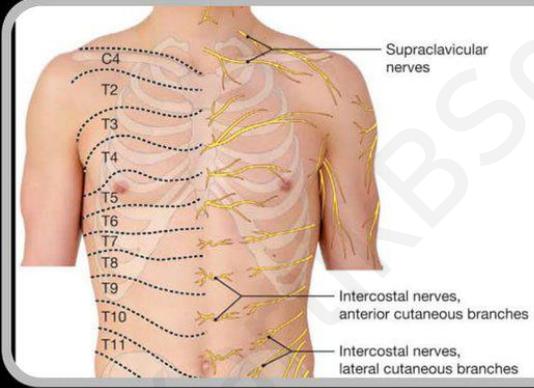
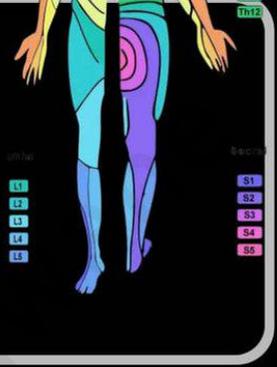
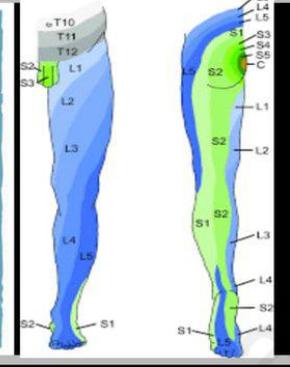
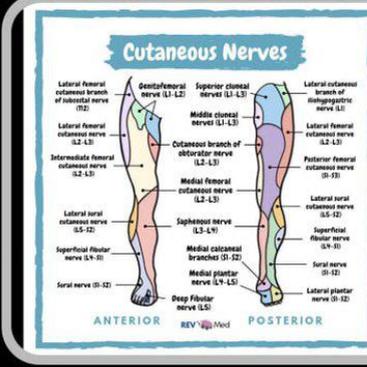
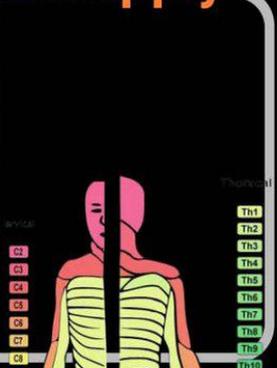
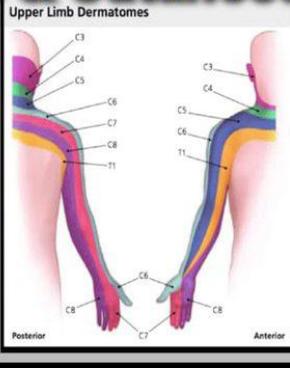
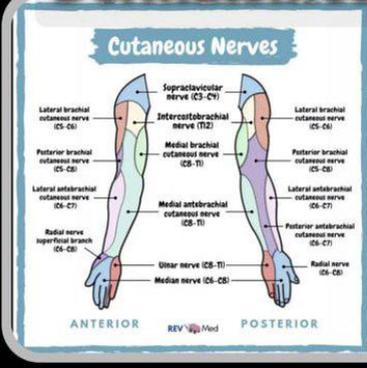
Dermatomes are a MAP.

Cutaneous innervation is the ROAD.

Choose your ROUTE wisely.



# Dermatomes & Cutaneous Supply



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Jun 16, 2025 · 2 tweets · [KartikBSonawane/status/1934515051542806653](https://twitter.com/KartikBSonawane/status/1934515051542806653)

🧠 "From Cord to Nerve: Unwrapping the Meningeal Origins of Peripheral Sheaths"

#NeuroAnatomy #PeripheralNerves  
 #EmbryologyUnwrapped #NerveSheaths #RegionalAnesthesia  
 #AnatomyInsights #FromCordToNerve  
 #NeuroBasics #NerveFabrics  
 #TipOfTheDay #MyRATips

Tip of the Day:

Ever wondered what happens to the coverings of the spinal cord once the nerve roots exit the central nervous system?

🎯 1. Starting Point: The Spinal Cord and its Meninges

📖 Pia mater – the innermost, delicate layer hugging the cord.

🕸️ Arachnoid mater – the web-like middle layer.

🛡️ Dura mater – the tough, outermost layer.

These layers not only protect the spinal cord but also play key roles during the transition of central fibers into peripheral nerves.

🌱 2. Nerve Root Exit: What Happens to the Pia?

- ◆ The pia mater continues briefly along the dorsal and ventral roots, forming a thin root sheath within the subarachnoid space.
- ◆ Denticulate ligaments, which are extensions of pia, stabilize the cord laterally but end at the conus medullaris and are absent in the cauda equina.
- ◆ Once beyond the denticulate ligament, the pia covering diminishes and does not persist as part of the peripheral nerve.

✅ Conclusion: Pia does not form the epineurium. Its role is brief and limited to the root entry zone.

🔄 3. Dural Sleeves and Epineurium: A Smooth Continuation

🖋️ The dura and arachnoid layers extend laterally to form radicular sleeves around each nerve root.

🔄 As the nerve root exits the subarachnoid space, the dura fuses with surrounding tissue to become the epineurium.

🛡️ The epineurium acts as the outermost sheath of peripheral nerves.

✓ Key Point: Epineurium is a continuation of the dura, not of pia.

#### 🧬 4. What About the Perineurium and Endoneurium?

##### 🧬 Perineurium:

- ◆ Forms a laminated barrier around nerve fascicles.
- ◆ Derived from mesenchyme.
- ◆ Essential for the blood-nerve barrier.

##### 🧬 Endoneurium:

- ◆ Surrounds individual axons and Schwann cells.
- ◆ Derived from mesenchymal fibroblasts and neural crest-derived Schwann cells.

🌱 Both layers are mesodermal in origin, not meningeal.

#### 📌 5. Embryological Clarification: The Role of Leptomeninges

🧠 Leptomeninges (pia + arachnoid) do not form the perineurium or epineurium.

📖 Earlier anatomical texts speculated on arachnoid contribution, but modern embryology confirms a mesodermal origin.

📖 The arachnoid-dura interface does contribute to radicular sleeves, which become epineurium.

✓ Therefore, the epineurium comes from the dura, and perineurium comes from mesenchyme, not from the arachnoid or pia.

#### 🧠 6. Special Case – The Cauda Equina

- ◆ After the cord ends at L1–L2, the cauda equina consists of free-floating nerve roots in CSF.
- ◆ These retain a thin pia coat but lack denticulate ligaments.
- ◆ Once they pierce the dura, they acquire an epineurial sheath.

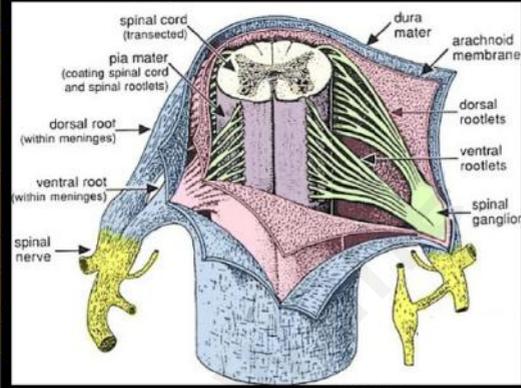
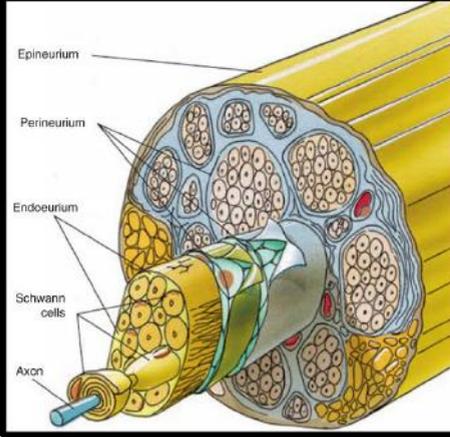
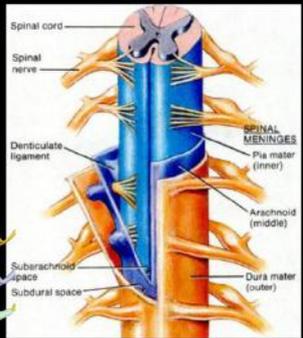
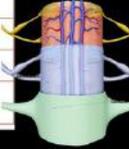
⚠️ Note: Pia ends early, and dural extensions become the primary covering of these roots.

##### 💡 Take-Home Message:

- ◆ Leptomeninges wrap the cord and nerve roots transiently- Do not form the definitive perineurium or epineurium.
- ◆ Dura and mesenchymal tissue that evolve into these strong, fibrous layers that protect and organize peripheral nerves.

# The Fabrics of Nerve: Weaving Origins into Function

Structure	Origin	Formed By
• Epineurium	Dura mater + mesenchyme	Dense connective tissue sheath
• Perineurium	Mesenchyme (mesoderm)	Multiple layers, blood-nerve barrier
• Endoneurium	Mesenchyme + neural crest (Schwann cells)	Loose tissue around each axon
• Dura mater	Mesenchyme (mesoderm)	Tough outer membrane
• Arachnoid mater	Neural crest-derived	Subarachnoid space
• Pia covering of roots	Neural crest-derived	Brief extension from cord



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May 10, 2025 · 2 tweets · [KartikBSonawane/status/1921108897173303485](https://twitter.com/KartikBSonawane/status/1921108897173303485)

"From Centre to Periphery: The Strategic Shift in Regional Anaesthesia"

#RegionalAnaesthesia #FromCentreToPeriphery  
 #PrecisionAnaesthesia  
 #MotorSparingBlocks  
 #UltrasoundGuidedRA  
 #EnhancedRecovery #ERAS  
 #SmartAnaesthesia  
 #SkillBasedPractice  
 #ModernAnaesthesia  
 #PeripheralBlocks  
 #NeuraxialToPeripheral  
 #PatientCentricCare #TipoftheDay  
 #MyRATips

Tip of the Day:

Transitioning from central neuraxial to peripheral regional anaesthesia techniques, especially within the context of modern surgery and ERAS protocols,

Let's see what happens?

Key Trends Along the Centre-to-Periphery Spectrum:

- Analgesic efficacy gradually decreases
- 🔧 Required volume of LA tends to increase
- 📦 Required LA concentration tends to decrease
- 🕒 Duration of analgesia generally increases
- ✖ Complication risks tend to decrease
- 🧠 Motor sparing effect becomes more pronounced
- 🔄 Laterality shifts from bilateral to unilateral
- 🎯 Procedure/site specificity is enhanced
- 🎯 Precision and targeting accuracy increase

🧠 Smartness of approach and skill requirement significantly increase

🏃 Early mobilisation is better supported

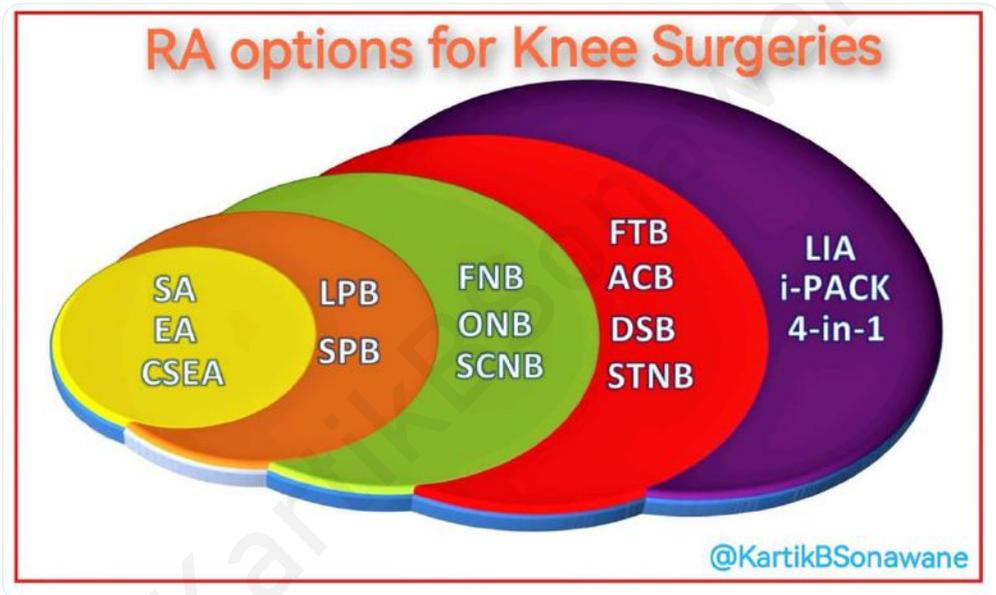
✅ Suitability for ERAS protocols is improved

🕒 Recovery time is reduced

🛡️ Patient safety and comfort are maximised

Bottom Line:

This centre-to-periphery paradigm shift reflects the evolution of RA towards high precision, minimal invasiveness, enhanced safety, and skill-based excellence—perfectly aligning with modern recovery pathways and patient-centric care.



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Apr 11, 2025 · 2 tweets · [KartikBSonawane/status/1910547383324131374](https://twitter.com/KartikBSonawane/status/1910547383324131374)

"Shifting the Pain Paradigm in TKA"

#TKAInsights #PainPathways #RegionalAnesthesia #PostoperativePain #KneeSurgery  
#GenicularBlock #ExtraArticularPain #PeriarticularTargets #SmartAnalgesia  
#OrthoAnesthesia #AnesthesiaTips #PainManagement #PrehabToRehab

Tip of the Day:

Before TKA,

The Pain source is primarily intra-articular—originating from structures inside the knee joint such as cartilage degeneration, inflamed synovium, and subchondral bone changes. This makes targeting intra-articular and capsular innervations, especially the genicular nerves, a logical approach for preoperative pain management and delaying surgery.

However,

After TKA,

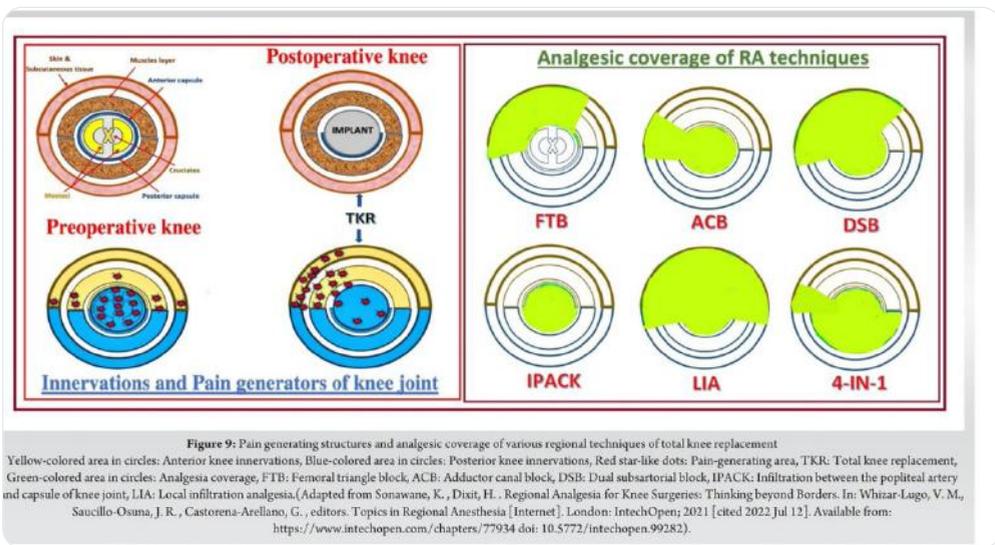
the native joint is removed and replaced with prosthetic components. Now, the pain no longer comes from inside the joint. Instead, it becomes an iatrogenic, extra-articular issue—arising from surgical trauma to soft tissues, the joint capsule, periosteum, quadriceps tendon, and skin. These are structures that lie outside the replaced joint.

Bottom line:

Patients don't feel pain in the joint post-TKA—it's the pain around it that matters!  
Tailor your analgesia accordingly.

Watch this video to understand it better,

<https://youtu.be/aBO-b73ZH6M?si=t8qFFvgz10HEQ-Xd>



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Jun 8, 2025 · 2 tweets · [KartikBSonawane/status/1931781990640230436](https://twitter.com/KartikBSonawane/status/1931781990640230436)

🎯 "Precision Under Pressure: Regional Anesthesia for VIP Patients"

#RegionalAnesthesia #VIPPatientCare #PrecisionAnesthesia #MotorSparingBlocks  
#AnesthesiaMatters #TipOfTheDay #MyRATips

Tip of the Day:

Be they political leaders, celebrities, or influential professionals - demands technical mastery and flawless execution under high expectations.

It's a delicate blend of clinical science, communication strategy, and discretion.

🧠 1. Patient-Centered Precision

VIPs often opt for RA due to:

- 🇺🇸 Desire for faster recovery and reduced sedation
- 🧠 Preservation of cognitive function, especially in the elderly
- 🛡️ Avoidance of risks associated with general anesthesia
- ✅ Goal: Deliver efficient, focused blocks that minimize physiological disturbance.

💉 2. Block Selection: Smart, Motor-Sparing Choices

Focus on blocks with high efficacy, low motor impact, and excellent safety.

- 🫁 Erector Spinae Plane (ESP) Block – thoracic or abdominal surgeries
- 🧠 Scalp Block – for awake craniotomy or neurosurgical sedation
- 🫀 PECS-II or Serratus Plane Block – for breast/thoracic surgeries
- 🦵 Combinations/Dual Subartorial Block (DSB) – for knee procedures with excellent analgesia and motor preservation
- 📦 Quadratus Lumborum (QL) Block – for abdominal wall and visceral analgesia
- ❌ Avoid dense motor blocks unless surgically or clinically necessary.

🛡️ 3. Safety > Status

Use ultrasound guidance, ensure aspiration, and follow standard dosing

Keep rescue strategies ready - GA conversion, airway management

 Protocols are non-negotiable - even for VIPs.

#### 4. Clear & Courteous Communication

Communicate using simple yet accurate medical language

Set realistic expectations - blocks may need supplementation

Navigate discussions with family physicians or handlers gracefully

 Document everything factually and professionally.

#### 5. Privacy is Paramount

Limit OR access to core team

Maintain confidentiality in charting and conversations

Be discrete in all verbal and written communication

 VIP ≠ VIP-erilous breaches.

#### 6. Team Dynamics

Preoperative team briefings help maintain alignment

Ensure everyone knows the RA plan, risks, and fallback options

 No surprises in the OR - especially for high-profile cases.

#### 7. Flawless Logistics

Anticipate any non-standard requests (entourage, quick turnover, anxiolytics)

Double-check drug availability, block equipment, and monitors

Be time-efficient, not rushed

 Every detail matters more than usual.

#### 8. Optimized Postoperative Plan

Prefer catheter techniques or long-acting LAs for continuous comfort

Minimize opioids, nausea, and cognitive clouding

Enable early mobilization and VIP-paced discharge

 Let the recovery reflect the block's precision.

## 9. Avoid the Traps

Don't alter protocols to please

Don't skip informed consent

Don't oversell outcomes

 Professionalism and patient safety must remain top priorities.

## 10. Intravenous (IV) Access: Subtle & Smart

When placing IV lines in VIP patients, aim for clinical efficiency with aesthetic discretion:

 Dorsum of hand – cosmetically acceptable but visible and uncomfortable for long procedures

 Forearm – preferred for longer surgeries and concealment under clothing

 Avoid antecubital fossa unless essential (more visible, prone to occlusion)

 Use skin-toned dressings, minimal tape, and secure well

Consider removing IV before public appearance, if safe

 Gentle technique, fewer attempts, and good positioning = elegance in care.

 Summary: Clinical Excellence Over Celebrity

RA in VIP patients is a high-stakes showcase of:

 Scientific reasoning

 Manual precision

 Mental clarity

 Emotional intelligence

Deliver evidence-based anesthesia - with Extra Finesse, not Extra Risk.

# PRECISION UNDER PRESSURE: REGIONAL ANESTHESIA IN **VIP** PATIENTS



😊 **Patient Centered Precision**  
Cognitive preservation,  
rapid recovery

📌 **Block Selection: Smart,  
Motor Sparing Choices**  
ESP, scalp, PECS-II/SAP, QL,  
dual subsartorial blocks

👤 **Safety Above Status**  
No shortcuts or deviations

🗨️ **Clear & Courteous  
Communication**  
Set realistic expectations

👉 **Privacy and Discretion**  
Limit staff, neutral language

✔️ **Team Briefing & Coordination**  
Keep everyone aligned  
and prepared

📦 **Flawless Logistics**  
Double-check equipment,  
drugs, monitors

😊 **Optimized Postoperative  
Strategy.** Minimize opioids,  
maximize comfort

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May 8, 2025 · 2 tweets · [KartikBSonawane/status/1920382149230014581](https://twitter.com/KartikBSonawane/status/1920382149230014581)

"The Multifaceted Power of Local Anesthetics"

#LocalAnestheticPower #BeyondTheBlock #FunctionalPharmacology #RegionalAnesthesia  
#PainMedicine #AnesthesiaMatters #InflammationRelief #OncoAnesthesia  
#SurgicalRecovery  
#TipoftheDay  
#MyRATips

Tip of the Day:

More than just nerve blockers—LAs are therapeutic agents with a wide range of systemic benefits.

### 1. Bactericidal & Bacteriostatic

 Mechanism:

-  Disrupt bacterial membranes (bactericidal at high concentrations)
-  Inhibit microbial enzyme systems (bacteriostatic at low concentrations)
-  More effective in acidic environments

#Antimicrobial #LocalAnesthetic #InfectionControl #Lidocaine

### 2. Anti-inflammatory & Anti-edema

 Mechanism:

-  Inhibit neutrophil migration and priming
-  Suppress pro-inflammatory cytokines (IL-1, TNF- $\alpha$ )
-  Reduce capillary permeability to limit edema

#AntiInflammatory #PostOpCare #EdemaControl #InflammationRelief

### 3. Antimitotic & Anticancer

 Mechanism:

 Inhibit tubulin polymerization → halt mitosis

 Epigenetic modulation: DNA methylation & histone acetylation

 Disrupt mitochondria → promote apoptosis

 Block VGSCs overexpressed in tumors → reduce invasion

#CancerPrevention #OncoAnesthesia #Antimitotic #LidocaineInCancer

#### 4. Antithrombotic

 Mechanism:

 Inhibit platelet aggregation via thromboxane A2 suppression

 Promote microcirculation

#Antithrombotic #PlateletInhibition #Microcirculation #RegionalSafety

#### 5. Vasomotor Effects

 Mechanism:

 Lidocaine → vasodilation via smooth muscle relaxation

 Ropivacaine/Bupivacaine → vasoconstriction at low doses

#Vasodilation #Vasoconstriction #LAProperties #RegionalAnesthesia

#### 6. Neuroprotective

 Mechanism:

 Reduce excitotoxic sodium influx

 Inhibit glutamate release

 Prevent oxidative stress and apoptosis (low dose benefit)

#Neuroprotection #NeuralHealth #AnesthesiaScience

#### 7. Analgesic Beyond Nerve Block

 Mechanism:

 Central desensitization (IV lidocaine)

👉 Inhibit ectopic discharges from damaged nerves

🧠 Modulate spinal cord excitability

#ChronicPainRelief #IVLidocaine #PainControl #OpioidSparing

## 8. Antipruritic

🌿 Mechanism:

🚫 Block unmyelinated C-fiber transmission

🎯 Suppress opioid-induced or cholestatic itching

#Antipruritic #ItchRelief #NeuraxialCare #SupportiveCare

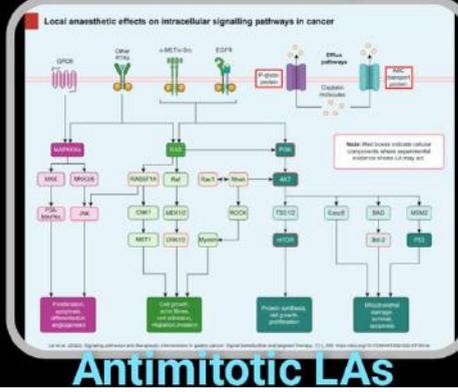
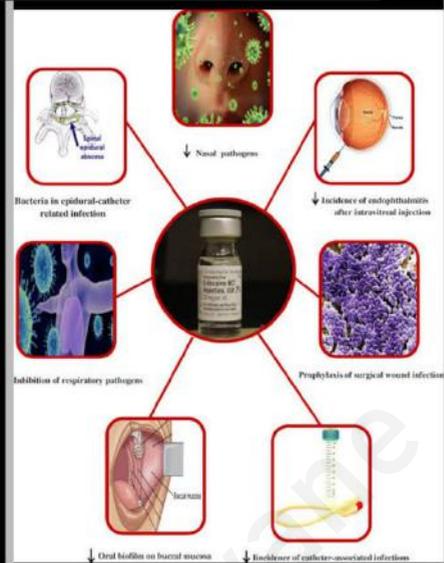
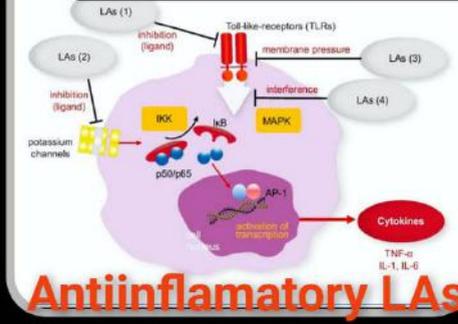
Bottom Lines:

Don't Ignore the Therapeutic Benefits of LAs in...

