

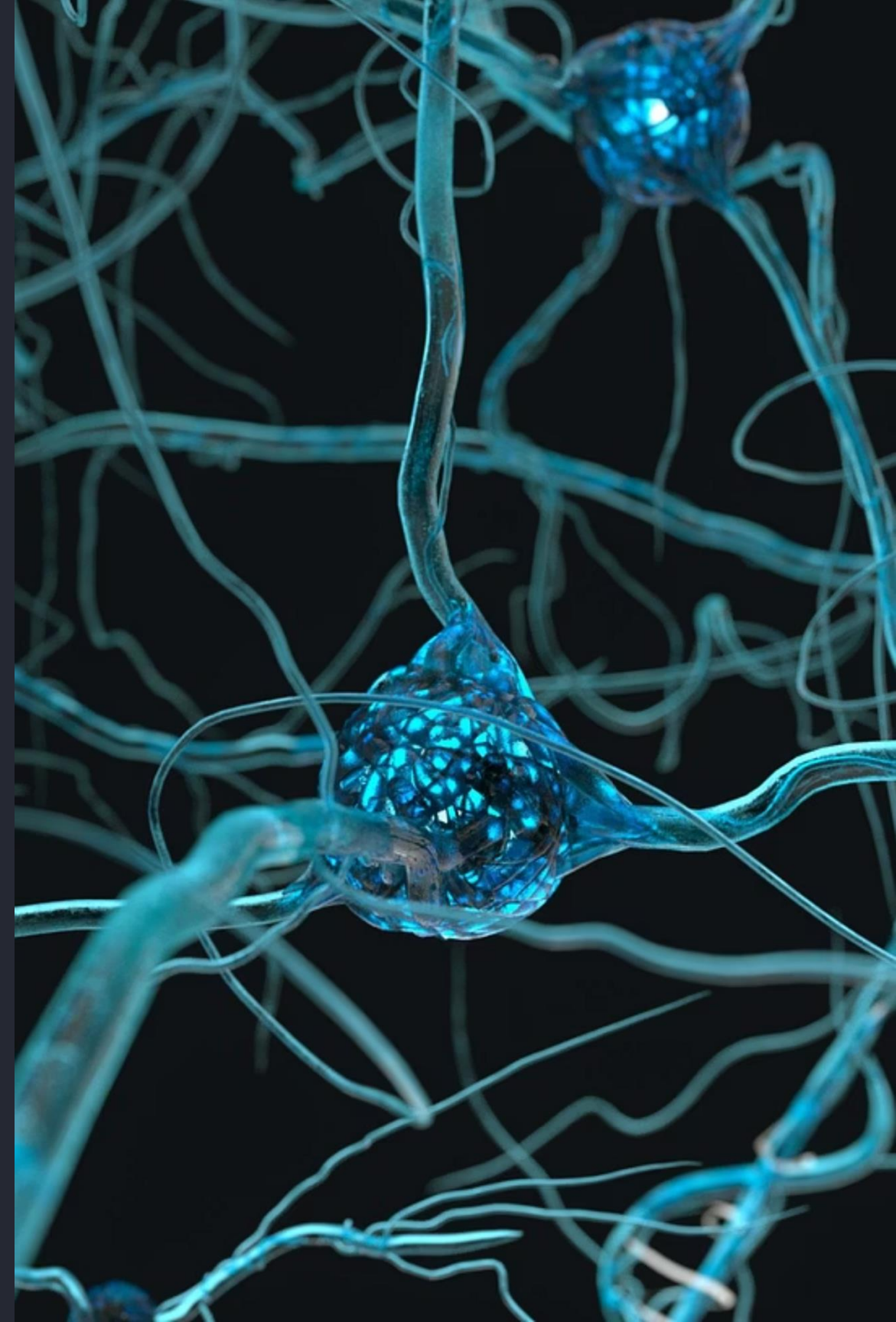
Intercostal Nerve Blocks

Matthew McClure, MD

Associate Professor, Anesthesiology

Medical Director and Division Chief

UT Health San Antonio



Disclosures

Funded Research

- *SPR Therapeutics*
- *Averitas Pharma*

Education Grants

- *Medtronic*
- *Boston Scientific*
- *Abbott*

Society Leadership

- *Legislative Committee Member, Texas Pain Society*
- *Alternate Delegate, Texas Society of Anesthesiology*