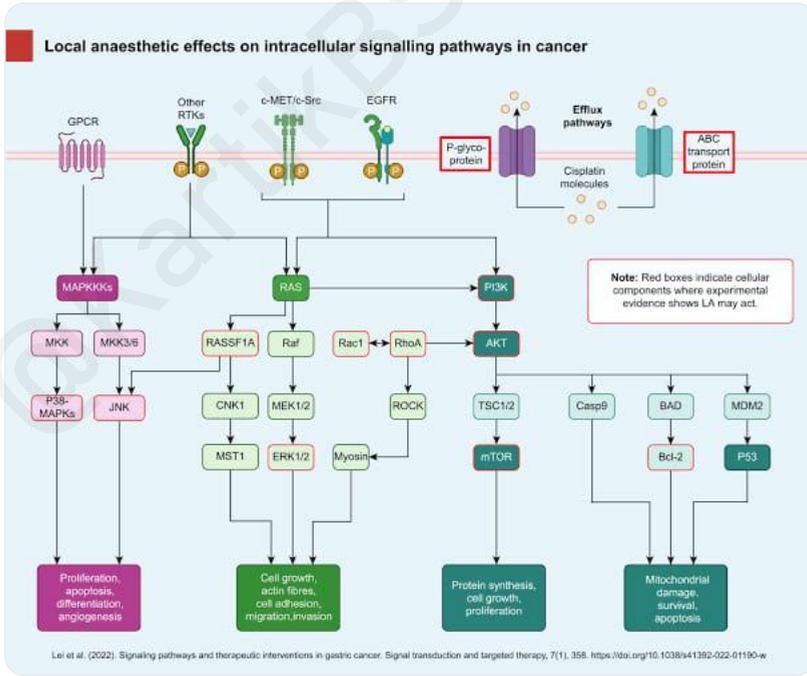
- Surgical Site Infection Prevention
- Postoperative Inflammation and Edema Control
- Preventing Cancer Recurrence Post-Surgery
- Reducing Thrombosis in Microvascular Procedures
- Chronic & Neuropathic Pain Management
- Neuroprotection in High-Risk Surgeries
- Treating Opioid-Induced or Cholestatic Pruritus

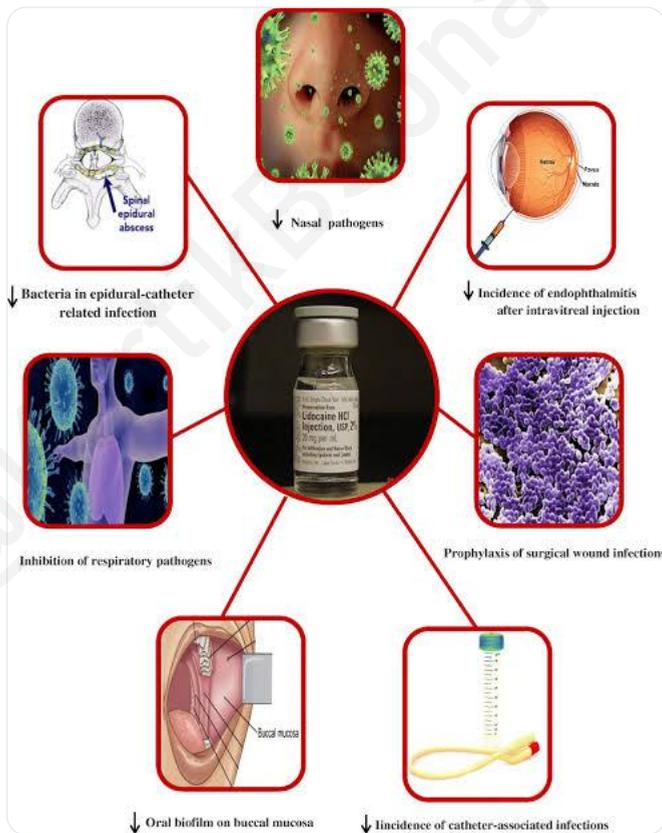
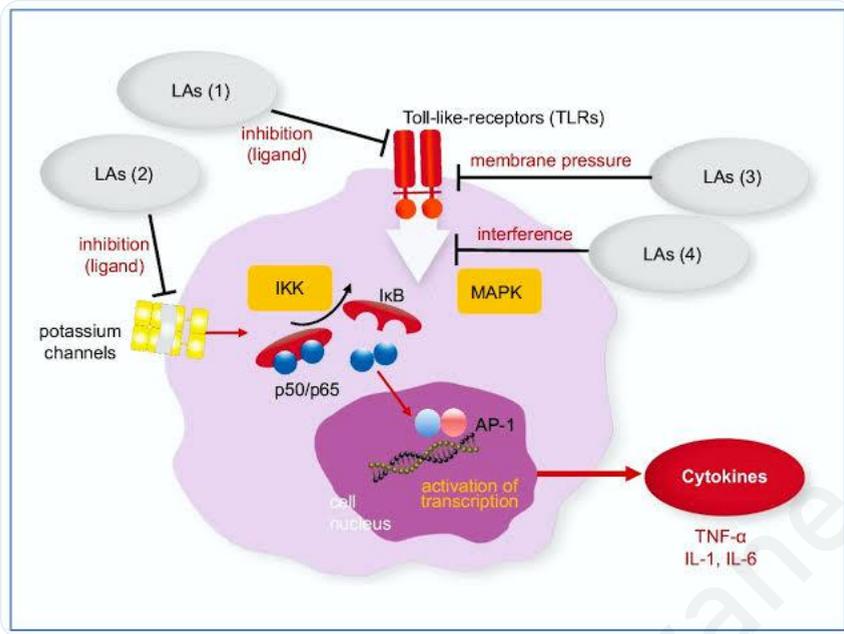


# Multifaceted Local Anesthetics



**Antimicrobial LAs**  
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Jun 4, 2025 · 2 tweets · [KartikBSonawane/status/1930207261164745107](https://twitter.com/KartikBSonawane/status/1930207261164745107)

   Gel It Right: The Science Behind Smooth Ultrasound Imaging   

#UltrasoundPhysics #MedicalImaging #AcousticCoupling #UltrasoundGel  
 #PointOfCareUltrasound #SonoTech  
 #RadiologyEducation #AnesthesiaEducation #MedEd  
 #ClinicianScientist #POCUS #RegionalAnesthesia  
 #UltrasoundInnovation #ImagingScience #SonographyLife #TipOfTheDay #MyRATips

Tip of the Day:

### INTRODUCTION

- ◆ Ultrasound imaging works by sending high-frequency sound waves into the body and interpreting the returning echoes.
- ◆ Air between the probe and skin causes major signal loss due to mismatch in acoustic properties.
- ◆ Ultrasound gel bridges this gap, ensuring smooth transmission of waves from probe to tissue.

### 1. AIR IS AN ENEMY

 Air has extremely low acoustic impedance and is full of dust particles, making it a poor conductor of sound.

 This leads to:

- ◆ Almost 100% wave reflection
- ◆ High attenuation and scattering
- ◆ No useful imaging without a coupling medium

### 2. GEL BRIDGES THE GAP

 Ultrasound gel has impedance similar to soft tissue (~1.5 MRayl), creating a smooth path for sound waves.

 It replaces air, reducing reflection to almost negligible levels

 Acts as a physical and acoustic bridge between transducer and skin

### 3. VELOCITY MATCHING MATTERS

 To pass sound effectively, acoustic velocity between adjacent media must be as close as possible.

 Air vs. tissue = huge velocity mismatch → refraction, dispersion, and distortion

 Gel's velocity (~1500 m/s) is close to soft tissue (~1540 m/s), ensuring:

- ◆ Accurate depth calculations
- ◆ Reduced refraction artifacts
- ◆ Clearer imaging

#### 4. PREVENTING SIGNAL DEGRADATION

 Ultrasound gel reduces attenuation by:

- ◆ Eliminating air pockets
- ◆ Preventing scattering from particles in air
- ◆ Maintaining beam coherence and intensity

 This leads to better signal quality and sharper resolution.

#### 5. WHAT'S INSIDE GEL?

-  Water-based (80–90%) for acoustic compatibility
-  Glycerin or propylene glycol – retains moisture, smooth texture
-  Carbomer/cellulose – gives gel consistency
-  TEA (triethanolamine) – maintains pH and structure
-  Preservatives – prevent microbial growth and contamination

#### 6. INTERFACES & TRANSMISSION EFFICIENCY

 Ultrasound gel ensures:

-  Excellent coupling at gel–skin and gel–fat interfaces
-  Limited transmission at gel–bone interface (due to high impedance mismatch)
-  Very poor transmission at air–skin interface without gel

#### 7. ALTERNATIVES TO GEL (Use with Caution)

 Acceptable in emergencies/ resource-limited settings:

- ◆ Aloe vera gel – natural, water-rich, may trap air
- ◆ KY jelly – acoustically suitable, expensive
- ◆ Glycerin + water – simple, dries fast
- ◆ Cornstarch + water – emergency-only, non-sterile
- ◆ Lignocaine ointment – sterile, smooth, viscous
- ◆ Betadine – sterile antiseptic, poor acoustic quality

 Never use non-sterile agents for invasive or sterile procedures

#### FINAL TAKEAWAY

 Ultrasound gel is not just a lubricant - it's a critical scientific tool. It:

-  Eliminates air gaps
-  Matches acoustic impedance and velocity
-  Reduces signal loss through reflection and attenuation

- ✓ Preserves the quality and accuracy of imaging
- Without gel, your ultrasound machine sees nothing but NOISE.

## Ultrasound Gel as a Coupling Medium

### Alternatives to Ultrasound Gel

Alternative	Pros	Scientific Limitations
➤ Aloe Vera Gel	Biocompatible, water-rich	May contain air bubbles; variable viscosity
➤ KY Jelly	Water-based; impedance-compatible	Expensive; not optimized for acoustic performance
➤ Glycerin + Water	Similar velocity and impedance	Dries quickly; lacks preservatives
➤ Cornstarch + Water	Useful in emergencies	Non-sterile, inconsistent quality
➤ Oil-based Lubricants	Occasionally used	High attenuation, difficult to clean, poor coupling
➤ Lignocaine Sterile Ointment	Sterile, smooth texture, readily available	High viscosity; variable acoustic impedance; costly
➤ Betadine (Povidone-Iodine)	Antiseptic, available in sterile form	Suboptimal acoustic properties; may stain equipment

### Composition of Ultrasound Gel

Component	Scientific Role
◇ Water (80-90%)	• Main medium for sound propagation
◇ Glycerin / Propylene Glycol	• Retains moisture and provides smooth consistency
◇ Carbomer / Cellulose	• Provides gel viscosity and structural stability
◇ Triethanolamine (TEA)	• Adjusts pH and maintains gel consistency
◇ Preservatives	• Prevents microbial contamination

### Acoustic Interfaces

Interface	Impedance Mismatch	Reflection Coefficient	Transmission Efficiency
◇ Air-Skin	Very High	~99.9%	Very Poor
◇ Gel-Skin	Minimal	~0.12%	Excellent
◇ Gel-Fat	Minimal	~0.15-0.3%	Excellent
◇ Gel-Bone	High	~40-70%	Poor

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May 6, 2025 · 2 tweets · [KartikBSonawane/status/1919660399701721565](https://twitter.com/KartikBSonawane/status/1919660399701721565)

🦷 From Skin to Capsule: Smart Blocks for Every Hip Cut!"

#THR #RegionalAnesthesia #PENGblock #FICB #QLblock #TAPblock #LFCNblock  
#SmartAnalgesia #PostOpPain #OrthoAnesthesia  
#TipoftheDay  
#MyRATips

Tip of the Day:

The key to Post-op analgesia after Total Hip Replacement?

Block what matters—based on Surgical approach & Innervation.

#### ▶ Anterior Approach

- ◆ Joint Capsule (Anterior)
  - Use PENG block (targets FN, ON, AON)
- ◆ Skin – Upper Incision
  - Subcostal (T12), Iliohypogastric (L1)
  - Add TAP (subcostal/lateral) or QL block (Type 1/2)
- ◆ Skin – Mid/Lower Incision
  - IIN, GFN, LFCN → Block with FICB, TFP, or LFCN block

#### ▶ Anterolateral Approach

- ◆ Joint Capsule (Anterior & Lateral)
  - Covered well by PENG block
- ◆ Skin
  - Mostly LFCN, ± IIN/GFN
  - Use FICB or LFCN block
  - If upper extension → add TAP/QL

#### ▶ Posterolateral Approach

- ◆ Joint Capsule (Posterior)
  - Minimally nociceptive → No sciatic block needed
  - Use PENG for anterior capsule

- ◆ Skin – Upper Incision
- T12, L1 (Subcostal, IHG) → TAP/QL block
- ◆ Skin – Lower Incision
- LFCN → Use LFCN block or high-volume FICB

▶ Local Anesthetic Strategy

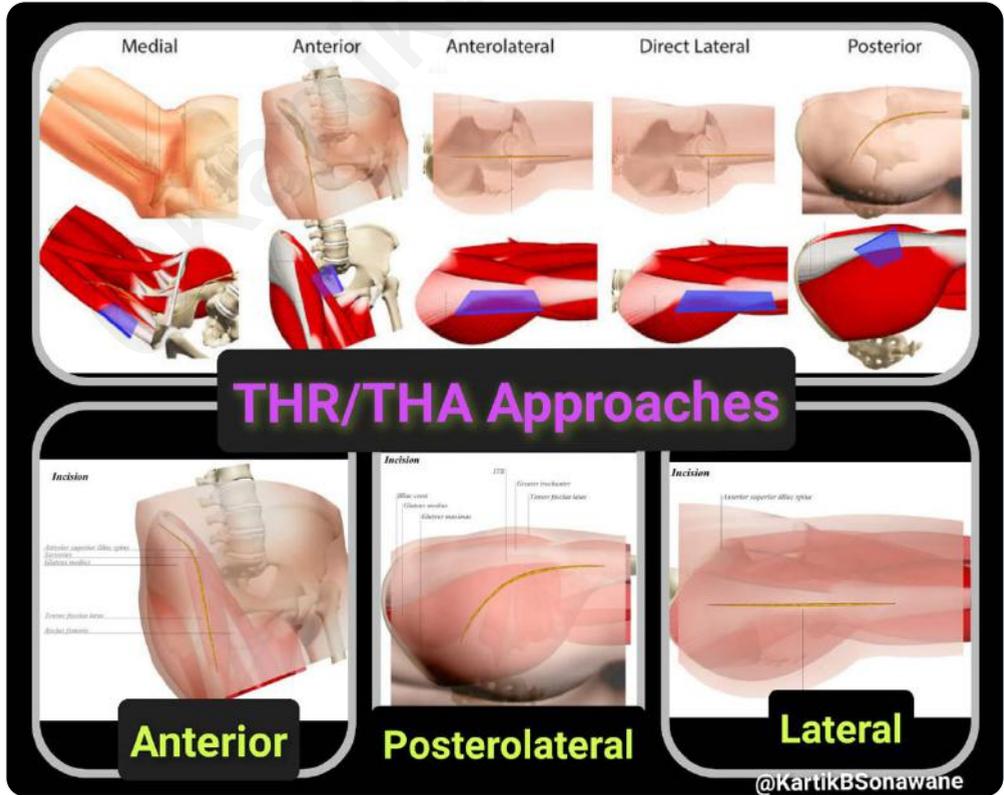
🖋️ Type:  
Ropivacaine 0.2–0.25%, Bupivacaine 0.125–0.25%

- 📏 Volumes:
- PENG: 20 mL
  - FICB: 30–40 mL
  - TAP/QL: 20–30 mL
  - LFCN: 5–10 mL

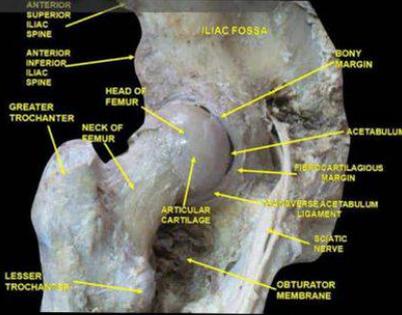
My go-to hierarchy for THR analgesia:

QLB > FICB > PENG + LFCN

"Block smart.  
Incision-specific.  
Capsule-aware.  
Approach-adapted."



# Hip Joint



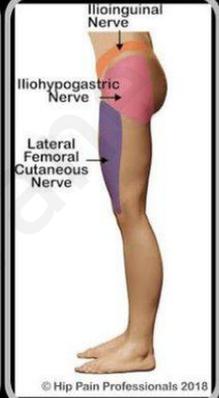
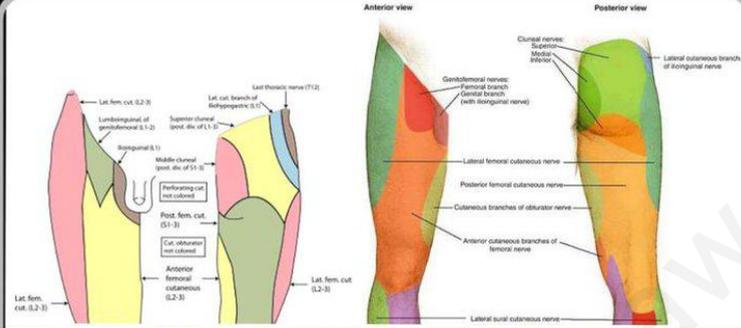
## Mechanoreceptors



## Nociceptors

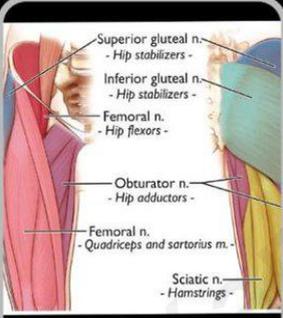


© Hip Pain Professionals 2018

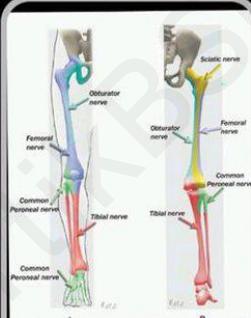


© Hip Pain Professionals 2018

# Dermatomes



## Myotomes



## Osteotomes

## Capsular innervation



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96	97	98	99	100



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Jun 3, 2025 · 2 tweets · [KartikBSonawane/status/1929928169605435737](https://x.com/KartikBSonawane/status/1929928169605435737)

🔍 Sharpen the View: Mastering Needle Visibility in Ultrasound-Guided Blocks ✨🧠

#UltrasoundGuidedBlocks #NeedleVisibility #RegionalAnesthesia #UltrasoundTechniques  
#EchogenicNeedle #NeedleTracking #POCUS #UltrasoundEducation #AnesthesiaTips  
#MedTwitter #MedicalInfographics #BlockTechniques  
#TipOfTheDay #MyRATips

Tip of the Day:

⚖️ FRCS vs PHART Framework

◆ FRCS – Image Optimization for Diagnostics (POCUS & Scanning): Designed to maximize visualization of internal structures, ideal for initial assessment and diagnosis.

↻ Fanning: Pivoting the probe in an arc to visualize the full extent of a structure (e.g., a vessel or nerve).

🔄 Rotation: Clockwise or counterclockwise turn of the probe to align anatomical landmarks with the beam.

👉 Rocking (Heel-Toe Maneuver): Tilting one end of the probe to center the beam over curved surfaces like vessels.

📦 Compression: Gentle downward pressure to collapse veins, remove air, and enhance contact.

➡ Sliding: Shifting the probe linearly across the skin to trace a nerve or vessel.

✓ Sweeping: Wide arc movement to explore deeper or adjacent areas.

🧠 Uses: Pre-block scanning to identify structures, confirm sonoanatomy, and assess for anatomical variants.

Click this link to know it better:

<https://x.com/NephroP/status/1789645901180334185?t=BnZH6ErpLdStUtpxLn8VTg&s=19>

◆ PHART – Needle Optimization for Intervention (RA & Procedures): Designed to align the needle with the ultrasound beam and improve needle tip visibility during insertion.

👉 Pressure: Applying/modulating pressure to flatten tissue planes or highlight fascial layers.

👉 Heeling: Lifting one end of the probe to steer the ultrasound beam and align it with the needle shaft.

🔄 Alignment: Realigning the probe's center to follow the trajectory of the advancing needle.

↻ Rotation: Minor probe twists to correct obliquity or gain a clearer needle view.

👉 Tilt: Subtle angling to enhance reflection from the needle, especially when it's not ideally

echogenic.

🧠 Uses: During needle insertion for peripheral nerve blocks, particularly useful in steep or oblique approaches.

## 🔧 TECHNIQUES to Enhance Needle Visibility

### 1. Needle Approach Optimization 📌

✅ In-Plane Approach: Needle is aligned parallel to the probe; full shaft and tip are visible.

❌ Out-of-Plane Approach: Only a cross-section of the needle is visible; tip identification is more challenging.

⚙️ Oblique Approach: A hybrid technique to improve visualization when conventional methods fail.

### 2. Optimize Needle Angle 📐

✅ Shallow Angle (30–45°): Ideal for reflecting sound back to the probe. Better echogenicity.

⚠️ Steep Angle (>60°): Ultrasound waves reflect away from the probe; needle becomes nearly invisible.

### 3. Hydrodissection 💧

◆ Injecting small volumes of saline/LA between tissue layers creates a visible separation and guides needle advancement.

◆ Particularly useful in fascial plane blocks (e.g., TAP, QL, ESP).

### 4. Tissue Movement Cues 👁️

◆ Even when the needle is not directly seen, watch for tissue movement caused by needle tip advancement.

◆ Subtle lifting or shifting of layers indicates needle location and spread.

## 🔧 GADGETS & Advanced TECHNOLOGIES

### 1. Echogenic Needles ✨

◆ Feature dimples, coatings, or laser etching that enhance ultrasound wave reflection.

◆ Essential when working at steep angles or deep planes.

### 2. Needle Guides 📏

◆ Clip-on accessories that maintain a fixed angle between the probe and the needle.

◆ Particularly useful for novices or in deep block placements (e.g., lumbar plexus, paravertebral).

### 3. Beam Steering (Electronic Focusing) 🔄

◆ Alters the ultrasound beam angle without moving the probe, enhancing needle-beam alignment.

◆ Excellent for in-plane blocks at steep angles.

#### 4. Compound Imaging (Spatial Compounding) 📺

- ◆ Uses multiple angles to generate a composite image, reducing speckle and improving clarity.
- ◆ Enhances visualization in noisy or artifact-prone zones.

#### 5. Needle Tracking Systems 📶

- ◆ GPS-like technology using sensors in the needle or probe.
- ◆ Provides real-time on-screen guidance.
- ◆ Examples: eZono eZGuide, Philips Needle Navigation, BK Medical Smart Needle.

#### ✅ PRACTICAL TIPS:

👤 Pre-scan first: Locate nerve, muscle, and vessels; plan the needle path before puncturing.

🔄 Combine PHART & FRCS: Use FRCS for target clarity and PHART for perfecting needle visibility.

🕒 Move the needle slightly: Subtle jiggling or tapping can help track needle location when visibility is poor.

⚙️ Adjust depth, gain, and focus on your machine to match needle location.

👉 Use echogenic needles for deeper, angled, or fascial blocks.

🔄 Don't hesitate to re-angle or re-insert if the needle is off-plane.

💡 Practice on phantoms or simulators to master probe maneuvers and beam alignment.

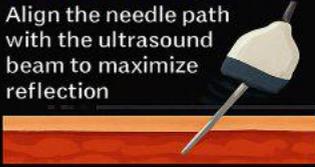


# Better Needle Visibility

## TECHNIQUES

### Needle Path Alignment

Align the needle path with the ultrasound beam to maximize reflection



### In-Plane Approach

Insert the needle in-plane to visualize the entire needle shaft to tip



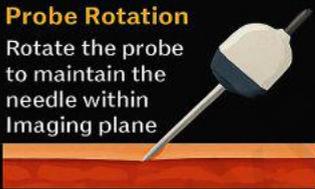
### Needle Angle Optimization

Adjust the needle angle to approximately 45° to the ultrasound beam



### Probe Rotation

Rotate the probe to maintain the needle within Imaging plane



## GADGETS

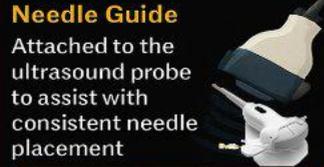
### Echogenic Needle

Utilizes textured or coated surfaces to enhance ultrasound reflection



### Needle Guide

Attached to the ultrasound probe to assist with consistent needle placement



### Beam Steering

Shifts the ultrasound beam direction to better illuminate the needle



### Needle Tracking

Employs sensors to track the needle position relative to the probe in real time



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# Ultrasound Probe Movements

## FRCS



### FANNING

Pivoting the probe side-to-side



### ROTATION

Spinning the probe on its axis



### ROCKING

Tilting the probe in a heel-to-toe motion



### COMPRESSION

Exerting downward pressure with the probe



### SLIDING

Moving the probe along the skin

**For Diagnostic purpose (POCUS)**

## PHART



### PRESSURE

Applying force to flatten tissue planes



### HEELING

Lifting the far end of probe



### ALIGNMENT

Centering the probe beam over the needle



### ROTATION

Adjusting the probe to improve needle visualization



### TILT

Angling the probe beam slightly

**For Needling Enhancement (RA)**

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May 5, 2025 · 2 tweets · [KartikBSonawane/status/1919273643269628246](https://twitter.com/KartikBSonawane/status/1919273643269628246)

"Bladder on Hold: The Hidden Risk of Sacral Plexus Blocks"

#RegionalAnesthesia #SacralPlexusBlock #UrinaryRetention #AnesthesiaTips #NerveBlocks  
#TipoftheDay  
#MyRATips

Tip of the Day:

Yes—urinary retention can occur, with Sacral Plexus Block

Let's see How?

🧠 Nerve Roots Involved:

S2–S4 from the sacral plexus control bladder contraction.

⚡ Mechanism:

Blocking S2–S4 disrupts parasympathetic output, leading to:

- ↓ Detrusor contraction
- ↑ Risk of bladder atony and retention

➡ Unilateral Block:

Lower risk—but not always risk-free.

Even a unilateral block can cross over via:

- Large LA volume
- Deep pelvic fascial spread
- Patient positioning (supine/lateral)

⚠ Unintended Bilateral Spread:

- High LA volumes (>20 mL)
- Combined lumbar-sacral blocks
- Bilateral approaches
- Continuous techniques
- Pre-existing bladder dysfunction

♻ Bilateral Block:

Greater chance of bladder dysfunction.

Now the risk amplifies:

- Both pelvic splanchnic supplies are inhibited
- Voiding becomes challenging or impossible
- Especially concerning in elderly or patients with LUTS

▲ Risk Amplifiers:

High LA volume, lumbar-sciatic combo, pre-existing bladder issues.

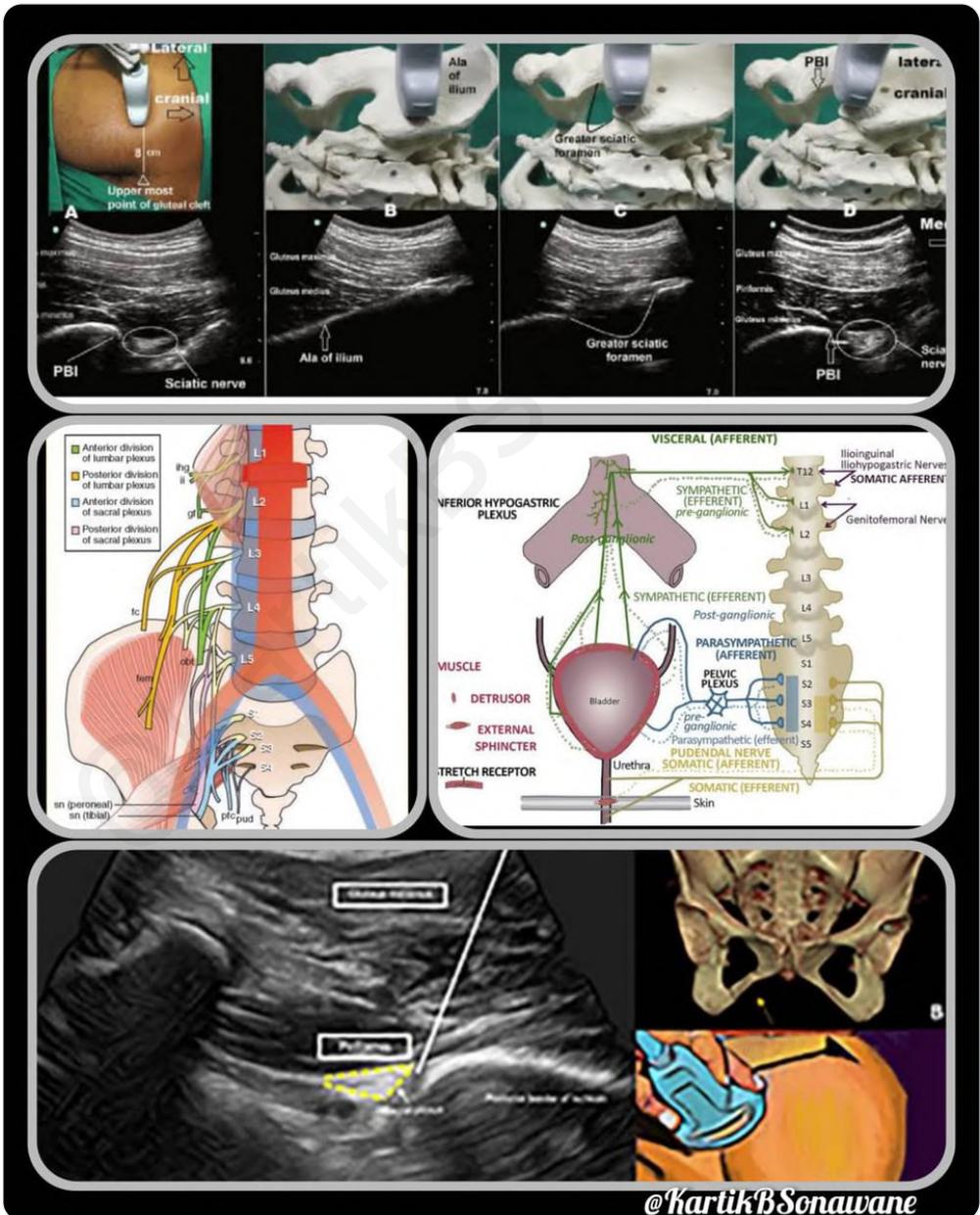
👉 Clinical Tip:

- Monitor post-op voiding in all sacral blocks
- Consider bladder scanning if retention suspected
- Warn patients about temporary urinary difficulties—especially with dense or bilateral effects

Bottom line:

Even "motor-sparing" regional blocks can cause autonomic side effects.

Understanding anatomy + spread = smarter, safer anesthesia.



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@threadreaderapp unroll

The image shows a grid of 20 rows and 5 columns of small, colorful buttons. Each button contains text that is too small to read. The buttons are arranged in a regular grid pattern. The colors of the buttons vary, including shades of red, blue, green, yellow, and purple. The grid is centered on the page.

@KartikBS @swane



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Apr 28, 2025 · 2 tweets · [KartikBSonawane/status/1916840648025518473](https://twitter.com/KartikBSonawane/status/1916840648025518473)

"From Membranes to Ligaments: Cracking the Thoracic Anatomy Code for Blocks"

#TipOfTheDay #RegionalAnesthesia #AnatomyMatters  
 #UltrasoundGuidedBlocks #AnatomyInsights #PainManagement #MedEd  
 #RegionalAnesthesia #PVB

Tip of the Day:

🛡️ The Superior Costotransverse Ligament (SCTL) is more than just a ligament – it is a continuation of the Posterior Intercostal Membrane (PIM).

Together, they form a protective fascial roof over the thoracic paravertebral space, critically influencing the spread of local anesthetic during blocks like the Paravertebral Block (PVB).

🧠 In contrast, the Lateral Costotransverse Ligament (LCTL) is purely a bone-to-bone stabilizer, anchoring the tip of the transverse process to the rib tubercle – without any fascial continuation from the intercostal membranes.

💡 Clinical Pearl:

During PVB, successful access to the paravertebral space often requires the needle to pass through or beneath the SCTL/PIM plane.

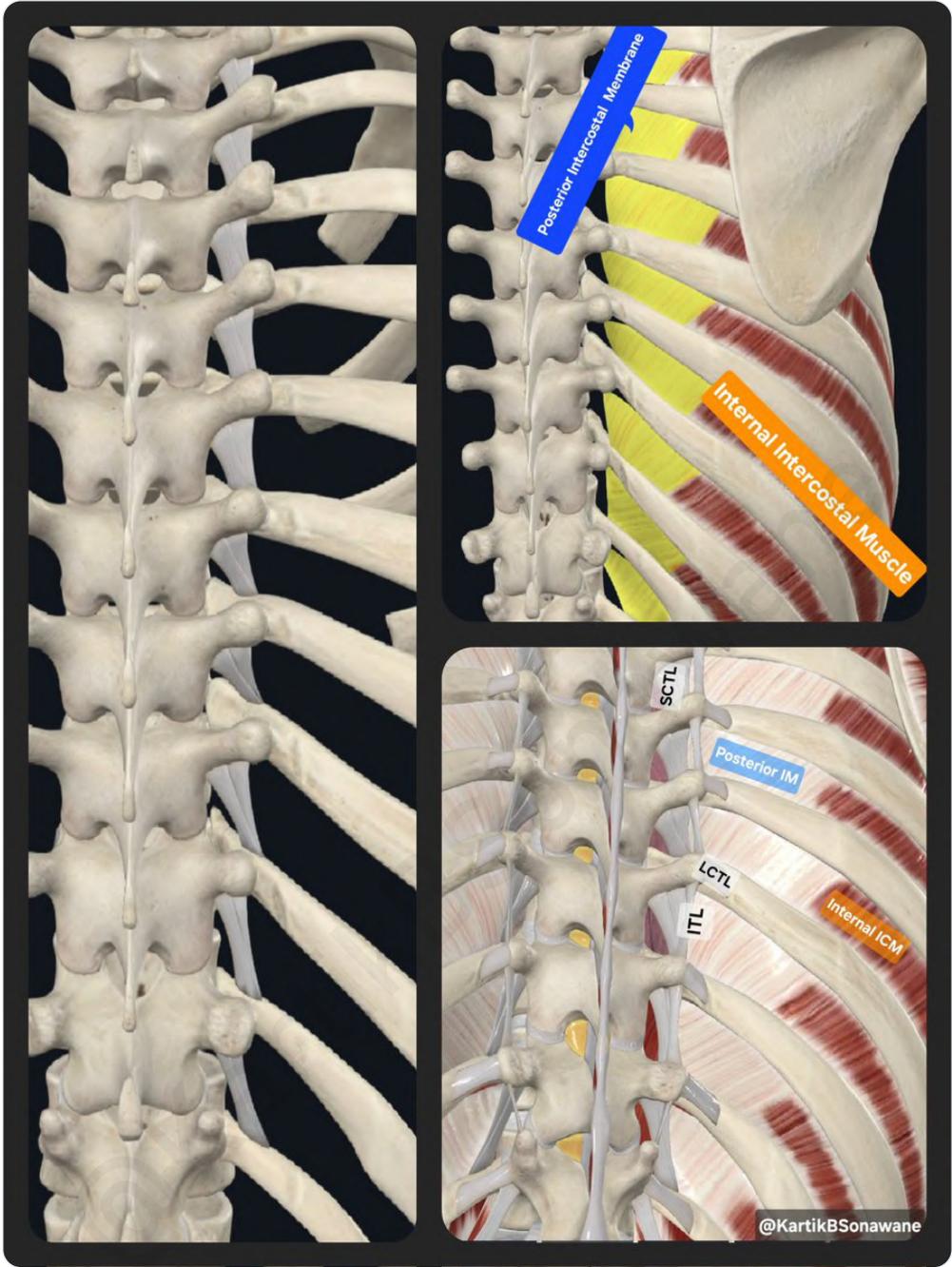
The LCTL, while important for rib stability, does not directly affect needle path or anesthetic spread.

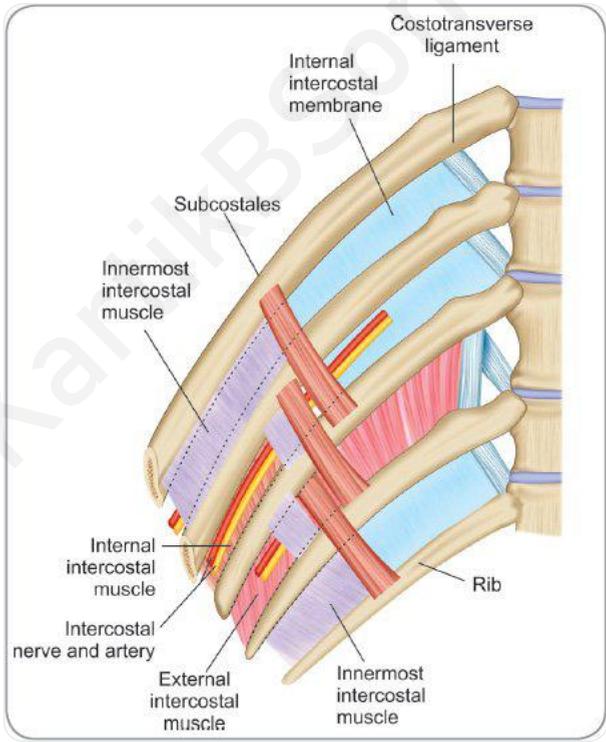
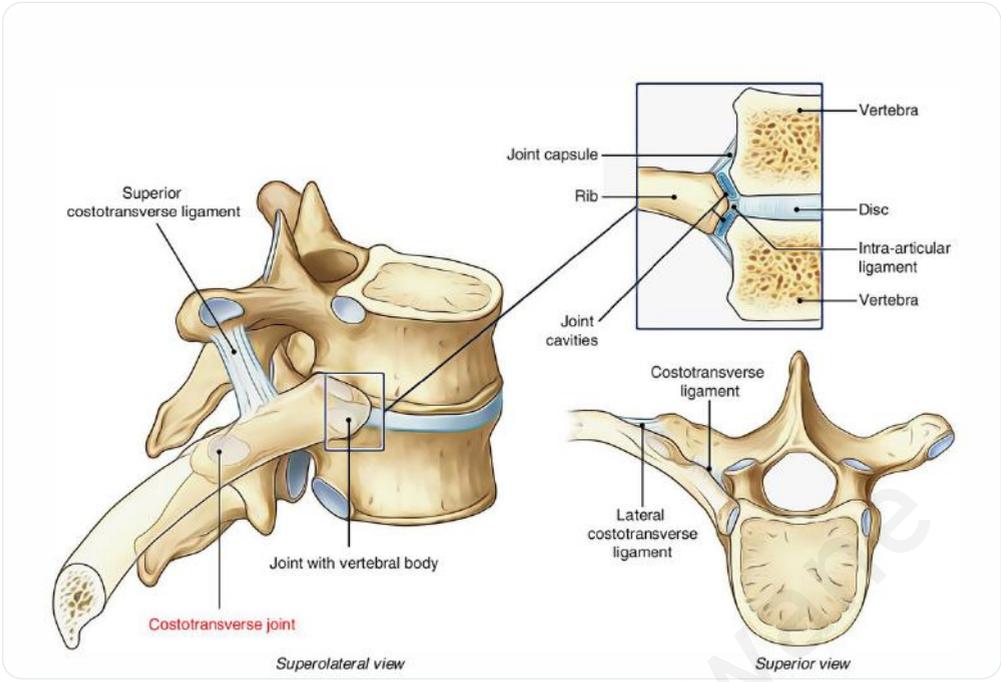
Why it matters:

Appreciating these small but critical transitions – from membranes to ligaments – allows for sharper targeting, improved block reliability, and safer clinical practice.

🌟 Bonus Tip:

The Intertransverse Ligaments – connecting transverse processes – aren't pierced directly during PVB either, but their fenestrations can allow anesthetic seepage during plane blocks like ESPB!





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May 2, 2025 · 3 tweets · [KartikBSonawane/status/1918174822884098071](https://twitter.com/KartikBSonawane/status/1918174822884098071)

🌟 "When Serotonin Strikes: Know the Syndrome Before It Spreads!"

A deadly yet preventable drug interaction—don't miss it!

#SerotoninSyndrome #RegionalAnesthesia #AnesthesiaTips #DrugInteractions #ICU  
#PharmaSafety #TipOfTheDay #MedTwitter #MyRATips

Tip of the Day:

🔬 What is Serotonin Syndrome?

A toxic storm of excessive serotonin 🔄 in the CNS—can escalate rapidly if missed.

🧠 Mechanism:

↑ Serotonin → overstimulation of 5-HT1A & 5-HT2A receptors → neuro, autonomic, & cognitive chaos

⚠️ High-Risk Drug Combos:

- 🚫 Linezolid + Tramadol
- 🚫 SSRI/SNRI + MAOI
- 🚫 Fentanyl or Methadone + Antidepressants
- 🚫 Lithium + SNRI
- 🚫 Dextromethorphan + SSRIs

🌟 Symptoms to Catch Early:

🌀 Agitation, confusion

- 🔥 Hyperthermia, hypertension, tachycardia
- 🦋 Tremor, clonus, hyperreflexia (esp. in lower limbs)
- 😓 Sweating, restlessness
- 🕒 Rapid onset (within hours), fast progression
- 👁️ Lower limb clonus = a red flag!

💧 Management Pearls:

- 🛑 Stop all serotonergic drugs
- 💤 Sedate with benzodiazepines
- ❄️ Cooling for hyperthermia
- 💊 Cyproheptadine = serotonin antidote

ICU care if severe

Regional Anesthesia (RA) Advantage

- ✓ Opioid-sparing: Reduces risk in serotonergic patients
- ✓ Avoids systemic sedatives

⚠️ But beware:

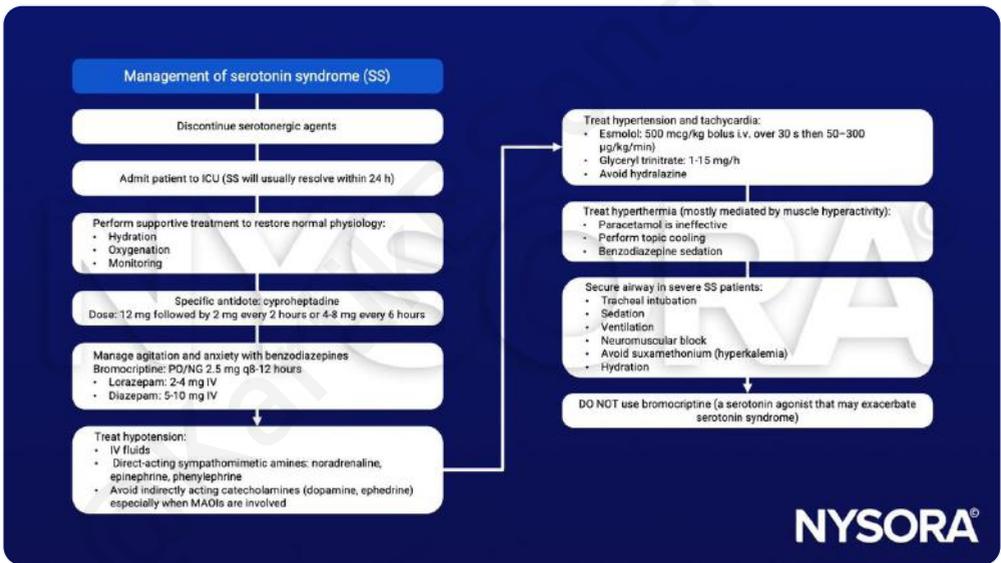
Intra-op use of Linezolid + Tramadol is risky—even in RA cases

Post-op agitation or tremor ≠ shivering → think serotonin!

Use non-serotonergic multimodal analgesia: Paracetamol, NSAIDs, ketamine (low dose)

Bottom Line:

- 🧠 Think serotonin syndrome in confused, twitchy, sweaty post-op patients
- 💊 Always review med history before giving linezolid or tramadol
- 📌 Use RA wisely—it could be life-saving

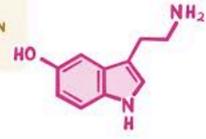


**BACKGROUND**

\* **LIFE-THREATENING TOXICITY** caused by **EXCESS SEROTONIN**  
 ~ "SEROTONIN TOXICITY" or "SEROTONIN TOXIDROME"

**CAUSES**

- \* **ANTIDEPRESSANT MEDICATION**
  - ~ SSRIs & SNRIs
  - ~ TCAs
  - ~ MAOis
- \* **OPIOIDS**
  - ~ TRAMADOL
- \* **OTHER MEDICATIONS**
  - ~ ONDANSETRON
  - ~ CIPROFLOXACIN
  - ~ SUMATRIPTAN
- \* **ILLICIT DRUGS & DIETARY SUPPLEMENTS**



**DIAGNOSIS**

- \* **PRESENTATION**
- \* **EXCLUDING OTHER POSSIBLE CAUSES**
- \* **HUNTER SEROTONIN TOXICITY CRITERIA (HSTC):**
  - ~ 1. MUST TAKE SEROTONERGIC MEDICATION
  - ~ 2. SPONTANEOUS CLONUS
- \* **RULE OUT NEUROLEPTIC MALIGNANT SYNDROME (NMS)**



**SIGNS & SYMPTOMS**

**3 A's:**

- \* **ALTERED MENTAL STATE**
  - ~ AGITATION, RESTLESSNESS, or ANXIETY
- \* **NEUROMUSCULAR ABNORMALITIES**
  - ~ OCULAR CLONUS, HYPERREFLEXIA, TREMORS, RIGIDITY of MUSCLES
- \* **AUTONOMIC HYPERACTIVITY**
  - ~ TACHYCARDIA, HYPERTENSION, DIAPHORESIS, MYDRIASIS, FLUSHED SKIN, ARRHYTHMIAS, VOMITING, or DIARRHEA

**MILD:**

- \* TREMORS, SWEATING, TACHYCARDIA, HYPERTENSION, & NAUSEA

**SEVERE:**

- \* FEVER, HYPERACTIVE BOWEL SOUNDS, CLONUS, AGITATION, HYPERTHERMIA, & DELIRIUM
- \* AS CONDITION WORSENS, RHABDOMYOLYSIS, MYOGLOBINURIA, RESPIRATORY & KIDNEY FAILURE





**TREATMENT**

- \* **DISCONTINUE SEROTONERGIC MEDICATION**
- \* **SUPPORTIVE CARE**
- \* **OFTEN RESOLVES** within **24 HOURS** of CESSATION
- \* **RARELY, INTUBATION & VENTILATORY SUPPORT**
- \* **SUPPORTIVE MEASURES INSUFFICIENT**
  - ~ SEROTONIN ANTAGONISTS to REVERSE EFFECTS



**OSMOSIS**  
From **ELSEVIER**

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Apr 25, 2025 · 2 tweets · [KartikBSonawane/status/1915801510447120730](https://x.com/KartikBSonawane/status/1915801510447120730)

"🎯🔑 Cracking the QL Code: Cross-Sectional Secrets Unlocked! 🧠🔥"

#RegionalAnesthesia #UltrasoundTips #AnatomyInsights #QLBlock #PainManagement  
#TipOfTheDay #MyRATips

🧠 Tip of the Day:

✅ Cross-sectional Anatomy (T12-L1): Essential for accurate QL blocks!

◆ At T12 Level:

👁️ Prominent muscle: Diaphragm

🚫 QL & Psoas muscles minimally visible or absent

📍 Subcostal nerve (T12) courses anterior to QL muscle

◆ At Lumbar Level (L1 onwards):

👁️ Prominent muscles: Quadratus Lumborum & Psoas Major

🌀 Lumbar plexus forms within the Psoas Major Muscle

➡️ Plexus nerves exit laterally, crossing anteriorly over QL muscle

🚫 Lumbar nerves do not enter TAP plane (already occupied by TAP plexus—thoracoabdominal nerves)

🔥 Only Iliohypogastric & Ilioinguinal nerves briefly enter TAP plane at ASIS level before becoming cutaneous

🎓 Clinical Pearl:

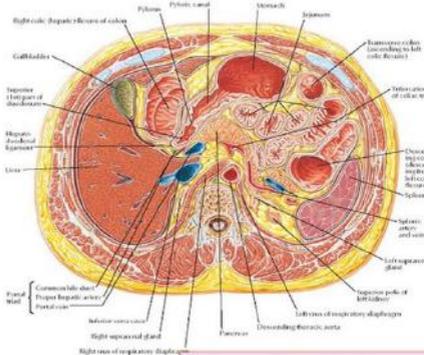
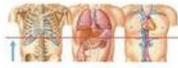
📖 Precise neural pathway knowledge is vital—many textbooks inaccurately depict these anatomical routes. Correct understanding is crucial for mastering QL block mechanics and ensuring successful nerve blocks!

For more details, read the following article:

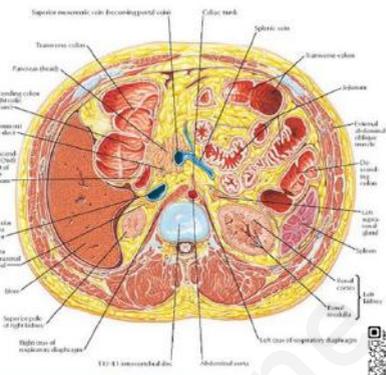
<https://x.com/KartikBSonawane/status/1850588172700532772>

# Cross-Section at T12 and T12-L1 Level

T12

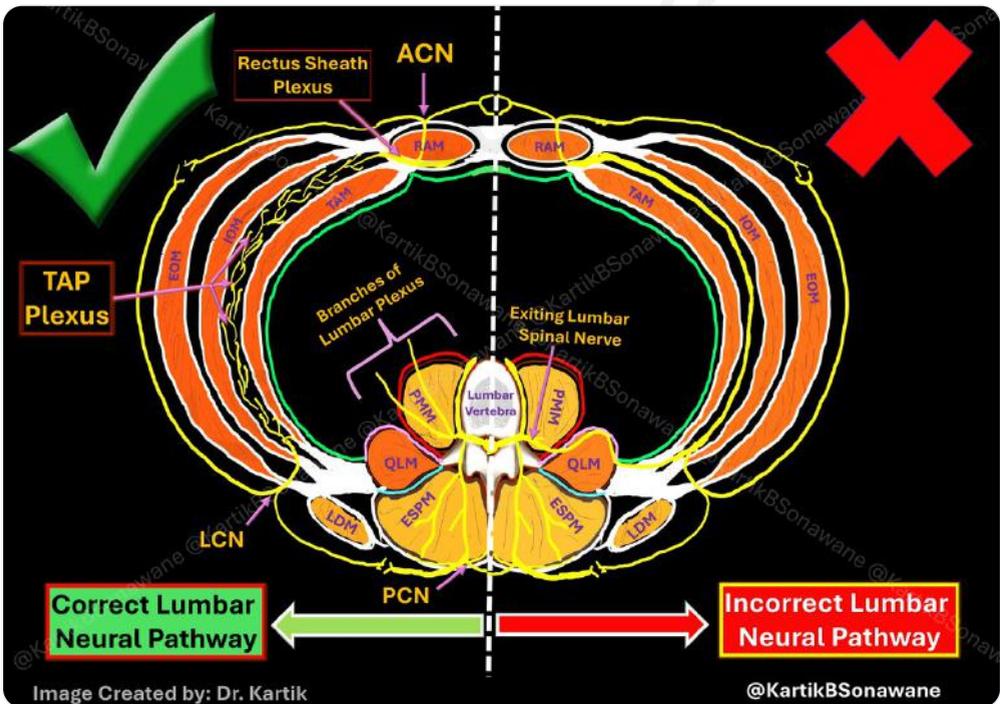


T12-L1



**No QL Muscle at this level**

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May 30, 2025 · 2 tweets · [KartikBSonawane/status/1928422895203872823](https://twitter.com/KartikBSonawane/status/1928422895203872823)

🧠 "Opioids in Pain Management: A Double-Edged Sword" ✂️

#Opioids #CancerRisk #OpioidAwareness #TumorGrowth #PainManagement  
 #OpioidCaution #RegionalAnaesthesia #OpioidFreeEra #CancerCare #AnesthesiaMatters  
 #BeyondPainRelief #TipOfTheDay #MyRATips

Tip of the Day:

🔍 OPIOIDS: NOT A CURE, JUST A COVER

- ◆ Opioids are powerful analgesics - Not anti-inflammatory agents.
- ✗ Only alter the PAIN PERCEPTION - Do not treat the underlying cause.
- 🎯 Centrally and peripherally acting - Primarily influence the brain and spinal cord.

🧬 MECHANISM OF ACTION

🔒 Opioids bind to G-protein-coupled receptors: Mu ( $\mu$ ), Kappa ( $\kappa$ ), and Delta ( $\delta$ ).

⚙️ Mechanisms:

- ◆  $\downarrow$  cAMP via adenylyl cyclase inhibition
- ◆  $\uparrow$  K<sup>+</sup> efflux  $\rightarrow$  neuron hyperpolarization
- ◆  $\downarrow$  Ca<sup>2+</sup> influx  $\rightarrow$  reduced neurotransmitter release
- ◆ Result:  $\downarrow$  Excitability of nociceptive pathways  $\rightarrow$  Pain suppression

🎯 Mu receptor effects: analgesia, sedation, euphoria, respiratory depression, and dependence.

💊 TYPES OF OPIOIDS

✅ Natural: Morphine, Codeine

👉 Semi-Synthetic: Oxycodone, Buprenorphine, Hydromorphone

🧬 Synthetic: Fentanyl, Tramadol, Methadone

🧠 Endogenous: Endorphins, Enkephalins

📍 Routes: Oral, IV, Transdermal patches, Sublingual, Buccal

📌 INDICATIONS

- ◆ Acute pain: Trauma, surgery, myocardial infarction 🏥
- ◆ Chronic pain: Primarily for cancer pain or palliative care, with great caution in non-cancer patients ⚠️

 Procedural sedation and anesthesia (e.g., fentanyl, remifentanyl)

## ✗ NOT AN ANTI-INFLAMMATORY

 Unlike NSAIDs or steroids, opioids do not inhibit prostaglandins or cytokines.

 They do not reverse the inflammation but simply mask pain perception.

 Using opioids in conditions with an inflammatory basis may delay definitive treatment.

## OPIOID-INDUCED COMPLICATIONS

 Tolerance: Escalating dose requirement over time

 Respiratory depression: Dose-dependent and life-threatening

 Constipation & Nausea: Common GI side effects

 Hyperalgesia: Increased sensitivity to pain despite opioids

 Cognitive dysfunction, sedation, hormonal changes, addiction

 No absolute ceiling for full agonists like morphine or fentanyl

## OPIOID & CANCERS: AN EMERGING CONCERN

 Tumor Promotion Risks:

 Immune suppression: Reduced natural killer (NK) cell function, T-cell inhibition

 Tumor growth stimulation via mu-receptor expression on cancer cells

 Enhanced angiogenesis: Upregulation of VEGF supports new blood vessel growth

 Tumor-friendly microenvironment: Shifted balance toward inflammation and immune evasion

 Clinical Evidence:

◆ Some retrospective studies suggest higher recurrence or metastasis with high opioid doses during cancer surgery.

◆ Regional techniques may reduce opioid needs and potentially improve oncological outcomes.

## DEPENDENCE & ADDICTION

 Dependence: Physiological adaptation → Withdrawal symptoms on discontinuation

 Addiction: Compulsive use despite harm

 Mechanisms:

◆ Dopamine surge in mesolimbic system (esp. nucleus accumbens)

◆ Neuroplastic changes in reward, learning, and executive control centers

◆ Endogenous opioid suppression → Reliance on external opioids

◆ Rebound excitation during withdrawal → Anxiety, pain, irritability

## OPIOID INDUCED HYPERALGESIA (OIH)

◆ A paradoxical condition where patients become more sensitive to pain with continued

opioid use.

- ◆ Clinical clue: Escalating pain despite increasing opioid doses.
- ◆ Reversed or minimized by opioid tapering and NMDA blockers (e.g., ketamine)

🔧 Mechanisms:

- ◆ NMDA receptor activation → Central sensitization
- ◆ Spinal dynorphin upregulation
- ◆ Descending facilitation from the brainstem
- ◆ Microglial activation and neuroinflammation

## 🛡️ OPIOID ANTAGONISTS

- 💉 Naloxone: Emergency reversal of overdose
- 💊 Naltrexone: Oral maintenance therapy for addiction
- 🚽 Methylnaltrexone: Treats opioid-induced constipation without affecting analgesia

## 🧠 OPIOID-SPARING/FREE STRATEGIES

- ✓ Reduce risk of addiction and systemic side effects
- ✓ Avoid respiratory depression and delayed recovery
- ✓ Prevent hyperalgesia and hormonal imbalances
- ✓ Enhance quality of recovery and functional outcomes

🔧 Strategies:

- 🔪 Multimodal analgesia (NSAIDs, acetaminophen, gabapentinoids)
- 🧪 Regional anesthesia (blocks, neuraxial techniques)
- 🧑 Non-pharmacological methods (CBT, physiotherapy, mindfulness)
- 📄 ERAS protocols for perioperative care

## ✅ SUMMARY

- 🧠 Opioids are potent but risky - Must be used with clinical vigilance.
- 🔍 Not anti-inflammatory - Do not address pain origin.
- 🧬 Complex interaction with immune and tumor biology.
- 🚫 Avoid unnecessary exposure - prefer opioid-sparing strategies for better safety & long-term outcomes.



# Opioids: Classification with Mechanisms

Category	Opioid	Routes of Administration	Typical Dose	Mechanisms of Action	Comments
Natural	Morphine	Oral, IV, SC, IM, Epidural	Oral: 10-30 mg q4h; IV: 2-5 mg q4h	Full Mu receptor agonist	Gold standard; histamine release
	Codeine	Oral	15-60 mg q4-6h	Prodrug converted to morphine; weak Mu agonist	Metabolism by CYP2D6 required
Semi-Synthetic	Oxycodone	Oral, IV	Oral: 5-15 mg q4-6h	Mu receptor agonist	High oral bioavailability
	Hydromorphone	Oral, IV, SC	Oral: 2-4 mg q4-6h; IV: 0.2-1 mg q2-3h	Mu receptor agonist	More potent than morphine
	Buprenorphine	SL, Transdermal, IV	SL: 0.2-0.4 mg q6-8h; Patch: 5-20 mcg/hr	Partial Mu agonist; Kappa antagonist	Ceiling effect; safer in renal impairment
	Heroin	IV	Not clinically used	Converted to morphine in CNS	Illegal in many countries
Synthetic	Fentanyl	IV, Transdermal patch, Buccal	IV: 25-100 mcg q1-2h; Patch: 25-100 mcg/hr q72h	Full Mu receptor agonist	Highly potent; minimal histamine release
	Remifentanyl	IV (infusion)	0.05-2 mcg/kg/min	Full Mu agonist; ultra-short acting	Metabolized by plasma esterases
	Meperidine	Oral, IV	2.5-10 mg q8-12h	Mu agonist + NMDA antagonist	Long half-life; useful in neuropathic pain
	Tramadol	Oral, IV	50-100 mg q4-6h (max 400 mg/day)	Weak Mu agonist + SNRI	Seizure risk; serotonin syndrome risk
	Tapentadol	Oral	50-100 mg q4-6h	Mu agonist + Norepinephrine reuptake inhibitor	Newer agent; fewer GI side effects
Endogenous	Endorphins	Endogenous	---	Bind primarily to Mu receptors	Natural pain modulators
	Enkephalins	Endogenous	---	Bind primarily to Delta receptors	Endogenous analgesic peptides
	Dynorphins	Endogenous	---	Bind primarily to Kappa receptors	Role in stress and dysphoria

### Receptor Mechanisms

Receptor	Effects	Location
❖ Mu (MOR)	Analgesia, euphoria, respiratory depression	Brainstem, thalamus, spinal cord
❖ Kappa (KOR)	Spinal analgesia, dysphoria	Hypothalamus, spinal cord
❖ Delta (DOR)	Mood modulation, analgesia	Limbic system, spinal cord

### Classification as per Receptor Activity

Full Agonists	Partial Agonists	Mixed Agonist/Antagonists	Antagonists
Morphine, Oxycodone, Fentanyl, Methadone	Buprenorphine	Nalbufragin, Pentazocine	Naloxone, Naltrexone

### Opioid Complications

Complication	Details
<input type="checkbox"/> Tolerance	• Need for escalating doses
<input type="checkbox"/> Respiratory Depression	• Dose-dependent, life-threatening
<input type="checkbox"/> Constipation	• Due to decreased GI motility
<input type="checkbox"/> Hyperalgesia	• Paradoxical increase in pain sensitivity
<input type="checkbox"/> Dependence & Addiction	• Withdrawal symptoms, compulsive use

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# Opioids & Cancer



## IMMUNOSUPPRESSION

↓ NK cell and  
T-cell activity



## MOR STIMULATION IN TUMORS

Proliferation,  
migration,  
reduced  
apoptosis



## ANGIOGENESIS AND TUMOR GROWTH

↑ VEGF expression  
tumor vascularization



## TUMOR MICROENVIRONMENT

Altered macrophage  
polarization,  
inflammation



**Opioids can fuel TUMOR growth and spread**

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# Opioids vs Local Anesthetics

Parameter	Opioids	Local Anesthetics (LAs)
<b>Mechanism of Action</b>	Bind to opioid receptors (Mu, Kappa, Delta) in CNS and PNS	Block voltage-gated sodium channels in nerve membranes
<b>Site of Action</b>	Central and peripheral nervous systems	Peripheral nerves at site of injection
<b>Analgesia</b>	Modulates pain perception (central)	Blocks pain signal transmission (peripheral)
<b>Anti-inflammatory</b>	No	Yes (modest)
<b>Effect on Consciousness</b>	May cause sedation, euphoria	No sedation (unless high systemic levels)
<b>Onset &amp; Duration</b>	Depends on agent and route (e.g., IV morphine onset 5–10 min)	Depends on agent and site (e.g., lidocaine onset 2–5 min)
<b>Use in Acute Pain</b>	Yes, commonly used	Yes, particularly effective in regional techniques
<b>Use in Chronic Pain</b>	With caution; risk of dependence	Used in nerve blocks, infusions, neurolytic blocks
<b>Complications</b>	Tolerance, respiratory depression, dependence, hyperalgesia	Neurotoxicity, cardiotoxicity, systemic toxicity (LAST)
<b>Systemic Toxicity</b>	Yes – CNS depression, respiratory failure	Yes – Local Anesthetic Systemic Toxicity (LAST)
<b>Antagonist Available</b>	Yes – Naloxone, Naltrexone	No specific antagonist; supportive management
<b>Reversibility</b>	Yes – with antagonists	Partially reversible by metabolism and redistribution

## Opioids



- Not anti-inflammatory
- Bind to opioid receptors (μ, κ, δ)
- Alter pain perception
- Acute and chronic pain
- Associations with cancer recurrence



### COMPLICATIONS

- Respiratory depression
- Dependence, tolerance

## LAs



- Not anti-inflammatory
- Block sodium channels
- Inhibit nerve impulse conduction
- Local and regional anesthesia
- No impact on cancer recurrence



### COMPLICATIONS

- Potential neurotoxicity
- Cardiac toxicity (at high doses)

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May 1, 2025 · 2 tweets · [KartikBSonawane/status/1917855418803708138](https://twitter.com/KartikBSonawane/status/1917855418803708138)

“Sciatic Nerve: The Great Pretender!”

#SciaticNerve #TheGreatPretender #VlokaSheath #CoCuSeptum #RegionalAnesthesia  
#UltrasoundGuidedBlocks #AnatomyDecoded  
#MyRATips  
#TipOftheDay

Tip of the Day:

It looks like one big nerve—but it’s actually a dual-nerve bundle hidden in a sheath.

#### → Two Nerves, One Sheath

The “sciatic nerve” is a paraneural compartment (Vloka’s sheath) containing Tibial Nerve (TN) and Common Peroneal Nerve (CPN).

#### → Split by Co–Cu Septum (Compton–Cruveilhier)

Inside the sheath, TN & CPN are separated by the Co–Cu septum—a fascial divider that keeps them anatomically distinct, enabling selective nerve blocks.

#### → No Common Epineurium

The sciatic nerve has no unified epineurium—each component nerve retains its own protective layers, allowing for targeted or sparing techniques.

#### → Innervation Above the Knee (No innervation by SCN)

TN: semimembranosus, semitendinosus, long head of biceps femoris, ischial part of adductor magnus

CPN: short head of biceps femoris.

#### → Articular Supply to Hip & Knee

Both TN & CPN give sensory branches to hip and knee joints, making sciatic blocks effective for posterior joint pain.

#### → Regional Anesthesia Insight

To block the sciatic nerve effectively, use subparaneural injection—inside Vloka’s sheath, but outside the nerves.

It may look intraneural, but when done right, it’s safe and essential.

Bottom Line:

The sciatic nerve is a fascial illusion—two nerves, one sheath, divided by a septum.

Understand the architecture. Respect the layers.

Block with precision.

# SCN Anatomy

**SCN as Paraneural Sheath**

**Blood Supply of SCN**

**TN & CPN separated since Beginning**

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The collage consists of several panels: 1. Top left: Intraoperative photo of the paraneural sheath, sciatic nerve, and tibial nerve. 2. Top right: Diagram of the femoral region showing the biceps femoris tendon, sciatic nerve, tendon of semitendinosus muscle, epineurial sheath, tibial nerve, and common peroneal nerve. 3. Middle left: Diagram of the gluteal region showing the superior and inferior gluteal arteries, perforating branches of the profunda femoris, adductor hiatus, and popliteal artery. 4. Middle center: Dissection of the femoral region with labels for MGM, PM, AASN, IGA, SN, a, b, c, CPN, and TN. 5. Middle right: Dissection of the femoral region with labels for GM and QF. 6. Bottom left: Dissection of the femoral region with labels for M, ST, SB, and BA. 7. Bottom center: Dissection of the femoral region with labels for G.max and G.min. 8. Bottom right: Dissection of the femoral region with labels 1, 2, 3, 4, and 5.

# SCN Components

**SCN Components**

Labels: Subscapular compartment, Fatty tissue, Parascapular sheath, Co-Cu septum, Biceps femoris/semitendinosus muscle complex, Epiaponeurosis, Parascapular sheath, Subparascapular compartment, Epineurium, Paraneurium, Nerve fascicle, Nerve fascicle, Intercellular connective tissue, Subparascapular compartment, Adductor magnus - vastus intermedius muscle complex.

Labels: PNS, CCS, EPAM, CPN, LA, SEC, SPC, PA.

## Co-Cu Septum Between TN-CPN

Labels: Sciatic nerve, Anterior femoral cutaneous nerve, Tibial nerve, Common peroneal nerve, Sural nerve.

Labels: Parasacral, Subgluteal, Anterior, Popliteal.

Labels: SmM, BFM, PV, PA, TN, CPN, Wjeka's sheath.

**OUT-OF-PLANE**

**NYSOGA**

Labels: Lateral, Proximal, Distal, Biceps femoris, Sciatic Nerve, Adipose, Semitendinosus & Semimembranosus.

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Apr 23, 2025 · 2 tweets · [KartikBSonawane/status/1914906628794573088](https://twitter.com/KartikBSonawane/status/1914906628794573088)

"Don't Be Fooled: Why ESP Block Isn't a Spine Surgery Soloist"

#ESPBlock #AnesthesiaTips #SpineSurgery #RegionalAnesthesia #PainManagement  
#PatientSafety #MinimallyInvasive  
#MyRATips

Tip of the day

The Erector Spinae Plane (ESP) Block may look like a magic trick—but here's why it's not your one-stop solution for spine surgeries:

- 🎯 Targets dorsal rami only consistently – covers skin & deep muscles
- 🚫 Misses anterior rami – which supply superficial/intermediate muscles & thoracolumbar fascia
- ⚠️ Medial branch spread? – too unpredictable to trust
- 🔥 Fascial pain generators – often go untouched
- 🔒 Airway security in prone – GA is a must for patient safety, isn't it?

So, when does ESPB shine?

- ✅ Great for minimally invasive procedures (e.g., vertebroplasty, endoscopic discectomy)
- ❌ Not enough for open or major spine surgeries

Use ESPB smartly—but don't fly solo when the stakes are high!

# Muscles of the BACK

Innervated by VR

## Superficial Group

Shoulder Movements

- Trapezius M.
- Latissimus Dorsi M.
- Levator Scapulae M.
- Rhomboids M.

## Intermediate Group

Thoracic Cage Movements

- Serratus Posterior Superior M.
- Serratus Posterior Inferior M.

## Thoracolumbar Fascia

Innervated by DR

## Deep Group

Superficial Layer

### Spino Transversales

- Splenius Capitis
- Splenius Cervicis

Intermediate Layer

### Erector Spinae Group

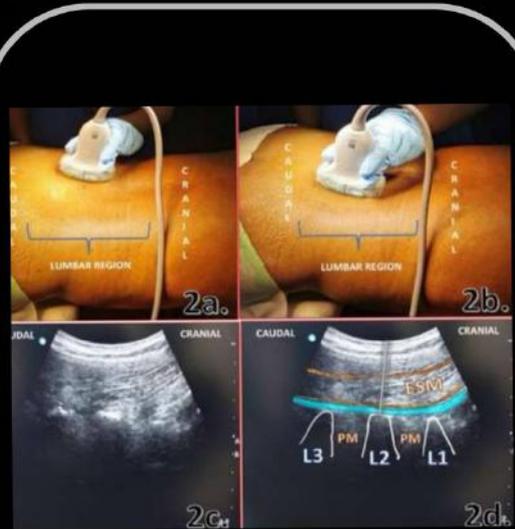
- Iliocostalis (Cervicis, Thoracis, Lumborum)
- Longissimus (Capitis, Cervicis, Thoracis)
- Spinalis (Capitis, Cervicis, Thoracis)

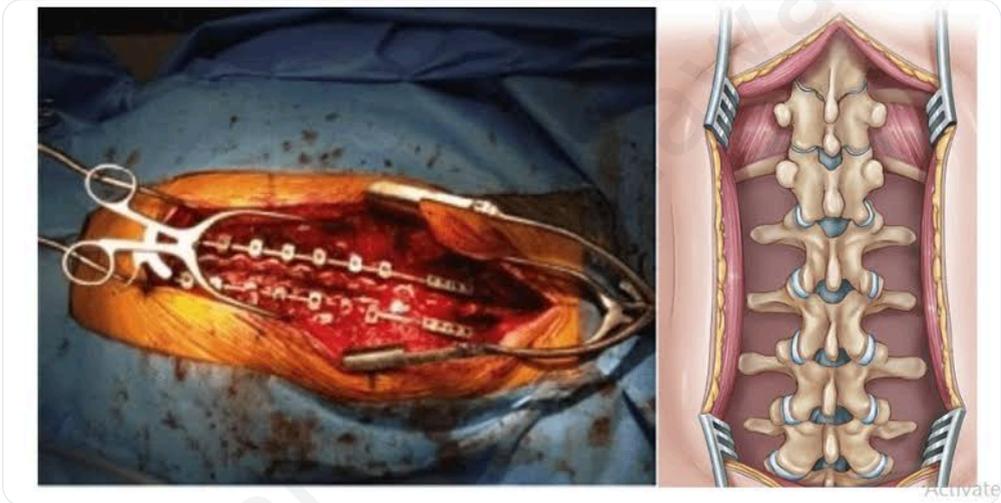
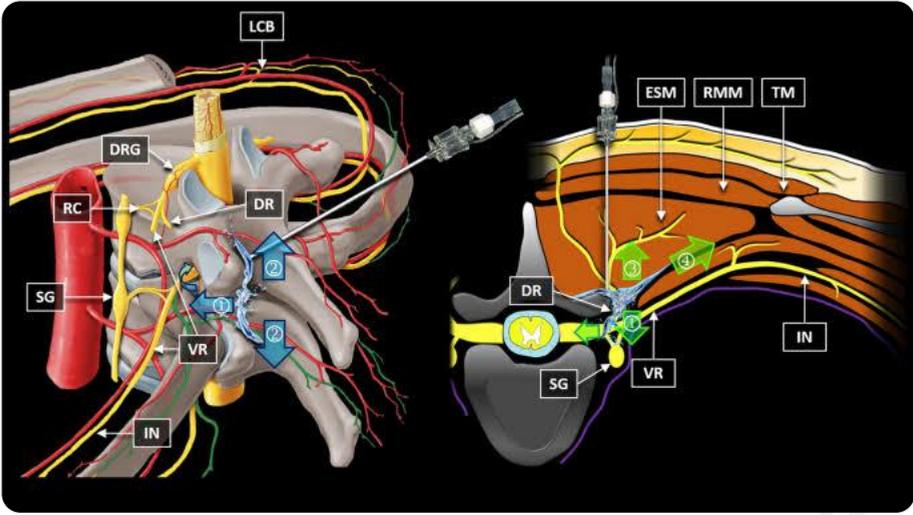
Deep Layer

### Transverso Spinalis

- Semispinalis (Capitis, Cervicis, Thoracis)
- Multifidus
- Rotatores

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May 29, 2025 · 3 tweets · [KartikBSonawane/status/1928043186649452682](https://twitter.com/KartikBSonawane/status/1928043186649452682)

🧠📌 “Blocking Bleeds with Precision: A Modern Guide to Anticoagulants in Regional Anesthesia (ASRA 2025)”

#ASRA2025 #RegionalAnesthesia #AnticoagulantSafety  
 #AnesthesiaGuidelines #PerioperativeMedicine #HemostasisMatters  
 #BlockSafeBlockSmart  
 #BleedingRisksInRA #TipOfTheDay #MyRATips

Tip of the Day:

- ◆ RA, especially neuraxial and deep plexus techniques, requires more than technical proficiency.
- ◆ It demands precise knowledge of anticoagulant pharmacology, hemostatic physiology, and individual risk assessment.
- ◆ The ASRA 2025 guidelines represent a pharmacokinetic-based, safety-first framework - not derived from clinical trials but from the mechanistic action, plasma half-life, and renal clearance of each agent.

🧠 How a Clot Forms, Stabilizes, and Matures?

✍️ 1. Platelet Adhesion

- ◆ Injury exposes subendothelial collagen and von Willebrand factor
- ◆ Platelets adhere via GPIb receptors on their surface

🔥 2. Platelet Activation & Aggregation

- ◆ Activation triggers release of ADP & thromboxane  $A_2$
- ◆ These recruit additional platelets
- ◆ Platelets aggregate via GPIIb/IIIa receptors, bridging with fibrinogen to form a plug

🧬 3. Coagulation Cascade (Secondary Hemostasis)

- ◆ Intrinsic and extrinsic pathways converge → thrombin is generated
- ◆ Thrombin converts fibrinogen → fibrin, forming a mesh
- ◆ Factor XIIIa cross-links fibrin for structural stability

🩸 4. Clot Retraction

- ◆ Platelets contract via actin-myosin, tightening the fibrin net
- ◆ This shrinks and stabilizes the clot, sealing the vessel

🧬 Intrinsic vs. Extrinsic Pathways: The Coagulation Cascade Demystified

🩸 Extrinsic Pathway

- ◆ Triggered by tissue injury
- ◆ Tissue Factor + Factor VIIa activates Factor X → Xa

### Intrinsic Pathway

- ◆ Initiated by contact with collagen
- ◆ Cascade: XII → XI → IX → IXa + VIIIa → X → Xa

### Common Pathway

- ◆ Xa + Va → converts Prothrombin → Thrombin (IIa)
- ◆ Thrombin → Fibrinogen → Fibrin
- ◆ XIIIa stabilizes fibrin clot

### Tests:

- ◆ PT/INR: extrinsic (warfarin)
- ◆ aPTT: intrinsic (heparins)

### Drug Actions:

- ◆ Heparins → inhibit IIa/Xa
- ◆ Warfarin → blocks synthesis of II, VII, IX, X
- ◆ DOACs → inhibit Xa or IIa

### Hemostasis in a Nutshell

- ◆ Primary Hemostasis: Platelet plug formation: Inhibited by - aspirin, clopidogrel, ticagrelor, GPIIb/IIIa blockers
- ◆ Secondary Hemostasis: Coagulation cascade → fibrin clot : Inhibited by - heparins, warfarin, DOACs, DTIs

### Anticoagulants by Action

- ✓ Antiplatelets (Aspirin, Clopidogrel, etc.): Inhibit platelet plug
- ✓ GPIIb/IIIa inhibitors: Block final step of aggregation
- ✓ Heparins (UFH, LMWH): Inhibit IIa/Xa
- ✓ Warfarin: ↓ Vitamin K-dependent factors
- ✓ DOACs: Direct Xa or IIa inhibition
- ✓ DTIs: Potent thrombin inhibition

### ASRA 2025 Guiding Principles

- ◆ Guidelines based on pharmacology - not clinical outcomes
  - ◆ Weigh bleeding vs. thrombosis risk individually
  - ◆ High-risk blocks (e.g., neuraxial) require utmost caution
- ◆ Drug timing by half-life:
  - ◆ Low-dose → Stop  $\geq 2 \times t_{1/2}$
  - ◆ High-dose → Stop  $\geq 5 \times t_{1/2}$

◆ Use lab monitoring when possible:

- ◆ Anti-Xa for LMWH/DOACs
- ◆ dTT or ECT for dabigatran
- ◆ INR for warfarin

🚨 Special Safety Warnings

⚠️ Dual Antiplatelets (e.g., aspirin + clopidogrel) → High bleeding risk; avoid neuraxial techniques unless paused

⚠️ NSAIDs → Safe alone, but risky when combined

⚠️ Renal Dysfunction → Prolongs drug clearance

⚠️ Resuming anticoagulation:

- ◆ Prophylactic: ≥6 hrs post-block
- ◆ Therapeutic: ≥24 hrs post-block

📌 ASRA Guidelines on Specific Agents

📌 Fondaparinux (Arixtra) – From Previous ASRA Guidelines

- ◆ Long  $t_{1/2}$  (~21 hrs), renal clearance
- ◆ Neuraxial blocks discouraged unless: Single atraumatic pass and No indwelling catheters
- ◆ First postop dose: ≥6 hrs after catheter removal

📌 Newer Agents

◆ Cangrelor – Rapid, reversible P2Y12 inhibitor (IV)

- ◆ Avoid RA for ≥3 hrs post-discontinuation
- ◆ Resume ≥8 hrs after catheter removal

◆ Andexanet Alfa – Xa reversal agent

- ◆ Reverses rivaroxaban/apixaban
- ◆ No direct neuraxial guidance; used in emergencies

◆ Idarucizumab – Dabigatran reversal antibody

- ◆ Allows safe urgent RA if dabigatran recently used

✅ Clinical Takeaways for Safer RA

🚫 Neuraxial hematoma = catastrophic

🕒 Use drug  $t_{1/2}$  to guide timing:

- ◆ Low dose =  $2 \times t_{1/2}$
- ◆ High dose =  $5 \times t_{1/2}$

🔍 Consider renal function, age, weight, polypharmacy

📌 If measurable: Ensure DOAC plasma level is <30 ng/mL

Always involve a multidisciplinary team for high-risk decisions

Follow A-G Anticoagulant Safety Checklist.

### RA & Anticoagulant Guidelines Overview (ASRA 2025)

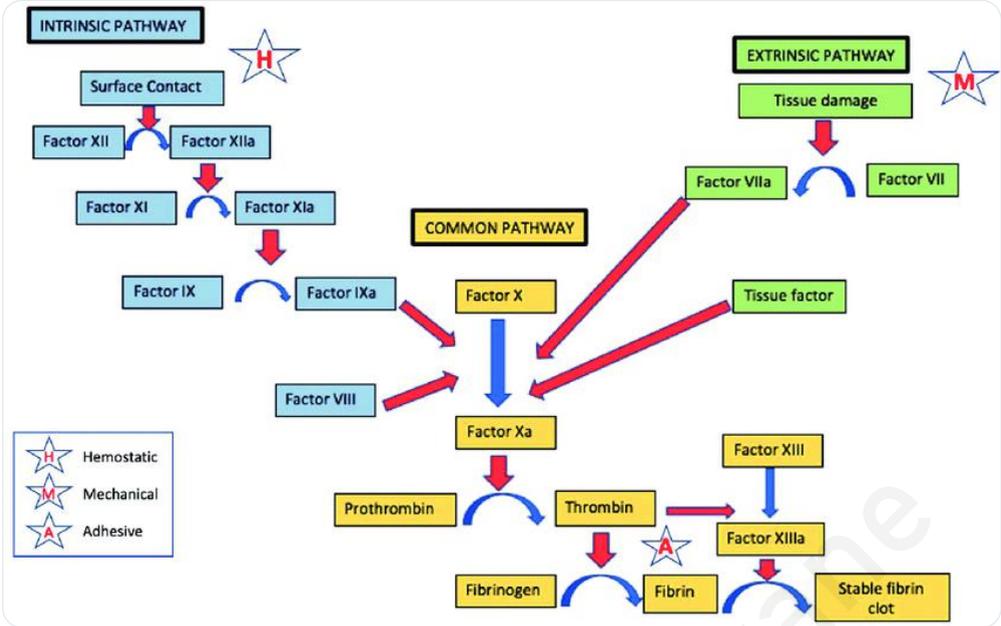
Drug	Mechanism	Test	Stop Before RA	Catheter Removal	Restart After RA
❖ Aspirin	COX-1 inhibitor	Platelet inhibition	None	Safe alone	Continue
❖ Clopidogrel	P2Y12 inhibitor	ADP receptor blocker	None	Stop 7 days	Post-op per team
❖ Prasugrel	P2Y12 inhibitor	ADP receptor blocker	None	Stop 7 days	Post-op per team
❖ Ticagrelor	P2Y12 inhibitor	ADP receptor blocker	None	Stop 5 days	Post-op per team
❖ GPIIb/IIIa Inh	Final aggregation block	None	8-48 hrs	Avoid	Post-op per team
❖ UFH	Indirect IIa/Xa via ATIII	aPTT	4-6 hrs	4-6 hrs	1 hr
❖ LMWH	Indirect Xa via ATIII	Anti-Xa	12-24 hrs	Same	4 hrs
❖ Warfarin	Vit K antagonist	INR	Stop 5 days, INR<1.4	INR<1.4	Case dependent
❖ Apixaban	Direct Xa inhibitor	Anti-Xa	36-72 hrs	6-24 hrs	6-24 hrs
❖ Rivaroxaban	Direct Xa inhibitor	Anti-Xa	24-72 hrs	6-24 hrs	6-24 hrs
❖ Edoxaban	Direct Xa inhibitor	Anti-Xa	72 hrs	24 hrs	24 hrs
❖ Dabigatran	Direct thrombin inhibitor	dTT	72-120 hrs	24 hrs	24 hrs
❖ Bivalirudin	Direct thrombin inhibitor	aPTT	Contraindicated	Contraindicated	Contraindicated

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## ANTICOAGULANTS SPECTRUM

Category	Drug	Site of Action	Effect	Indications
<b>ANTI-PLATELETS</b>	Aspirin	COX-1 in platelets	↓ Thromboxane A2, ↓ Platelet aggregation	MI, Stroke prevention
	Clopidogrel	P2Y12 receptor	Blocks ADP-mediated platelet aggregation	ACS, Post-stenting
	Prasugrel	P2Y12 receptor	ADP receptor blocker	ACS, PCI
	Ticagrelor	P2Y12 receptor	Reversible ADP receptor blocker	ACS
	Abciximab	GPIIb/IIIa receptor	Prevents fibrinogen cross-linking	PCI adjunct
	Tirofiban	GPIIb/IIIa receptor	Inhibits final platelet aggregation	ACS, PCI
<b>ANTI-COAGULANTS</b>	Cangrelor	P2Y12 receptor (IV, reversible)	Rapid-onset ADP inhibition	PCI bridge in high-risk CAD
	UFH	Thrombin (IIa), Xa via ATIII	Inhibits IIa and Xa	DVT, PE, ACS, CPB
	LMWH	Xa via ATIII	Preferential Xa inhibition	DVT prophylaxis, Perioperative
	Fondaparinux	Factor Xa via ATIII	Selective Xa inhibition	VTE prophylaxis
	Warfarin	Vitamin K epoxide reductase	↓ Synthesis of II, VII, IX, X	AF, mechanical valves
<b>DOAC</b>	Defibrotide	Endothelial cell stabilizer	Anti-thrombotic and anti-inflammatory	VOD post-HSCT
	Dabigatran	Thrombin (IIa)	Direct thrombin inhibitor	AF, DVT/PE
	Rivaroxaban	Factor Xa	Direct Xa inhibitor	AF, DVT/PE, Post-ortho surgery
	Apixaban	Factor Xa	Direct Xa inhibitor	AF, DVT/PE
<b>DTI</b>	Edoxaban	Factor Xa	Direct Xa inhibitor	AF, DVT/PE
	Bivalirudin	Thrombin (IIa)	Direct thrombin inhibition	PCI, HIT
<b>Fibrinolytics</b>	Argatroban	Thrombin (IIa)	Direct thrombin inhibition	HIT
	Alteplase (tPA)	Plasminogen activator	Dissolves fibrin clots	Stroke, PE, MI
<b>Misc.</b>	Tenecteplase	Plasminogen activator	Fibrin-specific thrombolysis	STEMI
	Andexanet alfa	Recombinant Xa decoy	Reverses Factor Xa inhibitors	DOAC reversal
	Idarucizumab	Monoclonal antibody fragment	Neutralizes dabigatran	Emergency reversal

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1	Factor XII	Factor XIIa	Factor XI	Factor XIa	Factor IX	Factor IXa	Factor X	Factor Xa	Prothrombin	Thrombin	Factor XIII	Factor XIIIa	Fibrinogen	Fibrin	Stable fibrin clot
2	Factor XII	Factor XIIa	Factor XI	Factor XIa	Factor IX	Factor IXa	Factor X	Factor Xa	Prothrombin	Thrombin	Factor XIII	Factor XIIIa	Fibrinogen	Fibrin	Stable fibrin clot
3	Factor XII	Factor XIIa	Factor XI	Factor XIa	Factor IX	Factor IXa	Factor X	Factor Xa	Prothrombin	Thrombin	Factor XIII	Factor XIIIa	Fibrinogen	Fibrin	Stable fibrin clot
4	Factor XII	Factor XIIa	Factor XI	Factor XIa	Factor IX	Factor IXa	Factor X	Factor Xa	Prothrombin	Thrombin	Factor XIII	Factor XIIIa	Fibrinogen	Fibrin	Stable fibrin clot
5	Factor XII	Factor XIIa	Factor XI	Factor XIa	Factor IX	Factor IXa	Factor X	Factor Xa	Prothrombin	Thrombin	Factor XIII	Factor XIIIa	Fibrinogen	Fibrin	Stable fibrin clot
6	Factor XII	Factor XIIa	Factor XI	Factor XIa	Factor IX	Factor IXa	Factor X	Factor Xa	Prothrombin	Thrombin	Factor XIII	Factor XIIIa	Fibrinogen	Fibrin	Stable fibrin clot
7	Factor XII	Factor XIIa	Factor XI	Factor XIa	Factor IX	Factor IXa	Factor X	Factor Xa	Prothrombin	Thrombin	Factor XIII	Factor XIIIa	Fibrinogen	Fibrin	Stable fibrin clot
8	Factor XII	Factor XIIa	Factor XI	Factor XIa	Factor IX	Factor IXa	Factor X	Factor Xa	Prothrombin	Thrombin	Factor XIII	Factor XIIIa	Fibrinogen	Fibrin	Stable fibrin clot
9	Factor XII	Factor XIIa	Factor XI	Factor XIa	Factor IX	Factor IXa	Factor X	Factor Xa	Prothrombin	Thrombin	Factor XIII	Factor XIIIa	Fibrinogen	Fibrin	Stable fibrin clot
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17	Factor XII	Factor XIIa	Factor XI	Factor XIa	Factor IX	Factor IXa	Factor X	Factor Xa	Prothrombin	Thrombin	Factor XIII	Factor XIIIa	Fibrinogen	Fibrin	Stable fibrin clot
18	Factor XII	Factor XIIa	Factor XI	Factor XIa	Factor IX	Factor IXa	Factor X	Factor Xa	Prothrombin	Thrombin	Factor XIII	Factor XIIIa	Fibrinogen	Fibrin	Stable fibrin clot
19	Factor XII	Factor XIIa	Factor XI	Factor XIa	Factor IX	Factor IXa	Factor X	Factor Xa	Prothrombin	Thrombin	Factor XIII	Factor XIIIa	Fibrinogen	Fibrin	Stable fibrin clot
20	Factor XII	Factor XIIa	Factor XI	Factor XIa	Factor IX	Factor IXa	Factor X	Factor Xa	Prothrombin	Thrombin	Factor XIII	Factor XIIIa	Fibrinogen	Fibrin	Stable fibrin clot

# Think Before You Block

## A–G Anticoagulant Checklist

- A** — **Assess the patient**  
Review history, renal function, and indication for anticoagulation
- B** — **Bleeding risk evaluation**  
High-risk sites (e.g., neuraxial) require extra caution
- C** — **Check drug category**  
Antiplatelets, Heparins, DOACs, Warfarin, DTIs
- D** — **Dose and duration**  
Low vs, high dose? When was the last dose?
- E** — **Evaluate pharmacokinetics**  
Half-life, renal clearance, and need for reversal agents
- F** — **Follow ASRA guidelines**  
 $2 \times t_{1/2}$  for low dose,  $5 \times t_{1/2}$  for high dose
- G** — **Go/no-go decision**  
Proceed only if timing, labs, and safety align



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Some more details are added.

## RA & Anticoagulant Guidelines Overview (ASRA 2025)

	Drug	Mechanism	Test	Stop Before RA	Catheter Removal	Restart After RA
Antiplatelets	◇ Aspirin	COX-1 inhibitor	Platelet inhibition	None	Safe alone	Continue
	◇ Clopidogrel	P2Y12 inhibitor	ADP receptor blocker	Stop 7 days	Contraindicated while on drug	Post-op per team (> 6 hr post catheter removal)
	◇ Prasugrel	P2Y12 inhibitor	ADP receptor blocker	Stop 7 days	Contraindicated while on drug	Post-op per team (> 6 hr post catheter removal)
	◇ Ticagrelor	P2Y12 inhibitor	ADP receptor blocker	Stop 5 days	Contraindicated while on drug	Post-op per team (> 6 hr post catheter removal)
◇ GPIIb/IIIa Inh	Final aggregation block	None	8 hrs (Eptifibatid/Tirofiban) 48 hrs (Abciximab)	Avoid	Post-op per team (> 6-8 hrs post catheter removal)	
Anticoagulants	◇ UFH	Indirect IIa/Xa via ATIII	aPTT	4-6 hrs	4-6 hrs	1 hr
	◇ LMWH	Indirect Xa via ATIII	Anti-Xa	12-24 hrs	Same	4-24 hrs (Low - High Dose)
	◇ Warfarin	Vit K antagonist	INR	Stop 5 days, INR<1.4	INR<1.4	Case dependent
DOAC	◇ Apixaban	Direct Xa inhibitor	Anti-Xa	36-72 hrs (Low - High Dose)	6-24 hrs	6-24 hrs (Low - High Dose)
	◇ Rivaroxaban	Direct Xa inhibitor	Anti-Xa	24-72 hrs (Low - High Dose)	6-24 hrs	6-24 hrs (Low - High Dose)
	◇ Edoxaban	Direct Xa inhibitor	Anti-Xa	72 hrs	24 hrs	24 hrs
	◇ Dabigatran	Direct thrombin inhibitor	dTT	72-120 hrs (CrCl >50 - <50)	24 hrs	24 hrs
DTI	◇ Bivalirudin	Direct thrombin inhibitor	aPTT	Contraindicated	Contraindicated	Contraindicated

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Apr 30, 2025 · 2 tweets · [KartikBSonawane/status/1917577802741866724](https://twitter.com/KartikBSonawane/status/1917577802741866724)

"Pierce Precisely, Not Too Deeply – Decoding Pleural Displacement in PVB!"

#RegionalAnesthesia #UltrasoundGuided #ParavertebralBlock #AnatomyMatters  
 #PVBPerfected #TipOfTheDay  
 #MyRATips  
 #PVB

Tip of the day:

Confused why the pleura shifts anteriorly during a paravertebral block (PVB)—also known as,

**"Pleural lift sign" "Pleural displacement sign" "Dynamic pleural sign"**

Why that's actually a good sign?

✅ Know the Fascial Divide First!

The endothoracic fascia lies between the parietal pleura and the posterior paravertebral space (PVS)

It divides the PVS into:

Posterior compartment (Subendothoracic PVS)— contains somatic nerves (target for effective analgesia)

Anterior (extrapleural) compartment – houses the sympathetic chain

✅ Needle Path Is Posterior to Anterior

You advance through muscle layers → superior costotransverse ligament

Your ideal target: just anterior to this ligament, but posterior to the endothoracic fascia and pleura

✅ The Golden Question: Why Does the Pleura Move Anteriorly Then?

Because the local anesthetic is injected behind the pleura in the tight posterior compartment

The fluid can't spread posteriorly—so it pushes the pleura forward

This anterior displacement is a mechanical sign of correct spread, not an error

✔ Don't Confuse Displacement with Wrong Plane!

The pleura shifts forward, but the drug stays behind it—right where the somatic nerves are

Injecting into the anterior compartment (between fascia and pleura) may block only the sympathetic chain

✔ Final Pearl:

Anterior pleural shift = Injectate in posterior compartment = Somatic block success

No pleural movement? You're likely too superficial or not in the correct fascial plane

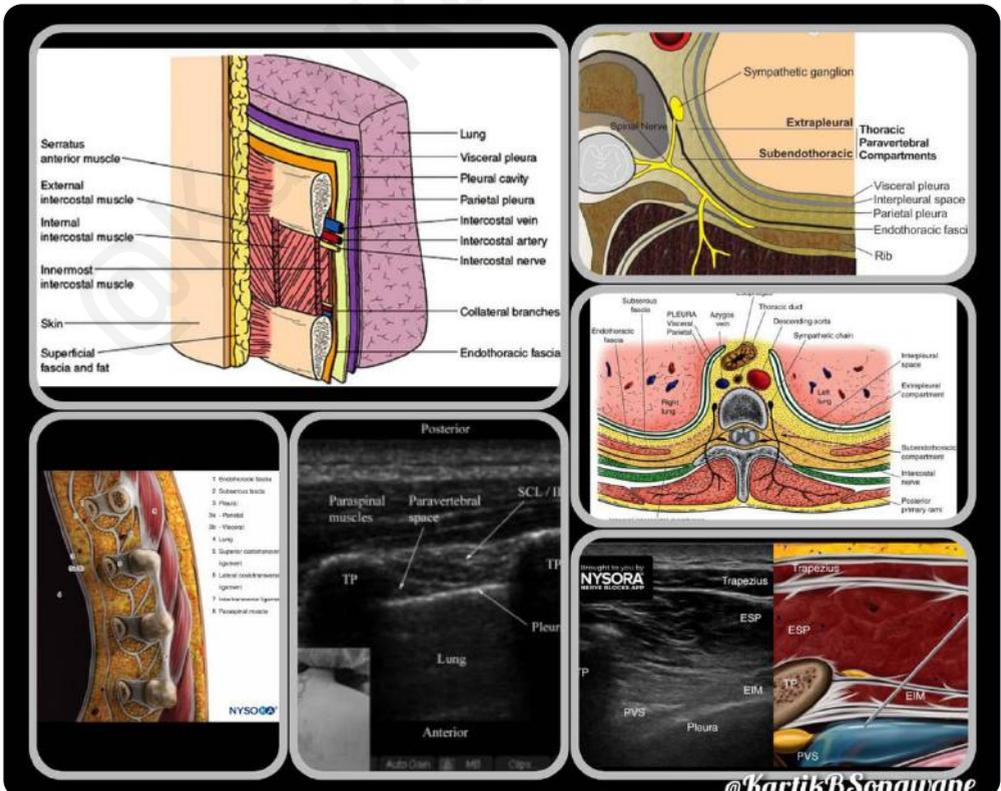
✔ Bonus Insight: What About the Subserous Fascia?

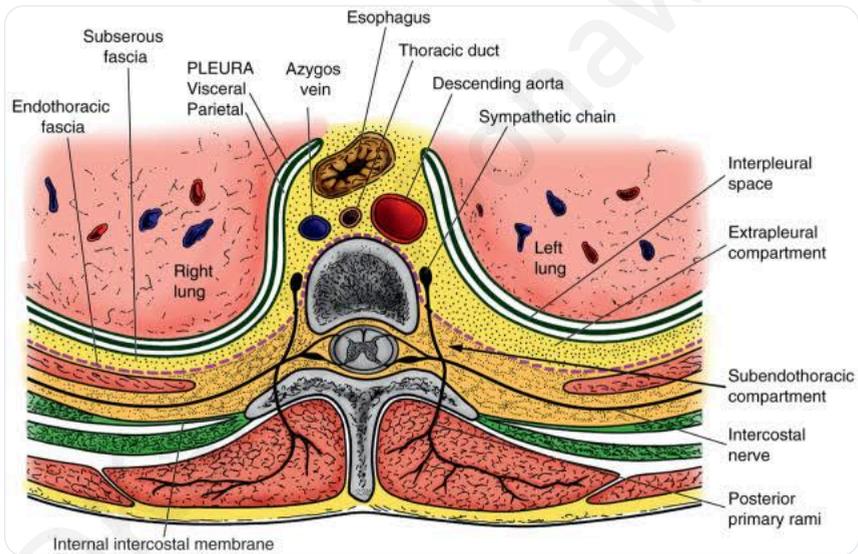
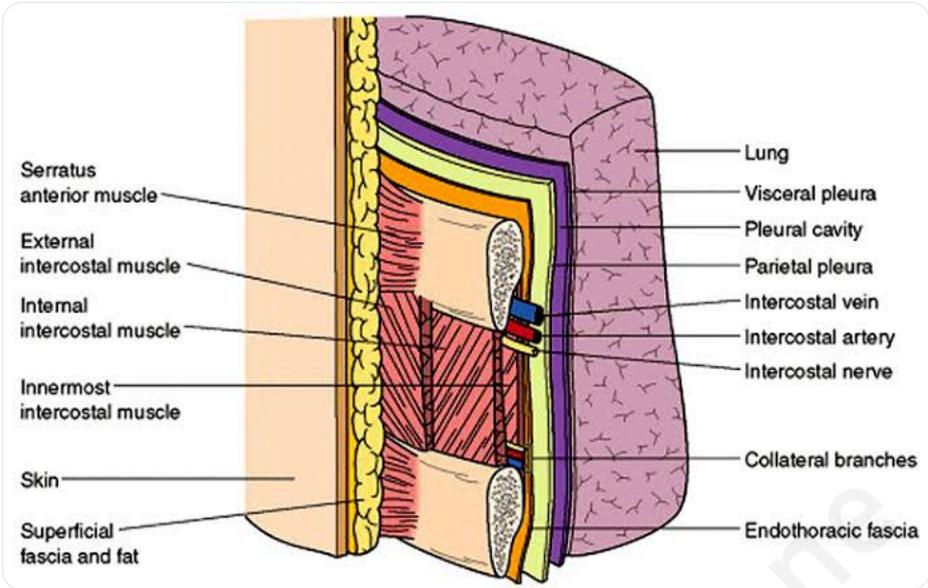
It lies between the pleura and endothoracic fascia, but is thin and variably defined

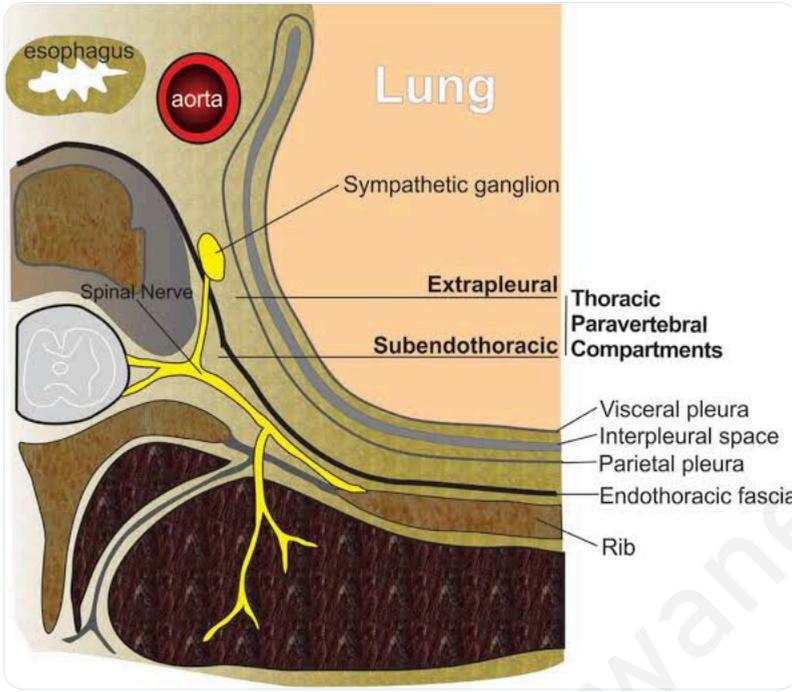
In practice, crossing it (along with endothoracic fascia) is often necessary to reach the posterior PVS

Its presence doesn't change the clinical target—just stay behind the pleura and in front of the ligament

Understand this fascial finesse, and your PVBs will hit the bullseye every time!







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Apr 20, 2025 · 2 tweets · [KartikBSonawane/status/1913867966741090325](https://twitter.com/KartikBSonawane/status/1913867966741090325)

"Finding the Lost Rib: The Case of the Invisible 2nd!"

Tip of the day:

#MyRATips

#Ultrasound #Pocus #Sonography #RibCounting #AnatomyInMotion #MedicalEducation

Scan all you want in the infraclavicular fossa, but the 2nd rib won't show up under the lateral clavicle!

Trace your probe from medial to lateral along the clavicle, spot the pectoral muscles, and reveal the true sonographic landmarks of the 2nd and 3rd ribs.

A must-watch for anyone learning rib counting or planning safe needling paths!

Watch following video for more details:

[https://youtu.be/xktNT5RJ8QE?si=c2\\_370PnrDROMaB1](https://youtu.be/xktNT5RJ8QE?si=c2_370PnrDROMaB1)



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May 27, 2025 · 2 tweets · [KartikBSonawane/status/1927303982625484822](https://twitter.com/KartikBSonawane/status/1927303982625484822)

🧠🕸️ "Understanding Nerve Plexuses: Nature's Intelligent Wiring System"

#NervePlexus #EmbryologyExplained #BrachialPlexus  
 #LumbarPlexus #SacralPlexus #CervicalPlexus  
 #CoccygealPlexus #Neuroanatomy #NeuralDevelopment  
 #MedicalEducation #AnatomyMatters #Neuroscience #MedTwitter #TipoftheDay  
 #MyRATips

Tip of the day:

The human body contains intricate networks of nerves known as PLEXUSES, formed by ANTERIOR RAMI of spinal nerves.

- 👉 Brachial plexus (C5–T1)
- 👉 Lumbar plexus (L1–L4 ± T12)
- 👉 Sacral plexus (L4–S4)
- 🧠 Cervical plexus (C1–C4)
- 👉 Coccygeal plexus (S4–S5, Co1)

These aren't random tangles - they're evolutionary marvels, intelligently designed to:

- 🔄 Provide redundancy in nerve supply
- ⚙️ Enable flexibility and coordination in movement
- 📡 Ensure efficient distribution of motor and sensory innervation to limbs and organs

? 🧠 Why Do Nerve Plexuses Exist?

🔄 Built-in Backup System:

Plexuses allow multiple spinal nerves to contribute to a single peripheral nerve. This means damage to one spinal segment doesn't completely paralyze a muscle or area of skin - it provides a biological backup system.

👉 Smooth & Synchronized Movements:

Limbs perform highly coordinated actions requiring input from various spinal levels. Plexuses help integrate this input into unified peripheral nerves like the radial, femoral, or sciatic nerves.

📡 Signal Distribution Hub:

Like a smart switching station, a plexus organizes and routes fibers efficiently to appropriate muscles and skin areas.

### Adaptive Wiring for Growing Limbs:

As limbs grow and rotate during development, plexuses allow the nerve supply to stay connected despite positional changes.

### Rotation Demands Rewiring:

Upper limbs rotate laterally, and lower limbs medially during embryogenesis.

Plexuses ensure nerves follow these rotations to reach original target muscles, preserving functional wiring.

### How Do Plexuses Form During Embryonic Life?

#### Neural Crest Cell Migration (Week 3–4):

Sensory neurons and autonomic ganglia originate from NEURAL CREST cells, while motor neurons arise from the NEURAL TUBE. These cells migrate and begin forming early nerve roots.

#### Segmental Patterning & Somites:

The embryo is segmented into somites, forming vertebrae, muscles, and dermis.

Each somite is linked with a spinal nerve, setting the stage for metameric (segmental) innervation.

#### Epaxial vs Hypaxial Muscle Masses:

Epaxial ( dorsal muscles): Supplied by posterior rami of spinal nerves.

Hypaxial ( ventrolateral muscles, including limb buds): Supplied by anterior rami, which later form the plexuses.

#### Limb Bud Emergence (Week 4–5):

As limb buds grow from the hypaxial region, they receive innervation from nearby anterior rami (e.g., C5–T1 for upper limbs, L2–S4 for lower limbs).

#### Axonal Intermixing (Week 5–8):

Motor and sensory axons from multiple spinal nerves intermingle at the limb base, forming complex networks.

#### Peripheral Nerve Formation:

These networks evolve into named nerves (e.g., median, ulnar, sciatic), each carrying a mix of fibers from several spinal roots.

### Why No Plexus in the Thoracic Region?

 The thoracic anterior rami mostly supply the intercostal muscles and chest wall in a segmental fashion, eliminating the need for a complex plexus - except a small intercostal plexus around T1–T2.

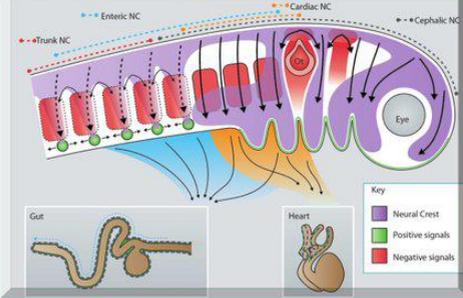
#### Take-Home Message:

◆ Nerve plexuses are nature's neural masterpieces - formed by anterior rami to innervate hypaxial muscles, especially in the limbs. Their formation reflects:

-  Neural crest migration
-  Somite segmentation
-  Limb bud development
-  Limb rotation

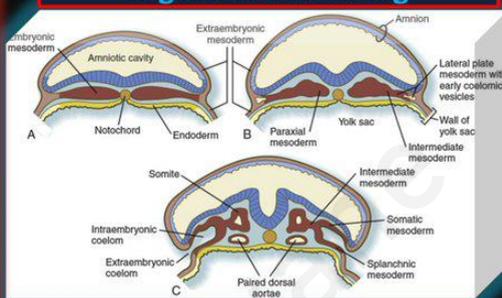
◆ They are evolutionary adaptations providing redundancy, flexibility, and precision, ensuring efficient neuromuscular function despite dramatic anatomical changes during development.

### Neural Crest Cell Migration (3rd-4th week)

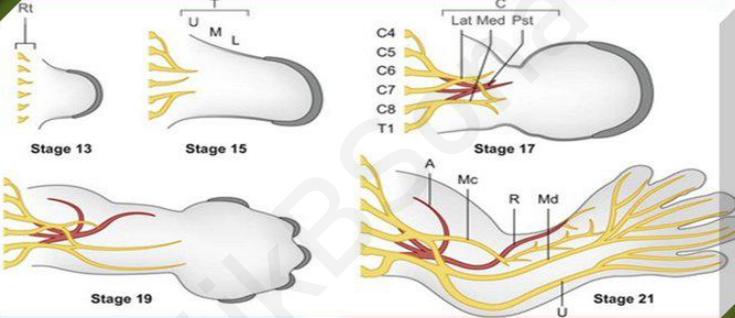


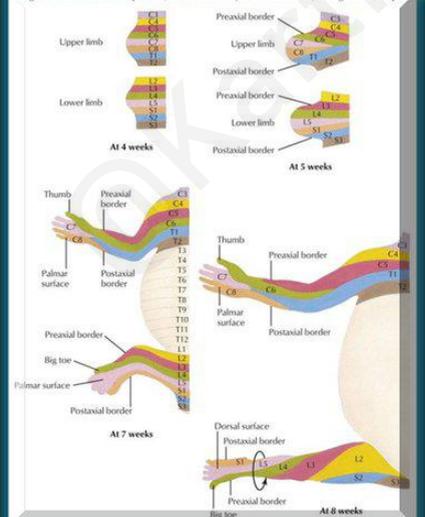
Key: Neural Crest (purple), Positive signals (green), Negative signals (red)

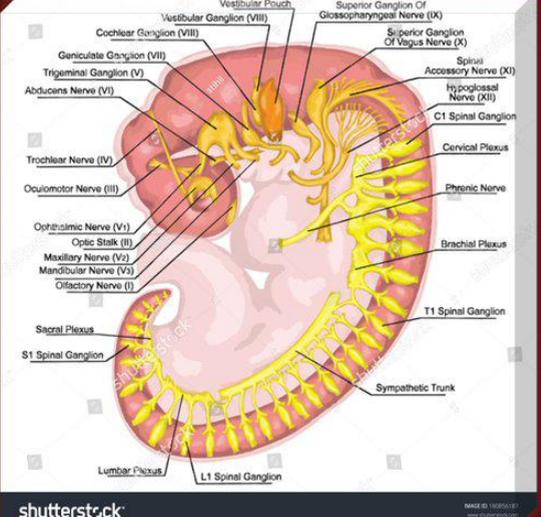
### Somite Differentiation and Segmental Patterning



### Limb Bud Outgrowth (4th-5th week) & Terminal Branch Differentiation







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Apr 29, 2025 · 2 tweets · [KartikBSonawane/status/1917143126105583640](https://twitter.com/KartikBSonawane/status/1917143126105583640)

"Innermost Intercostal Muscle: One Muscle, Three Faces!"

#Anatomy #ThoracicWall #MedicalEducation  
 #ChestWallBlocks  
 #ParasternalBlocks  
 #MyRATips

Tip of the Day:

Deep inside your thoracic wall 🦷 lies the Innermost Intercostal Muscle, but it doesn't always stay whole – it detaches beautifully into:

🛡️ Innermost Intercostal:  
 Between ribs, deepest layer

📍 Sternocostalis (Transversus Thoracis):  
 Anteriorly near the sternum

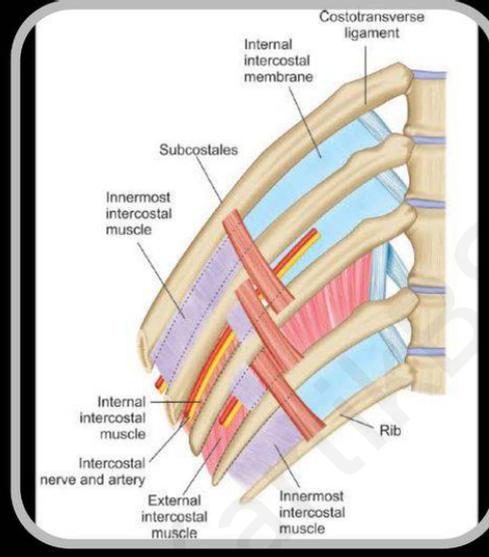
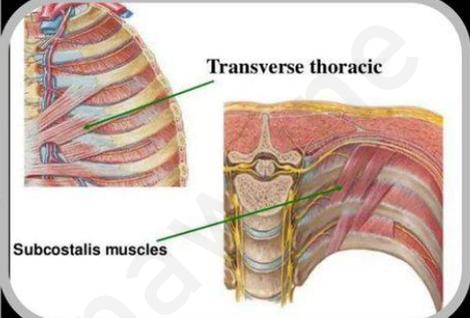
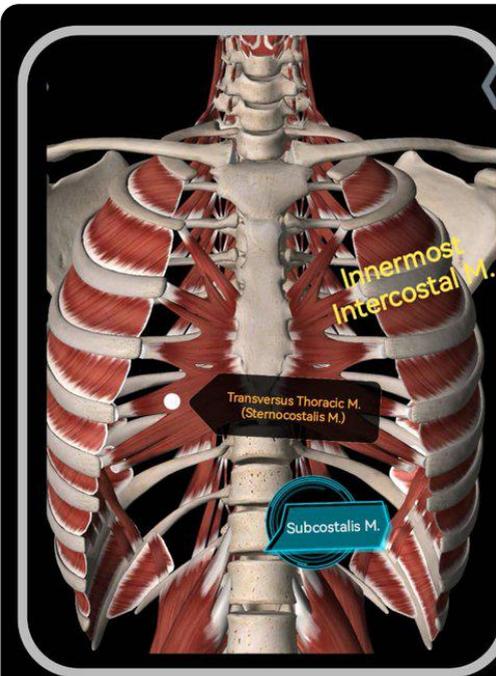
🌿 Subcostalis:  
 Posteriorly, spanning multiple ribs

Key Facts:

- ✅ All arise from the same muscular plane
- ✅ Share the same nerve supply (intercostal nerves)
- ✅ Share the same function (depress ribs during expiration)
- ✅ Differ only by location and fiber arrangement

They are not truly separate muscles – they are regional adaptations of a single deep muscle layer!

🦷 ✨ Nature's engineering at its finest!



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Apr 9, 2025 · 2 tweets · [KartikBSonawane/status/1909886565561627104](https://twitter.com/KartikBSonawane/status/1909886565561627104)

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### Tip of the Day

"Where It Starts, It Spreads: Chest Wall Blocks Decoded"

#RegionalAnesthesia

#ChestWallBlocks

#UltrasoundGuidedBlocks

#AnatomyMatters

#BlockSpread

#PecsBlock

#SAPBlock

#PainManagement

#AnesthesiaTips

Always know the origin and insertion of the muscle where local anesthetic (LA) is deposited during chest wall blocks.

The anatomical extent of that muscle largely determines the dermatomal coverage of the block.

For example:

Pectoralis Major extends only to the 6th rib, typically providing coverage from T2 to T6.

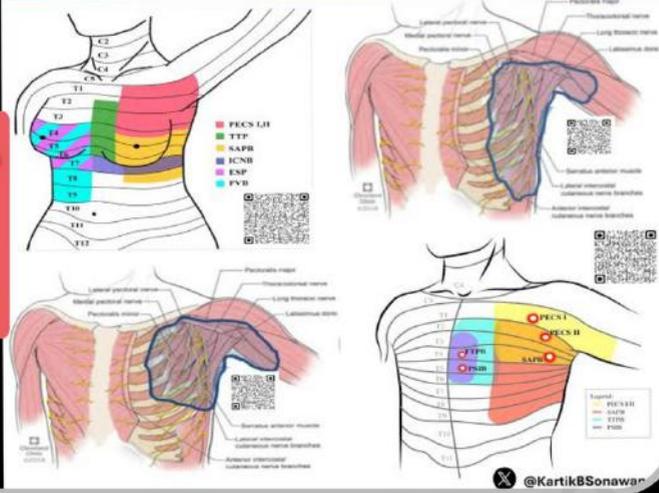
Serratus Anterior originates as far as the 9th rib, allowing the SAP block to cover T3 to T9.

Understanding muscle anatomy is key to predicting block spread and optimizing analgesia.

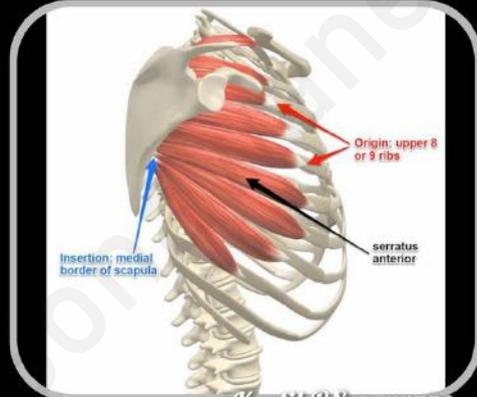
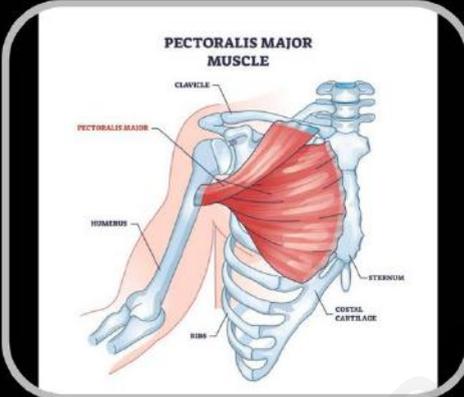
By Dr. Kartik Sonawane

# Analgesic Coverage: Anterolateral Chest Wall Blocks

*Where It Starts,  
It Spreads:  
Chest Wall  
Blocks Decoded*



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Jan 26, 2025 · 1 tweets · [KartikBSonawane/status/1883527430805291070](https://twitter.com/KartikBSonawane/status/1883527430805291070)

"The Lamp and the Spotlight: The Dual Role of Dexa"

Think of Dexamethasone as light illuminating a dark room.

When given intravenously (IV), it acts like a lamp, spreading its glow throughout the room (the entire body).

It reduces overall inflammation, calms systemic stress, and creates a balanced environment, but its reach is broad and diffuse.

On the other hand, Perineural Dexa is like a focused spotlight aimed directly at the nerve.

It highlights the precise area of concern, calming inflammation locally, prolonging the block's duration, and enhancing nerve recovery.

The spotlight provides clarity and precision that the lamp cannot achieve on its own.

The Spark of Combination:

When the lamp and spotlight work together, they transform the room. The lamp sets the atmosphere, while the spotlight enhances focus where it's needed most.

Together, IV and perineural Dexa create a balanced, long-lasting pain management solution—one illuminating the body, the other refining the target.

It's not just Light ;  
it's Brilliance !

Let's focus on Brilliance to light our minds and illuminate the path to precision and excellence.

By Dr. Kartik Sonawane



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3	3.1	3.2	3.3	3.4	3.5
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5	5.1	5.2	5.3	5.4	5.5
6	6.1	6.2	6.3	6.4	6.5
7	7.1	7.2	7.3	7.4	7.5
8	8.1	8.2	8.3	8.4	8.5
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11	11.1	11.2	11.3	11.4	11.5
12	12.1	12.2	12.3	12.4	12.5



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Sep 27, 2025 · 2 tweets · [KartikBSonawane/status/1971810645910999322](https://twitter.com/KartikBSonawane/status/1971810645910999322)

## 🔑 Rationale for Adding Intrathecal LA ± Opioids During CSEA with GA

#Anesthesia #RegionalAnesthesia #CSEA #Spinal #Epidural #TipIfTheDay #MyRATips

Tip of the Day:

### ⚡ Immediate & Reliable Analgesia

With an epidural alone, you need 15–20 ml of local anesthetic to adequately fill the epidural space and achieve segmental spread.

Spinal (intrathecal) injection provides rapid, dense, and predictable analgesia almost instantly, without waiting for epidural onset.

### 📌 Reduction in GA & Opioid Requirements

Intrathecal block provides baseline nociceptive suppression, reducing the need for volatile agents & IV opioids.

This minimizes respiratory depression, postoperative nausea/vomiting, & opioid-related side effects.

### ❤️ Hemodynamic Stability

Blunting of surgical stress responses reduces hypertensive and tachycardic fluctuations during incision and manipulation.

By decreasing anesthetic and opioid doses, cardiovascular depression from GA is also minimized.

### 🩸 Reduced Blood Loss

Sympathetic blockade from neuraxial anesthesia leads to vasodilation and lower venous pressures, especially in pelvic and lower limb surgeries - often translating to less intraoperative blood loss.

### 🌙 Postoperative Analgesia

The epidural catheter provides flexible, titratable postoperative analgesia, while the spinal dose ensures intraoperative pain relief and smooth transition until the epidural infusion takes over.

## 👉 Synergy with Opioids

Adding a small dose of intrathecal morphine, fentanyl, or sufentanil enhances analgesia quality without significantly increasing motor block.

Especially valuable in thoracic, abdominal, and pelvic surgeries, where visceral pain control is important.

## 📌 Clinical Scenarios

### 😊 Labor Analgesia:

Intrathecal fentanyl/sufentanil gives immediate pain relief, followed by epidural infusion.

### 👉 Pelvic & Lower Limb Surgeries:

Hip/knee replacements with GA + CSEA → reduced GA depth, less opioids, superior postop pain control.

### 👉 Abdominal Surgeries:

CSEA + GA blunts stress responses in open/lap colectomies, gynecological, urological procedures.

### 👉 Thoracic Surgeries:

Epidural is gold standard, but intrathecal opioid “start-up” ensures pain relief before epidural infusion titration.

## ✅ Summary:

Intrathecal LA ± opioids during CSEA with GA ensures immediate analgesia, reduces GA/opioid loads, improves hemodynamic stability, minimizes blood loss, & bridges smoothly to postoperative epidural analgesia.



## Why intrathecal LA +/- Opioids During GA + CSEA?



### IMMEDIATE ANALGESIA

Rapid, dense, predictable pain relief compared to epidural onset.



### REDUCED GA/OPIOID NEED

Lowers volatile agent and IV opioid requirements; fewer side effects.



### HEMODYNAMIC STABILITY

Blunts stress response, fewer HR/BP fluctuations.



### LESS BLOOD LOSS

Sympathetic block lowers venous pressures intraoperatively.



### POSTOPERATIVE ANALGESIA

Smooth transition to epidural infusion for pain control



### OPIOID SYNERGY

Small intrathecal opioid dose enhances analgesia without motor block.



## WHY ICU TEAMS OFTEN RESIST CSEA/INTRATHECAL + EPIDURAL IN GA CASES



### COMPLEXITY OF CATHETER MANAGEMENT

Epidurals (or CSEA setups) require careful catheter monitoring, dosing, asepsis, and troubleshooting. ICU teams may feel this adds extra workload compared to simply giving systemic opioids.



### FEAR OF INFECTION & COMPLICATIONS

Concerns about epidural abscess, meningitis, hematoma—especially in critically ill patients with prolonged catheters, sepsis risk, or anticoagulation. Even if rare, the fear of medico-legal consequences looms large.



### OPIOID-CENTRIC CULTURE

ICU pain protocols are often built around opioid infusions + adjuncts (dexmedetomidine, ketamine, propofol). This creates a default opioid-dependence mindset, making RA seem "unnecessary."



### LIMITED TRAINING & COMFORT

Not all intensivists are trained in managing epidural top-ups, troubleshooting block failures, or recognizing neuraxial complications. Lack of familiarity often translates into reluctance.



### PERCEPTION OF TIME-CONSUMPTION

Titration of epidurals, troubleshooting motor weakness, or managing low BP takes more attention than adjusting a fentanyl drip. Busy ICU workflow often pushes them toward "simpler" opioid regimens.

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Sep 8, 2025 · 2 tweets · [KartikBSonawane/status/1964941807571382560](https://twitter.com/KartikBSonawane/status/1964941807571382560)

🧪 IV FFP Builds Clots ✅ | 🧠 Perineural FFP Just Blocks ❌

#RegionalAnaesthesia #FreshFrozenPlasma #PatientSafety #Coagulopathy  
 #AnaesthesiaRisk #IVvsPerineuralFFP #FeasibilityNotEfficacy #AnaesthesiaDebate  
 #KnowTheScience #TipOfTheDay #MyRATips

Tip of the Day:

A. 🧪 INTRAVENOUS FFP (Standard Use)

🧪 Content → plasma with all soluble clotting factors (I–XIII), fibrinogen, albumin, globulins, anticoagulants (protein C/S, antithrombin), and citrate as preservative

⚙️ How it helps → replenishes clotting factors → restores the extrinsic & intrinsic pathways  
 → generates thrombin → converts fibrinogen to fibrin → stable clot formation

🩸 Indications → INR > 2 with urgent surgery, active bleeding, liver disease, DIC, massive transfusion, warfarin reversal (if PCC unavailable)

🕒 Onset → minutes after infusion (10–15 mL/kg dose dependent)

📚 Evidence → strong, guideline-supported

⚠️ Risks → TRALI, TACO, allergy, infection (rare)

✅ Regulatory Status → licensed, proven, predictable

B. 🧠 PERINEURAL FFP (Experimental Use)

🎯 Claimed action → “acts like fibrin glue” to seal perineural bleeds

🧪 Reality → ❌ no thrombin trigger + citrate chelates  $Ca^{2+}$  → no local fibrin clot

💧 True effect → simple volume tamponade (mechanical pressure), not hemostasis

1. Pharmacological Concerns

⚡ Local anaesthetic interactions →

📍 Dilution of LA → weaker block

📍 Protein binding → slower onset, prolonged duration

📍 Higher viscosity → restricted spread, unpredictable efficacy

## 2. Safety Concerns

🧪 Neurotoxicity potential → protein-rich fluid + citrate may irritate nerves, disrupt ion balance, or cause ischemia from pressure

🔥 Sterile inflammation → non-physiological proteins around nerves can provoke perineuritis

🦠 Infection risk → plasma is a nutrient-rich medium, raising concern for bacterial growth if contamination occurs

🔴 Compression injury → injected volume may elevate fascial compartment pressures, risking ischemic nerve damage

## 3. Ethical Concerns

⚖️ Off-label biologic use → perineural deposition of a blood product is not approved

📄 Governance gap → case consent ≠ ethical clearance; requires IRB approval and protocol registration

📰 Publication risk → reporting feasibility without mechanistic proof may mislead clinicians into unsafe replication

### C. 🧠 Why Perineural FFP Adds NO ADVANTAGE?

🚑 Systemic correction is already mandatory → Once IV FFP is transfused, clotting factors circulate to all bleeding sites (including perineural tissue).

🧴 Local FFP cannot polymerise → Without thrombin trigger + citrate chelation, perineural FFP cannot form a fibrin plug. Any effect is just mechanical tamponade.

⚠️ Risk > benefit →

Additional injection volume → nerve compression

Plasma proteins → sterile inflammation, infection risk

No evidence that outcomes improve compared to IV correction alone

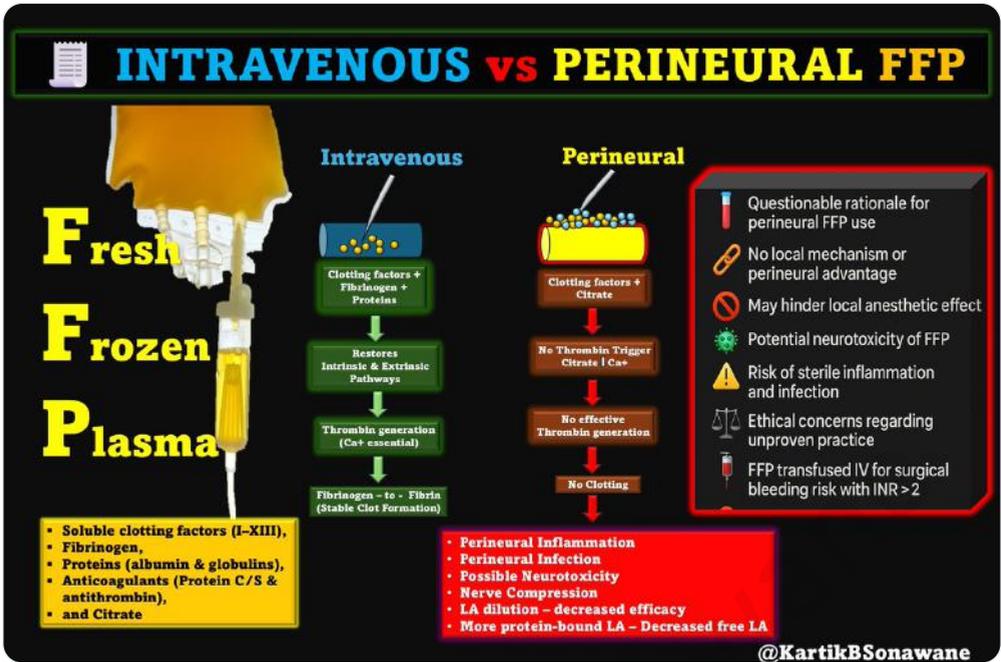
⚖️ Ethical gap → IV use = standard of care; perineural use = off-label, unproven, potentially misleading if published as efficacy.

### D. 🙌 BOTTOMLINE:

✅ IV FFP → proven systemic therapy, predictable, guideline-supported.

❌ Perineural FFP → mechanistically unsound, biologically risky, ethically problematic, and should remain strictly investigational.

☞ When IV FFP already does the job, perineural FFP adds no cure - only confusion and risk.



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Aug 24, 2025 · 2 tweets · [KartikBSonawane/status/1959696344253341992](https://twitter.com/KartikBSonawane/status/1959696344253341992)

📌💣 LAST: When Local Anesthetics Hit the Wrong Vessel 🚨

#LocalAnesthetic #LAST #RegionalAnesthesia #PatientSafety #AnesthesiaEducation #RAtechniques #ToxicityAwareness #SafeBlocks #AspirationFirst #KnowYourVessels #TipOfTheDay #MyRATips

Tip of the Day:

💠📌 Intravenous (Venous) Injection

🔄 Drug enters systemic circulation → right heart → lungs → left heart → high-flow organs.

🧠 CNS symptoms (tinnitus, dizziness, seizures) appear first.

❤️ At higher levels → cardiac toxicity (arrhythmias, arrest).

👉 Pulmonary “buffer” effect (lungs trap part of dose) gives some protection.

⚖️ Severity: Dose-dependent, influenced by protein binding & redistribution.

📌 Blocks with higher venous risk: Epidural, caudal, lumbar plexus, intercostal (due to rich venous plexuses).

📌📌 Intra-Arterial Injection

🚨 Central arteries (carotid/vertebral/coronary):

💠 Immediate direct high-concentration delivery to brain or heart.

🕒 Onset: Seconds → seizures, LOC, arrhythmias.

💣 Small dose = catastrophic effect.

📌 Blocks nearby: Interscalene, supraclavicular, stellate ganglion.

👉 Peripheral arteries (e.g., femoral, tibial):

📌 Blood flows distally into limb, not brain/heart.

⚠️ Risk of limb ischemia, pain, necrosis at injection site.

📊 Systemic absorption is slower, so LAST is less abrupt, but still possible.

📌 Blocks nearby: Femoral nerve block, adductor canal, popliteal sciatic.

✅ Take-Home Message: 💡💡

📌 Venous injection → systemic dilution → gradual CNS → cardiac toxicity.

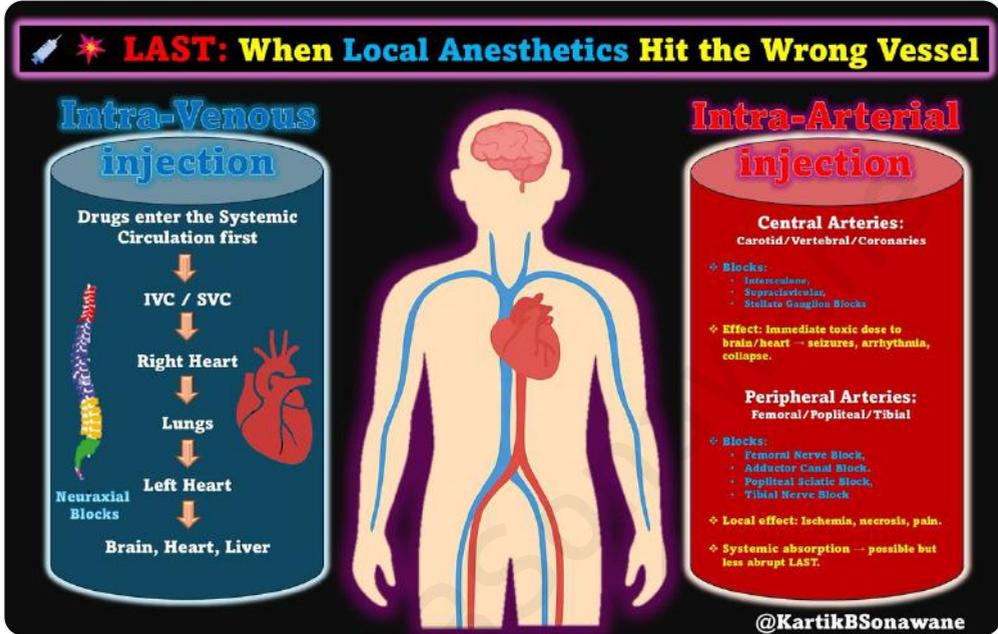
📌 Central arterial injection → catastrophic CNS/cardiac LAST in seconds.

📌 Peripheral arterial injection → local ischemia + delayed systemic toxicity.

📍 Block risk depends on anatomical proximity to venous plexuses or arteries.

- ◆ Epidural/intercostal/lumbar plexus → venous.
- ◆ Interscalene/supraclavicular → central artery.
- ◆ Femoral/popliteal → peripheral artery.

💡 Remember: The vessel you hit decides the fight you face — 🩸 vein for systemic, 🧠/❤️ central artery for catastrophe, 🦶 peripheral artery for ischemia. Stay safe, inject slow, and always aspirate! 🔄📌



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1	1. Epidural	2. Interscalene	3. Axillary	4. Brachial plexus	5. Infraclavicular
2	6. Cervical	7. Lumbar	8. Sacral	9. Femoral	10. Popliteal
3	11. Tibial	12. Sciatic	13. Adductor canal	14. Spinal	15. Cervical
4	16. Lumbar	17. Sacral	18. Femoral	19. Popliteal	20. Tibial
5	21. Sciatic	22. Adductor canal	23. Spinal	24. Cervical	25. Lumbar
6	26. Sacral	27. Femoral	28. Popliteal	29. Tibial	30. Sciatic
7	31. Adductor canal	32. Spinal	33. Cervical	34. Lumbar	35. Sacral
8	36. Femoral	37. Popliteal	38. Tibial	39. Sciatic	40. Adductor canal
9	41. Spinal	42. Cervical	43. Lumbar	44. Sacral	45. Femoral
10	46. Popliteal	47. Tibial	48. Sciatic	49. Adductor canal	50. Spinal
11	51. Cervical	52. Lumbar	53. Sacral	54. Femoral	55. Popliteal
12	56. Tibial	57. Sciatic	58. Adductor canal	59. Spinal	60. Cervical
13	61. Lumbar	62. Sacral	63. Femoral	64. Popliteal	65. Tibial
14	66. Sciatic	67. Adductor canal	68. Spinal	69. Cervical	70. Lumbar
15	71. Sacral	72. Femoral	73. Popliteal	74. Tibial	75. Sciatic
16	76. Adductor canal	77. Spinal	78. Cervical	79. Lumbar	80. Sacral
17	81. Femoral	82. Popliteal	83. Tibial	84. Sciatic	85. Adductor canal
18	86. Spinal	87. Cervical	88. Lumbar	89. Sacral	90. Femoral
19	91. Popliteal	92. Tibial	93. Sciatic	94. Adductor canal	95. Spinal
20	96. Cervical	97. Lumbar	98. Sacral	99. Femoral	100. Popliteal
21	101. Tibial	102. Sciatic	103. Adductor canal	104. Spinal	105. Cervical
22	106. Lumbar	107. Sacral	108. Femoral	109. Popliteal	110. Tibial
23	111. Sciatic	112. Adductor canal	113. Spinal	114. Cervical	115. Lumbar
24	116. Sacral	117. Femoral	118. Popliteal	119. Tibial	120. Sciatic
25	121. Adductor canal	122. Spinal	123. Cervical	124. Lumbar	125. Sacral
26	126. Femoral	127. Popliteal	128. Tibial	129. Sciatic	130. Adductor canal
27	131. Spinal	132. Cervical	133. Lumbar	134. Sacral	135. Femoral
28	136. Popliteal	137. Tibial	138. Sciatic	139. Adductor canal	140. Spinal
29	141. Cervical	142. Lumbar	143. Sacral	144. Femoral	145. Popliteal
30	146. Tibial	147. Sciatic	148. Adductor canal	149. Spinal	150. Cervical
31	151. Lumbar	152. Sacral	153. Femoral	154. Popliteal	155. Tibial
32	156. Sciatic	157. Adductor canal	158. Spinal	159. Cervical	160. Lumbar
33	161. Sacral	162. Femoral	163. Popliteal	164. Tibial	165. Sciatic
34	166. Adductor canal	167. Spinal	168. Cervical	169. Lumbar	170. Sacral
35	171. Femoral	172. Popliteal	173. Tibial	174. Sciatic	175. Adductor canal
36	176. Spinal	177. Cervical	178. Lumbar	179. Sacral	180. Femoral
37	181. Popliteal	182. Tibial	183. Sciatic	184. Adductor canal	185. Spinal
38	186. Cervical	187. Lumbar	188. Sacral	189. Femoral	190. Popliteal
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40	196. Lumbar	197. Sacral	198. Femoral	199. Popliteal	200. Tibial
41	201. Sciatic	202. Adductor canal	203. Spinal	204. Cervical	205. Lumbar
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43	211. Adductor canal	212. Spinal	213. Cervical	214. Lumbar	215. Sacral
44	216. Femoral	217. Popliteal	218. Tibial	219. Sciatic	220. Adductor canal
45	221. Spinal	222. Cervical	223. Lumbar	224. Sacral	225. Femoral
46	226. Popliteal	227. Tibial	228. Sciatic	229. Adductor canal	230. Spinal
47	231. Cervical	232. Lumbar	233. Sacral	234. Femoral	235. Popliteal
48	236. Tibial	237. Sciatic	238. Adductor canal	239. Spinal	240. Cervical
49	241. Lumbar	242. Sacral	243. Femoral	244. Popliteal	245. Tibial
50	246. Sciatic	247. Adductor canal	248. Spinal	249. Cervical	250. Lumbar
51	251. Sacral	252. Femoral	253. Popliteal	254. Tibial	255. Sciatic
52	256. Adductor canal	257. Spinal	258. Cervical	259. Lumbar	260. Sacral
53	261. Femoral	262. Popliteal	263. Tibial	264. Sciatic	265. Adductor canal
54	266. Spinal	267. Cervical	268. Lumbar	269. Sacral	270. Femoral
55	271. Popliteal	272. Tibial	273. Sciatic	274. Adductor canal	275. Spinal
56	276. Cervical	277. Lumbar	278. Sacral	279. Femoral	280. Popliteal
57	281. Tibial	282. Sciatic	283. Adductor canal	284. Spinal	285. Cervical
58	286. Lumbar	287. Sacral	288. Femoral	289. Popliteal	290. Tibial
59	291. Sciatic	292. Adductor canal	293. Spinal	294. Cervical	295. Lumbar
60	296. Sacral	297. Femoral	298. Popliteal	299. Tibial	300. Sciatic



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Rethinking Posterior Knee Blocks in TKA: Lessons from the PPB vs IPACK Trial

#RegionalAnesthesia #TKA #KneeSurgery #PostoperativePain  
 #PoplitealPlexusBlock #IPACK #FemoralTriangleBlock #AdductorCanalBlock  
 #DualSubsartorialBlock #TipOfTheDay #MyRATips

Tip of the Day:

◆ Same Target, Different Routes

- The article compared Popliteal Plexus Block (PPB) with IPACK in TKA.
- Anatomically, both infiltrate the popliteal plexus region, covering the same innervation.
- No surprise the study showed similar outcomes - both techniques are essentially overlapping.

◆ Redundancy in Study Design

- By combining both with Femoral Triangle Block (FTB), the trial diluted any real difference.
- The results largely reaffirm anatomy, rather than providing new clinical insight.

◆ Posterior Pain is Secondary

- As highlighted in many pain studies, posterior/intra-articular pain is less troublesome than extra-articular anterior pain.
- The FTB remains the major contributor to postoperative analgesia and functional recovery.

◆ Limitation: Preoperative Requirement

- Both PPB and IPACK must be performed before incision.
- This reduces flexibility in multimodal analgesia planning.

◆ ACB as a Smarter Option

- Literature supports that a true Adductor Canal Block (ACB) often results in popliteal spread, mimicking posterior coverage.
- Unlike PPB/IPACK, ACB can be performed postoperatively, alongside FTB → better adaptability.

◆ DSB: Toward Complete Coverage

- Dual Subartorial Block (DSB) addresses procedure-specific innervation comprehensively.
- A potential single-technique solution eliminating the need for redundant posterior add-ons.

◆ 🏆 Clinical Takeaway

- The article essentially compared two faces of the same block.
- Future research should move beyond redundancy → focus on FTB-centered strategies with ACB or DSB as practical, flexible, and procedure-specific alternatives.
- Research should focus on functional outcomes (rehab, ambulation, satisfaction) rather than comparing mirror-image blocks.

✨ PPB and IPACK are just two roads leading to the same city – different paths, same destination. ✨

**RAPM August 2025** Original research

### Analgesic efficacy of popliteal plexus block versus infiltration between the popliteal artery and capsule of the posterior knee block combined with femoral triangle block after total knee arthroplasty: a randomized non-inferiority trial and cadaveric evaluation

**Medial Approach**      **Popliteal Approach**      @KartikBSonawane

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Aug 16, 2025 · 2 tweets · [KartikBSonawane/status/1956795112023003222](https://twitter.com/KartikBSonawane/status/1956795112023003222)

🦋 Mobilizing for Success: Determinants of Functional Outcomes After Arthroplasty 🚀

#Prehabilitation #PatientOptimization #ImplantDesign #Orthopedics #EarlyMobilization  
#ERAS #MotorSparing #RegionalAnesthesia #Rehabilitation #TipOfTheDay #MyRATips

Tip of the Day:

▪ Arthroplasty is a restorative journey aimed at regaining mobility, independence, and quality of life.

🧠 Psychological impact → Early mobilization builds confidence, reduces fear, and speeds rehab.

🏆 Outcome success → Synergy of implant choice + pain control + early rehab = better ROM, less pain, improved QoL.

🔑 Key Factors Affecting Functional Outcomes

### 1 Preoperative Patient Status

🧑 Baseline mobility & strength – Prehabilitation and preserved quadriceps power predict faster recovery.

❤️ Comorbidities – Diabetes, obesity, and cardiovascular diseases impair healing and delay rehabilitation.

🧠 Psychological readiness – Anxiety, fear of pain, or depression reduce adherence to postoperative physiotherapy.

### 2 Intraoperative Considerations

🔧 Implant positioning & soft-tissue handling – Accurate alignment, stable fixation, and minimal trauma ensure optimal biomechanics.

🕒 Reduced surgical time – Lowers tissue inflammation and perioperative morbidity.

🩸 Hemodynamic stability – Prevents ischemia and aids tissue healing.

### 3 Implant Design and Functional Outcomes 🦋

Different implant designs influence biomechanics, proprioception, and muscle efficiency.

▪ Posterior-Stabilized (PS): Reliable rollback, stable flexion → good ROM.

▪ Cruciate-Retaining (CR): Preserves PCL for more physiologic kinematics → better proprioception.

▪ Ultra-Congruent / Medial Pivot: Mimic natural knee motion → smoother early gait and confidence.

▪Unicompartmental (UKA): Preserves native ligaments → fastest recovery and near-normal function.

👉 Key Points: Even the best implant fails to deliver optimal outcomes if pain is uncontrolled and mobilization is delayed.

#### 4 Postoperative Mobilization 🚶

💡 Same-day mobilization is non-negotiable.

✅ If mobilized immediately:

- Maintains soft tissue flexibility, preventing adhesions.
- Reduces fibrosis, stiffness, and long-term pain.
- Improves ROM & patient confidence.
- Enhances circulation, reduces DVT, & prevents pulmonary complications.

⚠️ If NOT mobilized promptly:

- ❌ Leads to fibrosis, capsular tightening, & muscle guarding.
- ❌ Inflammatory responses increase scarring & joint stiffness.
- ❌ Joint becomes more painful later, prolonging rehab.
- ❌ Poor ROM → compromised long-term outcomes.

#### 5 RA: Why Motor-Sparing is Crucial 📌

Femoral Nerve Block (FNB)

- ✅ Provides excellent analgesia.
- ❌ Causes quadriceps weakness, delaying ambulation and increasing fall risk.
- ❌ Contradicts ERAS principles and worsens stiffness by preventing early mobilization.

Motor-Sparing Alternatives

- 🎯 Preserve quadriceps strength, allowing same-day ambulation.
- 🚀 Provide analgesia comparable to FNB but with significantly lower fall rates.
- ✅ Align perfectly with fast-track/ERAS pathways.

#### 6 Multimodal Pain Management 💊

🌿 NSAIDs/COX-2 inhibitors – Target inflammation and swelling.

💡 Acetaminophen – Steady background analgesia.

🧠 Gabapentinoids & Duloxetine – Address neuropathic pain, preventing central sensitization and chronic postsurgical pain.

📌 Low-dose ketamine – Useful opioid-sparing adjunct in select patients.

#### 🏆 Take-Home Message

💡 The functional outcome of arthroplasty is not defined by surgical replacement alone, but by a comprehensive rehabilitation strategy:

🚶 Immediate mobilization is essential - preventing fibrosis, stiffness, and chronic pain while ensuring optimal ROM.

📌 Implant design sets the biomechanical foundation, but recovery depends on pain-free and

confident mobilization.

Motor-sparing analgesia allows safe ambulation and avoids the pitfalls of femoral nerve block-induced weakness.

Multimodal pain control with neuropathic pain management ensures long-term comfort, protects rehabilitation progress, and prevents chronic pain syndromes.

The journey of arthroplasty success begins with the scalpel, but is completed by pain control, early mobilization, & a patient-centered recovery pathway.

**Mobilizing for Success:**  
**Determinants of Functional Outcomes After Arthroplasty**

**Preoperative Patient Status**

- Baseline mobility & strength**
- Comorbidities**
- Psychological readiness**

**Intraoperative Considerations**

- Implant positioning & soft-tissue handling**
- Reduced surgical time**
- Hemodynamic stability**

Implant design	Kinematic principle	Functional benefits	Limitations	Early rehab impact
↕ <b>Cruciate-Retaining (CR)</b>	• Preserves PCL	• Better proprioception, quadriceps efficiency	➢ Sensitive to balancing errors	✓ Good if PCL intact
↕ <b>Posterior-Stabilized (PS)</b>	• Post-cam substitutes PCL	• Stable rollback, reliable flexion	➢ Cam wear, patellofemoral issues	✓ Predictable early flexion
↕ <b>Ultra-Congruent / Medial Pivot</b>	• High conformity, native-like motion	• Stable gait, high satisfaction	➢ Possible over-constraint	✓ Smooth early confidence
↕ <b>Unicompartmental (UKA)</b>	• Ligaments preserved	• Fastest recovery, near-normal gait	➢ Progression of OA	✓ Very rapid mobilization
↕ <b>Constrained / Hinge</b>	• High constraint	• Salvage stability	➢ Limited ROM, high stresses	✓ Protected mobilization

**Postoperative mobilization**

- If mobilized immediately:**
  - Maintains soft tissue flexibility to prevent adhesions.
  - Reduces fibrosis, stiffness, and long-term pain.
  - Improves range of motion (ROM) and patient confidence.
  - Enhances circulation, reduces the risk of DVT, & prevents pulmonary complications.

- If NOT mobilized promptly:**
  - Leads to fibrosis, capsular tightening, & muscle guarding.
  - Inflammatory responses increase scarring & joint stiffness.
  - Joint becomes more painful later, prolonging rehab.
  - Poor ROM → compromised long-term outcomes.

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Breaking Myths, Not Bones: A Friendly Letter from Your Block Doc 🦴💉

#RegionalAnesthesia #NerveBlocks #PainFreeSurgery #BreakingMyths #MythBusting  
#BlockDoc #AnesthesiaEducation #LIA #TraumaCare #OrthopaedicMyths #TipOfTheDay  
#MyRATips

Tip of the Day:

📖 Dear Sir Bones,

From the desk of "The Anesthetist Who Blocks But Never Blocks Progress"

Your reasons for banning peripheral nerve blocks (PNBs) are so imaginative they could fill a stand-up special.

Unfortunately, in the theatre, patients aren't laughing.

Here's my myth-by-myth reply — fun to read, hard to refute.

🌟 Excuse #1: "Once fracture fixed, there is no pain anyway"

🧠 That's like saying once a tooth is pulled, the nerve endings won't notice.

📖 Fact: Fixation stops instability, but pain from soft tissue injury, periosteum, and inflammation remains. PNBs mute these signals and accelerate rehab.

🌿 Excuse #2: "Drug seeps to surgical site → infection"

🧼 That's like fearing soap will cause skin infections because it touches the skin.

📖 Fact: Local anesthetics are sterile and fight bacteria:

🔒 Disrupt membranes

🚫 Inhibit microbial enzymes

💡 Work better in acidic tissue

Translation: They reduce infection risk.

🇬🇧 Excuse #3: "LIA is best; UK protocol for TKR"

☕ True, the UK likes tea - but coffee works too.

📖 Fact: LIA can work, but it's far from flawless:

⌚ Short-lived analgesia → severe breakthrough pain

⚠️ Risk of LAST from high-volume infiltration

🔧 Joint loosening and infection risk if asepsis lapses

🔄 Redo surgeries in infected or unstable joints

Translation: Best practice = multimodal analgesia. Blocks add safety, comfort, and duration.

 Excuse #4: "Blocks contraindicated for trauma patients"

 That's like saying helmets are contraindicated for motorbike riders.

 Fact: Blocks reduce opioids, aid physio, and speed recovery. The exception? Suspected compartment syndrome — but that's a specific, not a blanket, rule.

 Excuse #5: "Drug in muscle → swelling → compartment syndrome"

 That's like thinking a cup of tea will swell your stomach until your belt snaps.

 Fact: Local anesthetics are anti-inflammatory & anti-edema:

 Inhibit neutrophil migration

 Suppress pro-inflammatory cytokines (IL-1, TNF- $\alpha$ )

 Reduce capillary permeability

Translation: They reduce swelling, not cause it.

 Excuse #6: "I haven't touched those nerves, why are you blocking them?"

 That's like saying, I didn't hit the alarm, so why turn it off while it's still blaring?

 Fact: Pain signals don't care if you "touched" a nerve. Surgical trauma triggers pain in connected pathways. Blocks interrupt these signals before they even start.

 Excuse #7: "Joint replacement patients don't feel pain after surgery"

 That's like claiming marathon runners don't get thirsty at the finish line.

 Fact: Capsule, ligaments, and periosteum still fire pain signals. Blocks prevent severe rebound once spinal or GA wears off.

 Excuse #8: "This is not what we follow, so don't give"

 That's like refusing power tools because your grandfather used a hammer.

 Fact: Medicine evolves - protocols must follow evidence, not nostalgia. Evidence-based practice means using techniques proven to improve safety, comfort, and recovery.

 Excuse #9: "Block can cause permanent neuropathy - not my surgery"

 That's like blaming the electrician for the lights going out when you bulldozed the building.

 Fact: Permanent nerve injury from blocks is extremely rare (0.02–0.04%), often less than surgical or positioning-related injury. Proper technique and ultrasound guidance make blocks safer than most surgical retractors.

 Excuse #10: "Blocks are just a modern fad - we've managed patients for centuries without them"

 That's like rejecting washing hands in surgery because "we managed without it in the 1800s."

 Fact: Modern analgesia is about progress - fewer opioids, faster recovery, better function. History is for learning, not for limiting.

🎯 The Real Harm of a Block Ban

- 😞 Unnecessary pain → slower rehab, higher opioids
- 💊 Opioid side effects → nausea, constipation, respiratory depression
- 🏠 Longer stays → more cost, fewer beds
- 👉 Poor rehab participation → worse function
- 😞 Lower satisfaction → and they remember

💡 Bottom Line:

🎯 Local anesthetics are the Swiss Army knife of perioperative care — analgesic, antimicrobial, anti-inflammatory, anti-edema, neuroprotective.

🎯 Refusing them because of myths is like banning umbrellas because “rain helps plants grow.”

Yours (block) faithfully,  
Dr. Local A. Nesthetic 🧪🩺

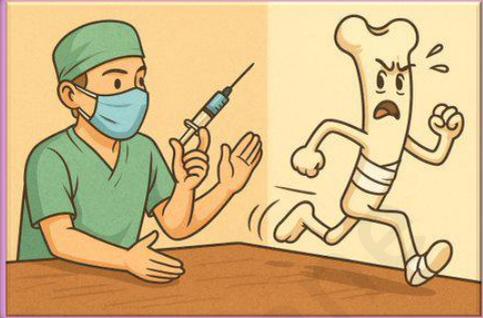
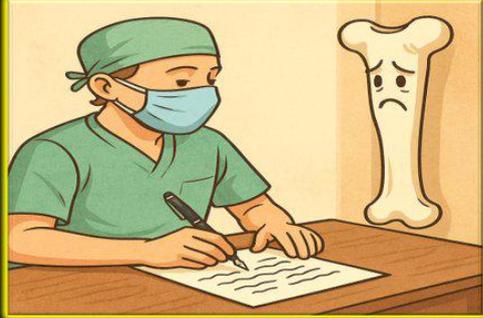


# Breaking Myths, Not Bones: A Friendly Letter from Your Block Doc 🦴💉



**Dear Sir Bones,**

From the desk of  
"The Anesthetist  
Who Blocks But  
Never Blocks  
Progress"



## Myths about RA

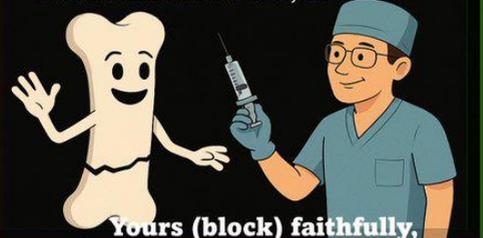
- Once # fixed there is no pain anyway, PNB has no role
- The drug that you give seep through the planes & reaches the surgical site causing post-op infection
- LIA is best & practiced as per UK protocol it seems for TKRs
- Blocks are contraindicated for trauma patients
- The drug gets into the muscle → muscle imbibes all the drug → swells → can cause post-op compartment syndrome
- You block can cause permanent neuropathy not my surgery



@KartikBSonawane

## Breaking Myths

- 1 Pain persists after fracture fixation
  - Periosteum injury & inflammation are e still sources
  - Blocks mute pain, reduce opioids, and speed recovery
- 2 LAs are bactericidal & bacteriostatic
  - They disrupt membranes and inhibit microbes
  - They reduce infection risk, not increase it
- 3 LIA has limitations for TKR
  - Risk of LAST, joint loosening & infection
  - Results are best when combining techniques
- 4 Blocks are effective analgesia in trauma
  - They reduce opioids and improve early recovery
  - Only if concern for compartment syndrome is present
- 6 LAs are anti-inflammatory & anti-edema
  - A block silences the entire alarm system



Yours (block) faithfully,  
Dr. Local A. Nesthetic 🦴💉

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**Dr. Kartik Sonawane** @KartikBSonawane

Jul 29, 2025 · 2 tweets · [KartikBSonawane/status/1950059540030116216](https://twitter.com/KartikBSonawane/status/1950059540030116216)

🎯🚀 Forward Flow Forward: Mastering the Popliteal Pathway via Smart ACB Strategies 🛠️

#RegionalAnesthesia #NerveBlocks #UltrasoundGuided #PeripheralNerveBlock  
 #AnesthesiaEducation #AdductorCanalBlock #PoplitealPlexus #AnteriorApproach #DSB  
 #HiPAC #4in1Block #KneeAnalgesia #MotorSparing #TipOfTheDay #MyRATips

Tip of the Day:

🧠 The Adductor Canal: Nature's Passageway to the Popliteal Fossa

👉 The AC is a musculoaponeurotic tunnel, bounded by two muscles (VMM & ALM/AMM) and one aponeurosis (VAM).

👉 It naturally connects the anterior thigh to the posterior thigh through the adductor hiatus.

👉 Using this anatomical passageway, local anesthetic can be directed from an anterior approach to reach posterior targets like the popliteal plexus and even sciatic nerve branches.

📏 Volume Dynamics & Direction in ACB-Based Techniques

🔍 When performing ACBs for knee or below-knee surgeries, understanding how LA moves and how we can guide that movement is critical for:

👉 Targeting the popliteal plexus (for knee analgesia),

👉 Or reaching the sciatic nerve trunks (for foot/ankle surgery).

💡 Popliteal Plexus = Enough for Knee Surgery

⚡ LA spread to posterior capsule & intra-articular branches (tibial & obturator articular twigs) is usually sufficient for TKA and arthroscopy.

⚡ Achievable with 15–20 mL when injected in the PURPLE perivascular zone at the proximal AC (just distal to FT apex).

💡 Sciatic Trunk Coverage = Needed for Below-Knee Surgery

⚡ Full coverage of the TN & CPN requires: High-volume LA (30–40 mL) in the AC.

⚡ The drug follows the femoral artery through the adductor hiatus into the popliteal fossa and around the sciatic nerve.

📖📚 What Did Dye Studies Show?

📄 Multiple dye and contrast studies have confirmed spread to the popliteal plexus when large volumes (20–30 mL) are injected perivascularly in the distal AC.

📄 In the landmark Gautier et al. series, 20 mL of contrast injected into the AC showed dye

around the sciatic nerve in all cases, with limited sensory or motor impact.

📖 Similarly, Runge et al. and Goffin et al. (cadaveric work) demonstrated consistent spread into the popliteal fossa, especially when dye was injected 1–2 cm above the adductor hiatus.

📖 Most importantly, Johnston et al. confirmed that dye injected into the distal AC could spread to the popliteal plexus, while distal FT injections did not.

📖 Hi-PAC and 4-in-1 innovated further by extending the anterior spread to the sciatic trunk.

📖 The only contradictory claim (RAPM, 2023) lacks dissection and underreports its own positive data.

### 📍 Where to Inject? The “Purple Zone”

🎯 Optimal target = deep to sartorius, lateral to femoral artery, and under the VAM.

🟪 This is the perivascular PURPLE zone, a conduit that sends LA through the adductor hiatus → popliteal fossa.

### 🔪 How Much? Volume Matters

📌 <10 mL: Often insufficient to reach the popliteal plexus or include major articular branches.

📌 15-20 mL: Ideal for proximal AC – to achieve popliteal spread without sciatic involvement.

📌 ≥20 mL: Increases likelihood of sciatic spread, especially if injected distally in the AC.

### ⚙️ DSB Technique = Dual Injection for Strategic Spread

#### 🔑 Volume Efficiency + Direction Control

💡 1st injection: 10-20 mL in distal FT pre-fills the proximal tract, restricting retrograde spread of the second injection.

💡 2nd injection: 10–20 mL in AC moves distally, pushing the drug toward the popliteal plexus

✅ Key Advantage: DSB achieves popliteal plexus involvement with less total volume than needed in a single-shot ACB alone.

🧠 Concept: Blocking the Backdoor, Opening the Front - By “sealing off” the proximal path with the first bolus, DSB converts the second bolus into a distally driven column, minimizing leakage and maximizing effect.

### 🔴 Why the RAPM (Smulders et al.) Study Missed the Mark?

👤 Cadaveric study, but no dissection ❌.

🕒 CT after 30 min - not real-time, no vascular flow, potential underestimation.

📌 Used 2 mL groups (!), only 30 mL showed popliteal spread in 3 cases - yet still concluded “no sciatic spread.”

❌ No comparison with prior positive studies

❌ Ignored key findings in 30 mL group

🗨️ Titled with a strong claim despite contradictory findings: misleading, non-neutral, and goal-directed bias.

📊 Contrast in CT can resemble soft tissue = interpretation bias.

### 🔄 Why Modify ACB Instead of Adding Blocks?

🚫 You don't always need iPACK or posterior sciatic blocks.

- ✓ A single smart ACB (or DSB) can:
  - Cover posterior capsule of the knee
  - Reach articular sciatic branches
  - Sometimes even spread to sciatic trunk (if needed, with higher volume)
- 👏 Minimizes motor block, preserves function, reduces number of injections.
- 🔴 Achieve foot analgesia from the front in below-knee surgeries when using Hi-PAC or 4-in-1.

🏠🔑 Final Take-Home Message

- ✓ Site trumps name: Where and how you inject matters more than the block label
- ✓ 15–20 mL in the purple zone = safe & effective posterior knee coverage
- ✓ DSB enhances forward flow, limiting volume while boosting effectiveness
- ✓ 30–40 mL directed distally (Hi-PAC/4-in-1) can reach sciatic trunk from anterior thigh
- ✓ One modified ACB can replace multiple blocks -if you respect anatomy and guide your volume!
- ✓ Popliteal-plexus spread rarely weakens ankle; Hi-PAC/4-in-1 almost certainly will factor this into rehab plans. So, always use diluted LA for selective sensory blockade.
- ✓ Document your plan - write “Popliteal-plexus target (20 mL)” or “Hi-PAC (35 mL) for below-knee surgery” so PACU and physio teams know what to expect.

🚀 One clever anterior injection can replace multiple blocks - if you know what you're doing. 🧠

### 🔴 Flow Forward: Mastering the Popliteal Pathway via Smart ACB Strategies

Boundaries	Anteromedial (VAM)	Anterolateral (ALM)	Medial (M)	Distal (VAM, AMM, VAM, VAM)
Anterolaterally	VAM	ALM	VAM	Absent
Posteromedially	VAM	Absent	Absent	Absent
Medially	Present	Absent	Absent	Absent
Contents	SN, NVM	Absent	Absent	Absent

**Needle Entry into the PURPLE ZONE, Containing neurovascular structures**

**LA Tracking: From Anteromedial (AC) to Posterior (Popliteal) Compartments**

AC to Adductor Hiatus    Anterior to Posterior    Spread in the Popliteal fossa As per the Volume injected

**AC & Popliteal Fossa Connection**

**Year-Wise Evidence: Anterior Approach Blocks and Popliteal/Sciatic Spread**

Year	Study	Technique	Volume	Modality	Findings	Conclusion
2016	Quatter et al.	Medial ACB	30 mL	NSB	LA reached sciatic plexus via posterior tibial artery	ACB can reach posterior tibial artery
2016	Range et al.	Distal ACB (indirect)	30 mL	Dye + Fluorescence	Dye consistently reached popliteal plexus	ACB can reach posterior tibial artery
2018	Ray Alilash et al.	Knee block	30-40 mL	Fluorescence	LA spread to popliteal plexus, sciatic plexus, and sciatic trunk	ACB can reach posterior tibial artery
2019	Jhinnas et al.	FT vs distal ACB	30 mL	Dye + Fluorescence	FT reached sciatic plexus	ACB can reach posterior tibial artery
2020	Diffin et al.	Distal ACB	30 mL	USG + Fluorescence	LA reached sciatic plexus	ACB can reach posterior tibial artery
2021	Srinawane et al.	HiPAC	30-40 mL	USG	LA reached sciatic plexus	ACB can reach posterior tibial artery
2021	Woodworth et al.	Anterior ACB	30-40 mL	USG, Ase	LA reached sciatic plexus	ACB can reach posterior tibial artery
2021	Smulders et al. (RAPM)	CT-based ACB (indirect)	3-30 mL	CT scan on fluoroscopy	Distal sciatic spread, but 3/3 cases 10-20 mL showed posterior spread	ACB can reach posterior tibial artery

**✗ RAPM Study Pitfalls (Smulders et al., 2023)**

Issues	Comments
<ul style="list-style-type: none"> <li>➢ Cadaveric but not dissected</li> <li>➢ CT (not MRI), done after 30 mins</li> <li>➢ Contrast looked like soft tissue</li> <li>➢ Only 3/36 showed popliteal spread</li> <li>➢ Misleading title</li> <li>➢ Omission of prior dye literature</li> </ul>	<ul style="list-style-type: none"> <li>✓ Missed the chance to confirm spread path anatomically</li> <li>✓ May underestimate true spread – no perfusion, risk of dye dilution</li> <li>✓ Observation bias likely in 3D interpretation</li> <li>✓ But all 3 came from the 30 mL group—a key finding that was downplayed</li> <li>✓ Concluded “no sciatic involvement” despite evidence to the contrary</li> <li>✓ Didn’t acknowledge established UK/European evidence on distal spread</li> </ul>

**For Knee Sx**

- 10-20 mL
- 20-30 mL
- 30-40 mL

**Below-Knee Sx**

- A = Tibial nerve and t-tunnel peroneal nerves in the popliteal fossa
- B = Sciatic nerve in the popliteal fossa
- C = Sciatic nerve in the popliteal fossa

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Oct 25, 2025 · 2 tweets · [KartikBSonawane/status/1982020068390412389](https://twitter.com/KartikBSonawane/status/1982020068390412389)

💊 Off-Label ≠ Illegal - A Tradition of Innovation!

#OffLabelUse #EthicalMedicine #EvidenceBasedPractice #ClinicalJudgment  
 #MedicalInnovation #SafePractice #SmartMedicine #AcademicExcellence #Pharmacology  
 #DrugUse #ClinicalWisdom #ResponsibleInnovation  
 #MedTwitter #TipOfTheDay #MyRATips

Tip of the Day:

### 1 ♦ "Off-Label" Vs "Illegal"?

➡ "Off-Label" means using a drug for a condition, route, dose, or patient group not mentioned on its official label that lists only those indications tested & approved after manufacturer-led clinical trials.

🚫 "Illegal" means violating laws or regulatory boundaries - such as using banned drugs or bypassing ethics approval.

💬 Off-Label = beyond the label, not beyond the law.

⚖️ Off-label use, when backed by sound evidence & clinical judgment, is not illegal or unethical.

### 2 ♦ Off-Label Use: A Global Reality

🌍 Off-label prescribing isn't a new or risky trend - it's a decades-old medical practice followed across the world.

📄 For the past 30–40 years, countless studies have evaluated off-label use of many drugs, and these practices have been accepted and approved by scientific communities and ethical boards globally.

📊 In fact, some of today's standard "on-label" treatments originated as off-label discoveries!

### 3 ♦ FDA Clarification - Don't Get Confused!

🇺🇸 The Food & Drug Administration regulates drug approvals only in the United States.

🌍 Other countries have their own authorities (like CDSCO in India or EMA in Europe).

📄 So, a drug that isn't "FDA-approved" for a particular use may still be safely and ethically used off-label elsewhere, based on published evidence or local approval.

👉 Don't confuse "off-label" with "unapproved" - they're not the same.

### 4 ♦ Why It's So Common

💡 Manufacturers seek regulatory approval only for profitable indications, leaving many safe

& effective uses unexplored.

👨‍⚕️ Clinicians, researchers, and academicians step in - testing, publishing, & refining new applications for existing drugs.

📖 This academic freedom, supported by ethics committees & scientific evidence, drives medical progress.

#### 5 ♦ Global Acceptance & Studies

🌐 Off-label drug use studies are conducted & ethically approved across the U.S., Europe, Asia, and other regions.

🏛️ Regulatory bodies & institutional review boards (IRBs) evaluate such research for safety & scientific merit, not merely for label status.

✅ Once benefits are proven & published, off-label use becomes accepted clinical wisdom, even before formal manufacturer-sponsored approval.

#### 6 ♦ Examples Speak Volumes

💉 Ketamine once approved only for anesthesia, now widely used off-label for depression & chronic pain.

💊 Gabapentin initially approved for seizures, now a mainstay in neuropathic pain management.

💧 Dexamethasone studied off-label for airway edema, later endorsed during COVID-19, perineural adjuvant.

#### 7 ♦ Ethics + Evidence = Excellence

📖 Off-label use must rest on sound clinical data, not casual experimentation.

👨‍⚕️ When clinicians use drugs off-label responsibly - with documentation, consent, and scientific backing - it's ethical and progressive.

⚖️ The key is judgment, not just the label.

#### 8 ♦ Fun Analogy

📱 Your smartphone brochure mentions camera for photography/video calls.

🎬 If a filmmaker shoots a cinematic movie using it, that's off-label use - creative and effective!

🚫 But misusing it for illegal recording? That's a violation.

💡 Medicine works the same way - innovation within ethics is excellence.

#### ♦ Bottom Line - A Global Academic Perspective ♦

🌟 Off-label use is a legitimate, ethical, and evidence-driven part of modern medical practice.

💬 It has been researched, approved, & practiced worldwide for decades.

🧠 It's not illegal or unethical, but rather a cornerstone of evidence-based evolution in medicine.

⚖️ FDA approval applies regionally; medical ethics apply universally.

🌟 "Off-label isn't unlawful – it's thoughtful medicine guided by science and responsibility."

**Off-Label  
≠ Illegal**

**Beyond the label,  
not beyond the law.**

**Innovation,  
not violation.**

**Ethics + Evidence  
= Excellence.**

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unroll





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Jul 16, 2025 · 3 tweets · [KartikBSonawane/status/1945463554456617004](https://twitter.com/KartikBSonawane/status/1945463554456617004)

🔍 Critical Appraisal of the “Humeral Head Brachial Plexus Block” – A Technique in No Man’s Land 🚨

#RegionalAnesthesia #BrachialPlexusBlock #UltrasoundGuidedRA #AnatomyMatters  
 #PrecisionBlocks #NerveBlockInsights #CriticalAppraisal #ClinicalAnatomy #AnesTwitter  
 #InnovateWithCaution  
 #TipOfTheDay #MyRATips

Tip of the Day:

A. 🧠 Overview:

📝 The proposed technique claims to offer an alternative approach targeting terminal branches

📝 Upon deeper anatomical analysis, this technique appears misinterpreted, redundant, & potentially incomplete for upper limb surgical anesthesia.

📝 Appears to sit in a Transitional anatomical zone, overlapping elements of several established techniques - yet lacking the precision or completeness of any one of them.

B. 🦋 Where “Humeral Head” Technique Actually Falls?

- ◆ Deep to PMm, but superficial to subscapularis
- ◆ Lateral & inferior to coracoid, not as distal as axillary
- ◆ Proximal to branching, but more distal than classical infraclavicular
- ◆ Medial to the quadrilateral space, so axillary nerve not reliably reached
- ◆ Anterior to humeral head, which acts as a sonographic landmark

In short, it’s in a gray zone:

- ➡ Too proximal to be terminal branch-specific
- ➡ Too distal to be a robust infraclavicular block
- ➡ Too superficial to reach posterior elements like the axillary nerve reliably
- ➡ Not aligned with the subscapularis plane to ensure shoulder capsule analgesia

🟡 Conclusion: A gray zone block - not specific, not complete.

C. ⚠️ Key Anatomical Concerns:

1. Cords, Not Branches:

🟡 Despite being labeled as terminal nerves (MCN, MN, RN, UN, AN), the structures shown

are certainly cords, not true branches.

True terminal branches typically separate distal to the axilla, after passing under the pectoralis minor or in the proximal arm - not this proximally at the humeral head.

The MCN typically pierces the coracobrachialis in the upper arm, not at this level.

The axillary nerve travels posteriorly through the quadrilateral space, which this anterior approach doesn't reach.

Therefore, the anatomical labeling may be premature or incorrect, affecting the interpretation of their cadaveric and ultrasound findings.

## 2. Arm Positioning Alters Anatomy:

The technique uses 90° arm abduction & external rotation with elbow flexion, which causes:

Anterior displacement of the neurovascular bundle.

Stretching and flattening of the cords around the axillary artery.

The posterior cord to move deep & posterior - often obscured by the humeral head & not visible on ultrasound.

! Clinical Impact: The posterior cord (radial & axillary nerves) may not be reliably blocked - leading to partial motor or sensory sparing.

## 3. Sonoanatomical Confirmation:

The clavicular head of PMM originates from the medial half of the clavicle & extends laterally.

As you move your probe laterally under the clavicle, you begin to visualize:

- ♦ The posterior surface of PMM
- ♦ The underlying cords of the brachial plexus surrounding the axillary artery
- ♦ And later, the humeral head & coracoid process

## 4. Why This Matters?

Seeing PMM fibers in this block approach – probe positioned near the lateral infraclavicular region, just lateral to the clavipectoral triangle & above or near the level of the cords.

Means not too distal (axillary level) or too medial (supraclavicular level).

It supports - not at the level of terminal branches, but rather at the CORD LEVEL.

Also, the subclavius & pectoralis minor may not even appear clearly here - further suggesting this is near the lateral cord zone, under the lateral clavicle.

## D. Sits Between Established Blocks, Yet Captures None Fully:

This Technique lies between:

- ♦ Lateral Infraclavicular
- ♦ Axillary
- ♦ Shoulder PENG
- ♦ Coracobrachialis-Subscapularis Plane
- ♦ Supraaxillary Block

- But doesn't reliably block MCN, AN, or articular/posterior branches.
- Especially problematic in shoulder/humerus surgeries where these are key.
- Functionally mimics a lateral infraclavicular block, without improving access, ergonomics, or safety.
- Cadaveric validation was minimal (n=3), with limitations of static dye spread and no 3D mapping.

E.  Clinical Series (n=20) - Not Strong Enough to support Claims:

- 📌 2/20 had incomplete blocks → possibly MCN/AN sparing
- 📌 No dermatomal/motor mapping done
- 📌 No comparison with gold-standard blocks
- 📌 Type of surgeries not clarified (shoulder cases?)
- 📌 In more complex surgeries, the failure rate may be significantly higher.
- 🧠 So, clinical success ≠ anatomical precision

F.  Clinical Relevance:

- 🎯 No unique advantage over adjacent blocks
- 🎯 Risks partial/incomplete coverage - especially for shoulder or above-elbow surgeries
- 🎯 Likely to miss MCN and AN due to their early branching and fascial separation
- 🎯 Doesn't tap into the articular branches like PENG or posterior targets like subscapularis/SSN

G.  A Strong Point Worth Noting:

- 💡 The authors have taken a bold step in exploring a novel sonoanatomical window, anterior to the humeral head.
- 💡 It may inspire future investigations or refinement of technique.
- 💡 Their hybrid approach combining cadaver anatomy with clinical application promotes innovation
- 💡 Though this needs much stronger anatomical clarity & functional justification.

🏠 Take Home Messages 

- 📌 Mislabels cords as branches.
- 📌 Risks MCN, SSN & AN sparing - inadequate surgical anesthesia.
- 📌 Falls between known approaches - No unique clinical advantage.
- 📌 Should be treated as a variant of infraclavicular block with caution - not a replacement for standard techniques.
  
- 📌 Further studies with dye-injected cadavers, MRI contrast imaging, & comparative trials are necessary before this can be recommended clinically.

🔍 A thoughtful exploration - but perhaps a familiar road with new markings. Proceed with curiosity, & apply with caution.

# Critical Appraisal of the "Humeral Head Brachial Plexus Block"



## Different Prone Positions around the Axilla

Techniques	Anatomical Zone	Key Target
❖ Lateral Infraclavicular Block	Cords around axillary artery (under PMm)	Full brachial plexus cords
❖ Axillary BPB	Terminal branches in axilla	MCN, MN, UN, RN
❖ Shoulder PENG	Articular branches (SSN, AN) via subcoracoid plane	Shoulder capsule sensory block
❖ Coracobrachialis-Subscapularis Plane Block	Beneath subscapularis, targets AN, SSN	Shoulder & posterior joint
❖ Supraaxillary Block (Sekar)	At apex of axilla, high terminal branches	MCN, MN, UN, AN

**A.**  
(Lateral  
Infraclavicular  
Block)



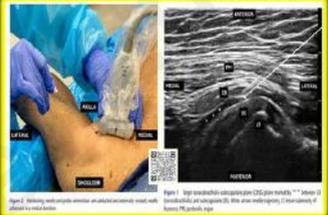
**B.**  
(Axillary  
BPB)



**C.**  
(Shoulder  
PENG  
Block)



**D.**  
(Coracob.-  
Subscapular  
Plane Block)



**E.**  
(Supra-axillary  
Block)



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image with corrected spelling - PROBE

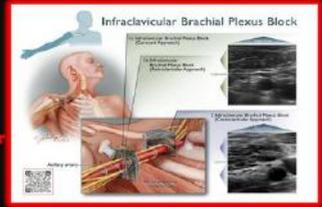


# Critical Appraisal of the "Humeral Head Brachial Plexus Block"

**F.**  
**(Humeral Head BPB)**



**A.**  
**(Lateral Infraclavicular Block)**



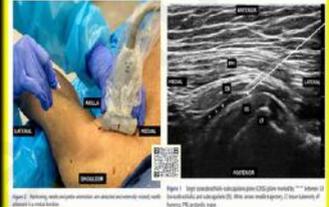
**B.**  
**(Axillary BPB)**



**C.**  
**(Shoulder PENG Block)**



**D.**  
**(Coracob.-Subscapular Plane Block)**



**E.**  
**(Supra-axillary Block)**



## Different Probe Positions around the Axilla

Techniques	Anatomical Zone	Key Target
❖ Lateral Infraclavicular Block	Cords around axillary artery (under PMm)	Full brachial plexus cords
❖ Axillary BPB	Terminal branches in axilla	MCN, MN, UN, RN
❖ Shoulder PENG	Articular branches (SSN, AN) via subcoracoid plane	Shoulder capsule sensory block
❖ Coracobrachialis-Subscapularis Plane Block	Beneath subscapularis, targets AN, SSN	Shoulder & posterior joint
❖ Supraaxillary Block (Sekar)	At apex of axilla, high terminal branches	MCN, MN, UN, AN

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May 26, 2025 · 2 tweets · [KartikBSonawane/status/1926927850872914123](https://twitter.com/KartikBSonawane/status/1926927850872914123)

🔍 ✨ "Seeing Beyond the Basics: Unlocking Clarity with Tissue Harmonic Imaging (THI)"

#TissueHarmonicImaging #UltrasoundGuidedBlocks  
 #RegionalAnesthesia #UltrasoundImaging #SonographyInAnesthesia #PrecisionMedicine  
 #PointOfCareUltrasound #MedEd #UltrasoundEducation  
 #AnesthesiaLearning #MedicalImaging  
 #TipoftheDay #MyRATips

Tip of the Day:

🧠 What is Tissue Harmonic Imaging (THI)?

➡️ THI is an advanced ultrasound technique that uses harmonic frequencies (created by the body's own tissues) to produce sharper, clearer images, helping to visualize nerves, fascial planes, and needle tips more confidently during regional blocks.

➡️ Analogy - Think of a song being played on a speaker in a noisy room. Standard ultrasound picks up the song plus all the background chatter. THI acts like noise-canceling headphones, filtering out the unwanted noise and letting you hear the song (important tissue details) clearly.

➡️ Simple Explanation: When an ultrasound wave (say, at 2 MHz) travels through the body, the tissues don't just reflect that exact wave. They distort it a bit, and in doing so, they generate new waves at higher frequencies - like 4 MHz, 6 MHz, etc. These are called harmonics.

The original wave = fundamental frequency (e.g., 2 MHz).

The new wave = harmonic frequency (e.g., 4 MHz, which is the second harmonic)

🌊 What Are Harmonic Waves?

📡 Ultrasound usually transmits a base frequency (fundamental wave).

🌈 As this wave travels through tissues, nonlinear propagation causes the wave to distort and produce new frequencies called harmonics.

🔄 The second harmonic (2× the original frequency) is the most useful – it's cleaner and less noisy.

🎯 Harmonics form only within the tissue, avoiding skin-level artifacts and improving deep structure imaging.

⚡ Higher-order harmonics (like 3rd or 4th) fade too quickly and are not used in clinical ultrasound.

⚙️ How Does THI Work?

### 🔄 1. Nonlinear Propagation

🔊 Sound wave speed changes with pressure inside tissues.

🔄 This distortion creates harmonic waves naturally as the wave travels.

🎯 These harmonics help create more detailed ultrasound images.

### 📈 2. Harmonic Formation

⚡ As energy shifts from the original frequency to harmonics, second harmonics dominate.

📦 Higher-order harmonics (3rd, 4th...) fade too fast to be useful.

### 🔧 3. THI Technologies

👉 Harmonic Band Filtering: Filters out the basic (fundamental) frequency and keeps only the second harmonic. Result: A cleaner, high-contrast image from deeper structures.

🔴 Pulse Phase Inversion: Sends two sound pulses, one normal and one inverted. When their echoes return, the fundamental signals cancel out, and the harmonic signals add up, giving a stronger and cleaner image.

### 📍 Why THI Matters in Regional Anesthesia?

👁️ See nerves and fascial planes more clearly

📏 Track needle tips with better precision

💧 Observe LA spread in real-time

💪 Boost confidence and safety in deep or challenging anatomy (e.g., obese patients)

### 👏 How THI helps in RA?

💡 Improved Image Clarity: THI reduces "speckle" and background noise. Makes tissues look less grainy and more defined. You get crisper outlines of nerves and muscles.

💡 Better Deep Structure Visualization: Especially useful in blocks like QL, sciatic, or infraclavicular, where the targets are deeper. THI helps make deep structures stand out more clearly.

💡 Enhanced Needle Tip Tracking: The cleaner image makes the echogenic needle tip easier to identify. Especially important when doing in-plane techniques or in patients with challenging anatomy (e.g., obese patients).

💡 Safer and More Accurate Blocks: With clearer images, you reduce the chance of accidental vascular puncture or nerve injury. It builds more confidence, especially for novice practitioners.

### ✅ Advantages of THI

🌟 Sharper images with better tissue contrast

🚫 Reduced clutter and reverberation artifacts

🔍 Enhanced visibility of low-contrast structures (like nerves)

🎯 Improved lateral resolution due to a narrower harmonic beam

## ⚠️ Limitations of THI

📉 Lower signal-to-noise ratio in superficial targets

📏 Less penetration depth (harmonics fade faster in deep tissues)

🔍 Axial resolution may be limited for very small targets

⚡ THI is less effective for very superficial structures because harmonic signals build up only after some depth (usually ~1.5 cm or more).

🚫 In shallow blocks like superficial cervical plexus or TAP, fundamental imaging might be better.

📏 It may slightly reduce frame rate, which can be adjusted.

## 🏠 Clinical Use Examples (Beyond RA)

👉 Liver: Better lesion margin visibility

👉 Kidneys: Distinguishes between cysts and solid masses

👉 Pregnancy: Enhances views of chorioamniotic separation

👉 Urinary tract: Improves detection of pelvic ectasia

## 📌 Take-Home Messages

✅ THI uses harmonic waves generated naturally within tissues - not just reflected echoes.

✅ It provides cleaner, high-resolution images that enhance accuracy and safety in RA.

✅ Harmonic signals build up only after some depth (usually ~1.5 cm or more)

✅ Especially helpful for deep structures, challenging patients, and precise needle tracking.

✅ Limitations exist, but with smart use, THI significantly improves the quality of ultrasound-guided blocks.

# TISSUE HARMONIC IMAGING

## USED IN REGIONAL ANESTHESIA

### What is THI?

THI is an advanced ultrasound technique that produces sharper and clearer images by using harmonic echoes – these are higher-frequency sound waves naturally generated by tissues

### How is THI helpful?

- Improved image clarity and definition
- Better deep structure visualization
- Enhanced needle tip tracking
- Safer and more accurate blocks

### Analogy:

Think of it like listening to music with background noise. Traditional ultrasound picks up all sounds, while THI acts like a smart filter that removes the noise to let you hear only the music more clearly.



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## TISSUE HARMONIC

Fundamental  
Return echo  
Harmonic

**Decreases Image Dynamic Range**

- Amplitude of the harmonic signal is lower in magnitude than the fundamental signal because of dynamic range of harmonic imaging is lower than the fundamental beam.
- it results in images with more contrast. Improve visualization.

**Better Lateral Resolution – Reduced Slice Thickness**

- Slice thickness of harmonic frequencies is narrower than the fundamental pulse
- The edges of any ultrasound beam produce fewer harmonics than central beam

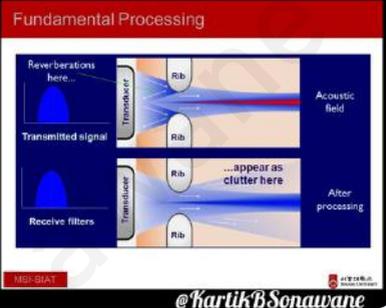
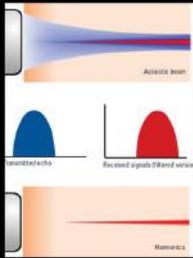
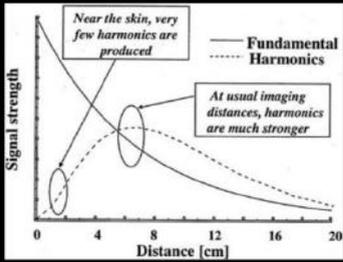
**Artifacts**

- Reduces some detrimental artifacts while useful artifacts are made more visible
- Square law in harmonic imaging, harmonic production is proportional to the square of the fundamental amplitude

**Worse Images in 'Glass Body' Patient**

- The resolution in harmonic images may be worse than fundamental imaging due to filtration decrease bandwidth
- Related to the better contrast resolution of the higher frequency fundamental image

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"🧠🦴 Vastoadductor Membrane (VAM): Gateway to Smart Analgesia in TKA 💡"

#VastoadductorMembrane #VAM #DualSubsartorialBlock  
 #MotorSparingAnesthesia #RegionalAnesthesia #AdductorCanalBlock  
 #UltrasoundGuidedBlock #AnatomyMatters #FascialPlanes #PeripheralNerveBlock  
 #AnesthesiaEducation #SmartBlocking #AnatomicalPrecision #TKAPainManagement  
 #EnhancedRecoveryAfterSurgery #FastTrackSurgery  
 #KneeSurgeryCare #TipoftheDay #MyRATips

Tip of the Day:

🧠 Anatomical Role of the VAM

📖 The VAM is a dense, collagen-rich fascial septum forming the anteromedial boundary of the adductor canal.

🏠 It lies deep to the sartorius, separating the vastus medialis muscle (VMM) from the adductor longus and magnus muscles.

🧱 It acts as a physical barrier and anatomical tunnel wall, crucial for directing local anesthetic (LA) flow.

📍 Attachments and Boundaries

- ◆ Laterally: Attaches to the posteromedial border of vastus medialis.
- ◆ Posteromedially: Anchors to the anterior surfaces of adductor longus (proximal) and adductor magnus (distal).

🧩 Forms the anteromedial fascial boundary of the adductor canal, opposite the posteromedial muscle wall.

📏 Extent and Dimensions

📏 Length: Approximately 7.6 cm from the apex of the femoral triangle to the adductor hiatus.

📏 Width: Varies - about 2.2 cm proximally, 1.7 cm midsection, and 0.5 cm distally.

📍 Proximal origin: Around 28 cm distal to ASIS.

📍 Distal termination: About 10 cm above the adductor tubercle.

🔗 Fenestrations in the VAM

🔍 Present in ~75% of cadaveric specimens.

🔄 Allow limited cross-compartment communication between the STM-VMM plane and the adductor canal.

● Fenestrations are physiological gaps in the VAM that allow passage of:

- Nerve to vastus medialis (NVM)
- Saphenous nerve branches (31%)
- Obturator nerve branches (12.5%)
- Perforating veins (22%)

#### 💧 Local Anesthetic Flow Dynamics

🌟 When LA is injected in the STM–VMM interfascial plane, it prefers to spread:

- ▼ Beneath the VAM into the adductor canal - the path of least resistance.
- 🔄 Along the natural musculoaponeurotic tunnel, facilitating broader spread and nerve coverage.

⚠️ While fenestrations exist, they offer greater fascial resistance than the canal tunnel, hence most LA flows under the VAM, not through it.

#### 💡 Clinical Relevance in Regional Anesthesia

✗ ACB targets the saphenous nerve, but often misses the NVM and other terminal femoral branches.

✓ DSB uses:

- 👉 A proximal injection in the STM–VMM plane to directly block NVM and SN.
- 👉 A second injection into the adductor canal to reinforce distal coverage.

👉 Why ACB Alone is Not Enough for TKA?

✗ ACB only targets the saphenous nerve in the adductor canal.

✗ It misses:

- 💡 NVM (often outside the canal in the STM–VMM plane)
- 💡 Peripatellar plexus and Subsartorial plexus branches
- 💡 Obturator nerve contributions and
- 💡 Posterior knee nerves (if volume <15ml)

🔄 While fenestrations help some spread, they are not sufficient alone to ensure full knee coverage.

#### 🧠 Take-Home Messages

🔧 The VAM is not the roof of the AC - that's the sartorius. Instead, VAM forms the medial fascial wall that governs how LA spreads.

✓ The VAM is not just a fascial boundary - it's an anatomical gateway that determines the success or failure of motor-sparing regional anesthesia techniques.

📦 LA injected beneath the VAM into the adductor canal flows easily along the low-





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"🔍 Why the Dual Subsartorial Block (DSB) Stands Apart"

Anatomically Accurate, Mechanistically Superior, & Clinically Purposeful.

#DualSubsartorialBlock #FemoralTriangleBlock  
 #AdductorCanalBlock #RegionalAnesthesia  
 #UltrasoundGuidedBlock #MotorSparingAnesthesia  
 #AnatomyMatters #ProcedureSpecificBlock  
 #InnovativeAnesthesia #ERASProtocol  
 #TKARecovery #SmartBlocking  
 #TipoftheDay #MyRATips

Tip of the Day:

📖 The Dual Subsartorial Block (DSB) is not simply a blend or variant of the Femoral Triangle Block (FTB) or Adductor Canal Block (ACB).

📖 It is a purpose-designed, dual-injection technique offering multi-plexus level analgesia while preserving motor function - something neither FTB nor ACB can fully achieve.

✅ Key Distinctions: DSB vs FTB & ACB

📍 1. Injection Location and Planes

◆ FTB: Injected within the femoral triangle, just below the inguinal crease, directly near the femoral nerve trunk → potential motor involvement.

◆ ACB: Injected within the mid-thigh adductor canal, distal and narrow in reach.

◆ DSB: Both injections are subsartorial.

● First injection is between Sartorius Tendon Medially (STM) and Vastus Medialis Muscle (VMM) - not inside the true femoral triangle.

● Second injection is in the true adductor canal.

📍 2. Spread Pattern

📍 FTB: Drug spreads directly inside the FT, over iliopsoas, often reaching motor branches.

📍 ACB: Localized spread, minimal cephalad extension, limited knee coverage.

 DSB: Volume-dependent spread:

-  Directly reaches NVM and SN in the STM–VMM plane.
-  Indirectly spreads proximally into the FT, engaging peripatellar plexus.
-  Distally spreads under sartorius, engaging the subsartorial plexus.

### 3. Nerve Coverage

- ◆ FTB: Femoral nerve and its branches, trunk, SN, ± Obturator/LFCN.
- ◆ ACB: SN, ± NVM (if done more proximally).
- DSB: SN, NVM, ± indirect femoral branches → multi-plexus level block (Peripatellar + Subsartorial plexus).

### 4. Motor-Sparing Profile

 FTB: Risk of quadriceps weakness due to proximity to femoral nerve.

 ACB: Low risk - but insufficient for full knee coverage.

● DSB: Designed for motor preservation - avoids direct contact with femoral trunk while achieving broad sensory coverage.

### 5. Clinical Application

 FTB: Broad analgesia, acceptable when motor loss isn't a concern.

▼ ACB: Good for distal medial leg, but incomplete for knee surgeries.

 DSB: TKA-specific block under ERAS protocols - maximizes pain relief, preserves strength, supports early ambulation.

### Take-Home Message

 DSB is a strategically designed, plane-specific technique, not a true hybrid or extension of FTB or ACB.

 It targets STM–VMM interfascial plane and true adductor canal, enabling volume-driven, multi-plexus coverage without compromising motor function.

 Unlike FTB (which risks motor block) or ACB (which lacks full coverage), DSB uniquely balances analgesia and mobility, making it the ideal block for TKA and anterior knee procedures.

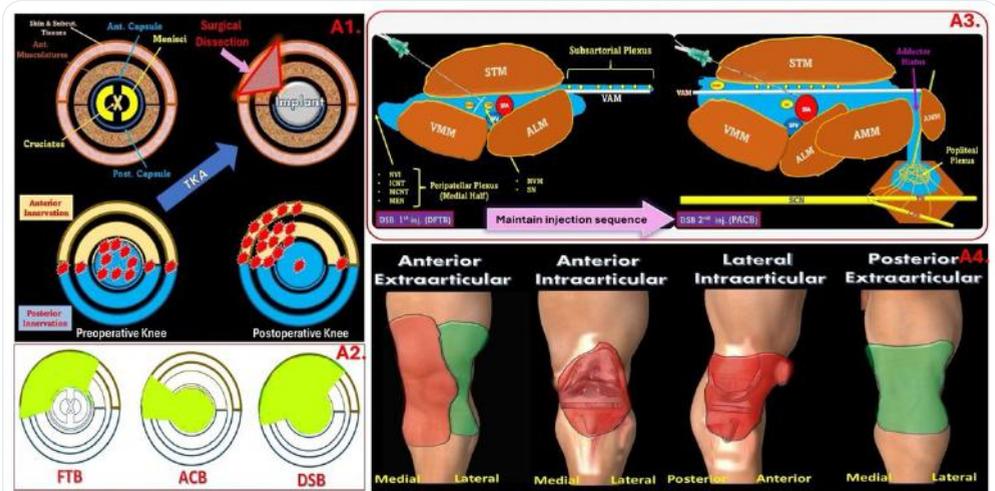
For more details about its innovation, Click the following link:

## DSB vs Conventional FTB and ACB

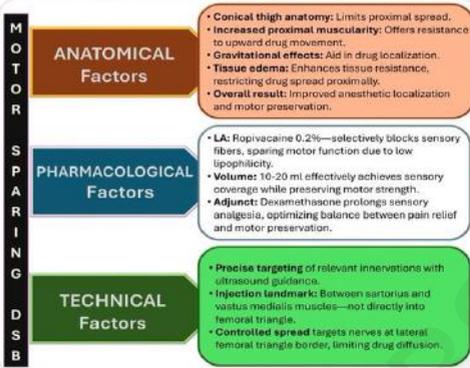
Parameters	Conventional FTB	Conventional ACB	Dual Subartorial Block (DSB)
❖ Block type	Single-injection	Single-injection	Dual injections below STM
❖ Year of Description	2015-2018 (Mislabelled as ACB)	2013 (Given most of the time in FT)	Concept: 2017, Presented: 2018, Published: 2020
❖ Anatomical landmark	Variable (not fixed)	Mid-thigh level	Apex of FT (sign of 3) for both injections
❖ Injection site	Within the distal FT	Mid-thigh AC	<b>FTB:</b> 1-2 cm proximal to apex of FT; <b>ACB:</b> 1-2 cm distal to the apex of FT.
❖ Technique	Injected adjacent to the FA targeting SN within FT	Targeting SN in mid-thigh without specific fascial precision	<ul style="list-style-type: none"> <li>• <b>FTB component:</b> Indirect, not within distal FT; between STM and VMM, targeting NVM and SN lateral to FA.</li> <li>• <b>ACB component:</b> Especially in proximal AC to avoid proximity to the sterile surgical field. Administered only after the FT injection</li> </ul>
❖ Target nerves	SN ± NVM	SN Popliteal plexus if Volume >20ml	<b>FTB:</b> SN + NVM, Subartorial and Peripatellar plexus <b>ACB:</b> SN, perivascular under the VAM, Popliteal plexus
❖ Volume of LA	15-20 ml	15-20 ml	10-20 ml + 10-20 ml (split between sites)
❖ Volume-Dependent Spread	Not primarily	Limited	Critical for full effect
❖ Coverage	Partial anterior/medial knee	Intraarticular and partial anterior knee	Comprehensive (anterior, posterior, intraarticular, and extraarticular)
❖ Involvement of Peripatellar Plexus	Possible (via direct spread)	No	Yes (via indirect spread from STM-VMM plane)
❖ Involvement of Subartorial Plexus	No	Partial	Yes (distal spread under sartorius)
❖ Motor Block Risk	Moderate to High	Low	Very Low
❖ Clinical Use	Thigh and knee analgesia	Motor-sparing analgesia	TKA with medial approaches under ERAS
❖ Purpose/Design Intent	Motor-sparing variant of femoral nerve block	Distal sensory block preserving quadriceps strength	Procedure-specific block maximizing analgesia and motor-sparing

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### A. Procedure-specific DSB



### B. Motor-sparing DSB



### C. Precision-type DSB

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🧠👎 "From Calm to Coma: Navigating the Sedation Spectrum in RA" 📌💤

#Sedation #Sleep #Anesthesia #MedicalEducation #MedTwitter #SleepVsSedation  
 #SedationContinuum  
 #AwakeSurgery #ConsciousSedation #SmartSedation  
 #AnesthesiaAwareness #MinimalToGeneral #FromSleepToGA #SedationinRA  
 #ProceduralSedation  
 #TipoftheDay #MyRATips

Tip of the Day:

Sedation isn't sleep, and anesthesia isn't silence.  
 Let's decode the difference.

🎯 Indications for Sedation in RA

- ◆ To relieve anxiety or fear of procedures
- ◆ Awkward or painful patient positioning
- ◆ During long/uncomfortable surgeries under RA
- ◆ If the block is partial/not fully effective
- ◆ For restless/ non-cooperative/psychiatric patients

🧩 When to Use What?

💧 Sedative alone: Block fully effective, just need comfort. → Midazolam, Dexmedetomidine

🌟 Sedative + Analgesic: Painful procedure or incomplete block. → Midazolam + Fentanyl/Ketamine

🕒 Prolonged RA Surgery: Dexmedetomidine infusion for cooperative, calm sedation

🧠 Mnemonic: R-A-M-S — Understanding Sedation Depth

- ◆ R – Responsive (Minimal Sedation)
- ◆ A – Arousable (Moderate/Conscious Sedation)
- ◆ M – Motor response only to pain (Deep Sedation)
- ◆ S – Silent/Unresponsive (General Anesthesia)

🧬 Where Lorazepam and Haloperidol Fit In

- ◆ Lorazepam: Ideal for anxious patients, alcohol withdrawal, or night-before premedication
- ◆ Haloperidol: Best for delirium, agitation, post-op restlessness, or PONV

## Alternatives to Sedation

 Music therapy (via headphones)

 Relaxation techniques: Guided breathing, counting, muscle relaxation

 Virtual Reality (VR) distraction (pediatric and needle-phobic adults)

 Phone or tablet entertainment

 Hypnosis or visualization (highly motivated or trained patients)

 Clear explanation and empathetic communication

 Patient education: Reduces anxiety, boosts cooperation

## Patient Concerns About Sedation

 Side Effects: Drowsiness, nausea, vomiting, or apnea

 Loss of Control: Fear of unconsciousness or “not knowing”

 Cognitive Impairment: Especially in elderly or neuro-sensitive patients

 Substance Use History: May trigger concerns of relapse or misuse

## Situational Tricks for Smart Sedation

 Refuses sedation: Offer control (music, environment), use dexmedetomidine sos

 Painful fracture positioning: Low-dose Ketamine, add Fentanyl if severe

 Delirium/agitation: Use Haloperidol instead of BZD

 Elderly patients: Minimize drug load, avoid BZD unless needed. Best options:

Dexmedetomidine, Low-dose Midazolam

 Long procedure under RA: Initiate Dexmedetomidine

 Incomplete block: Combine with local infiltration + opioids or Ketamine.

## Final Tips & Tricks

 Start low, go slow

 Explain everything — sedation starts with trust

 Target response, not unconsciousness

 Always be ready to manage airway—even if you don't expect to

 Monitor smarter: Capnography + pulse oximetry for combos

 Test sedation depth before procedures start—avoid surprises

 Remember:

 Not all sleep is peaceful, some is pharmacologically planned.

 In the spectrum between anxiety and apnea lies the sweet spot of sedation.

 The right dose can soothe a mind - or silence a system. Choose wisely.

## Understanding the Continuum: Sleep, Sedation & Anesthesia



	Physiological	Drug-Induced Anxiolysis	Drug-induced Drowsiness	Drug-induced depressed Consciousness	Drug-induced depressed Consciousness
❖ State	Arousable/ Purposeful response	Arousable Purposeful response	Arousable Purposeful response	Unarousable/ Nonresponsive to Pain	Unconscious/ Nonresponsive
❖ Responsiveness	Normal	Unaffected	Unaffected	Can be Impaired	Absent
❖ Airway reflexes	Spontaneous	Spontaneous	Spontaneous	Assisted	Assisted/ Controlled
❖ Ventilation	Sleep	Premedication/Anxiolysis	Minor Procedures	More invasive Procedure/Discomfort	Major Surgeries
❖ Indications					

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## Pharmacological Agents Used for Sedation in Regional Anesthesia

Drug	Class	Usual Dose (IV)	Onset	Duration	Advantages	Cautions
❖ Midazolam	Benzodiazepine	0.5–2 mg (titrate slowly)	1–2 min	30–60 min	Anxiolysis, amnesia, fast onset	Respiratory depression, paradoxical reactions
❖ Propofol	Sedative-hypnotic	25–75 mcg/kg/min (infusion)	30–60 sec	5–10 min	Titratable, short-acting, antiemetic	Hypotension, apnea with bolus
❖ Dexmedetomidine	Alpha-2 agonist	0.5–1 mcg/kg loading, 0.2–0.7 mcg/kg/hr	5–10 min	60–120 min	Minimal respiratory depression	Bradycardia, hypotension
❖ Fentanyl	Opioid	25–50 mcg bolus	2–5 min	30–60 min	Strong analgesia	Respiratory depression, chest wall rigidity
❖ Ketamine	NMDA antagonist	0.25–0.5 mg/kg	30–60 sec	10–20 min	Analgesia, maintains reflexes	Hallucinations, ↑HR/BP
❖ Nitrous Oxide	Inhaled agent	30–50% via mask	Rapid	Continuous	Non-invasive, anxiolysis	Diffusion hypoxia, nausea
❖ Remifentanyl	Ultra-short opioid	0.05–0.1 mcg/kg/min infusion	1–2 min	3–10 min	Ultra-short, easily titratable	Needs close monitoring
❖ Lorazepam	Benzodiazepine	0.5–2 mg IV/IM/PO	5–20 min	6–10 hrs	Longer-lasting anxiolysis, premedication	Sedation, confusion (elderly)
❖ Haloperidol	Antipsychotic	0.5–2 mg IV/IM	10–20 min	6–20 hrs	Delirium control, antipsychotic, PONV	QT prolongation, extrapyramidal symptoms

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# From Blocks to Brilliance: 54 Academic Tips in Regional Anaesthesia

By Dr. Kartik Sonawane

## My RA TIPS (pdf with clickable links)

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