Employment

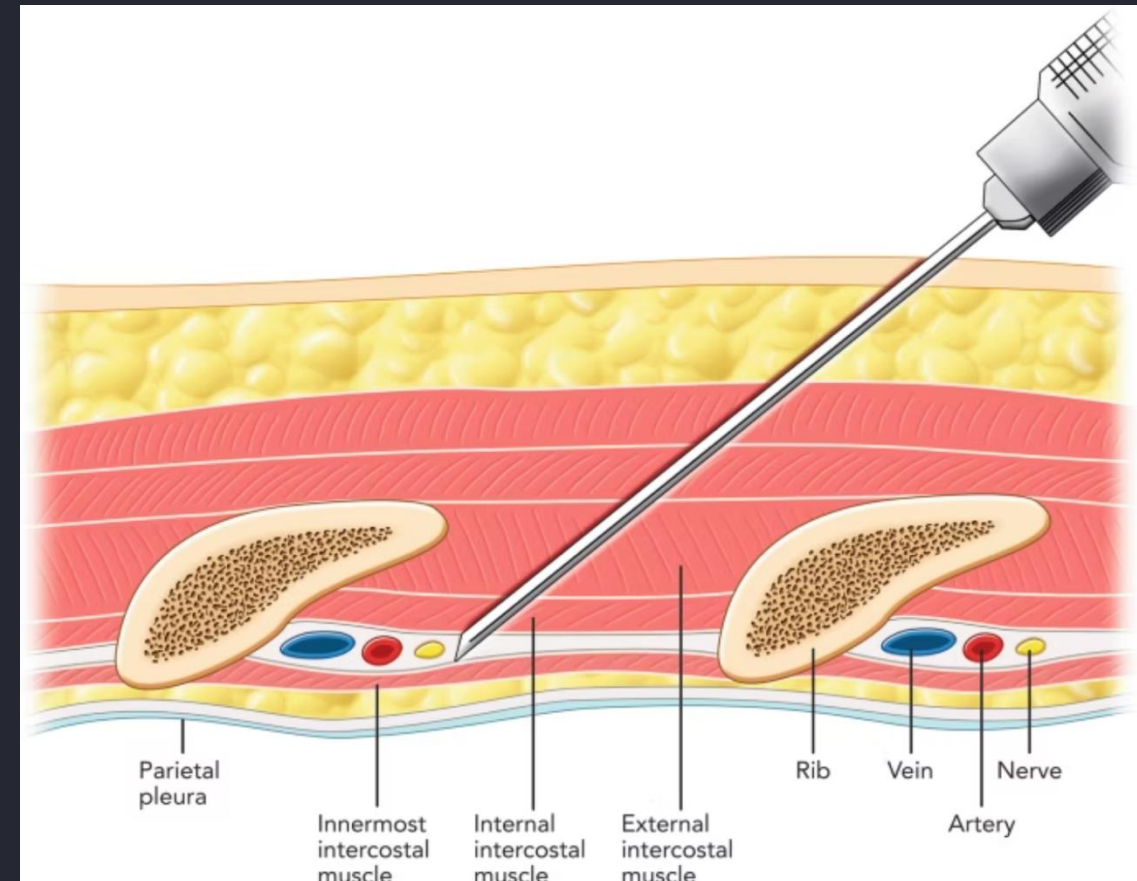
UT Health San Antonio

Objectives

- *Understand anatomy of intercostal nerves*
- *Indications for intercostal nerve blocks*
- *Techniques and approaches*
- *Risks and complications*
- *Clinical applications*

Anatomy

- *Intercostal nerves: Ventral rami of thoracic spinal nerves (T1–T11)*
- *Run along inferior border of each rib (neurovascular bundle: vein, artery, nerve 'VAN')*
- *Provide motor supply to intercostal muscles and sensory innervation to thoracic/abdominal wall*



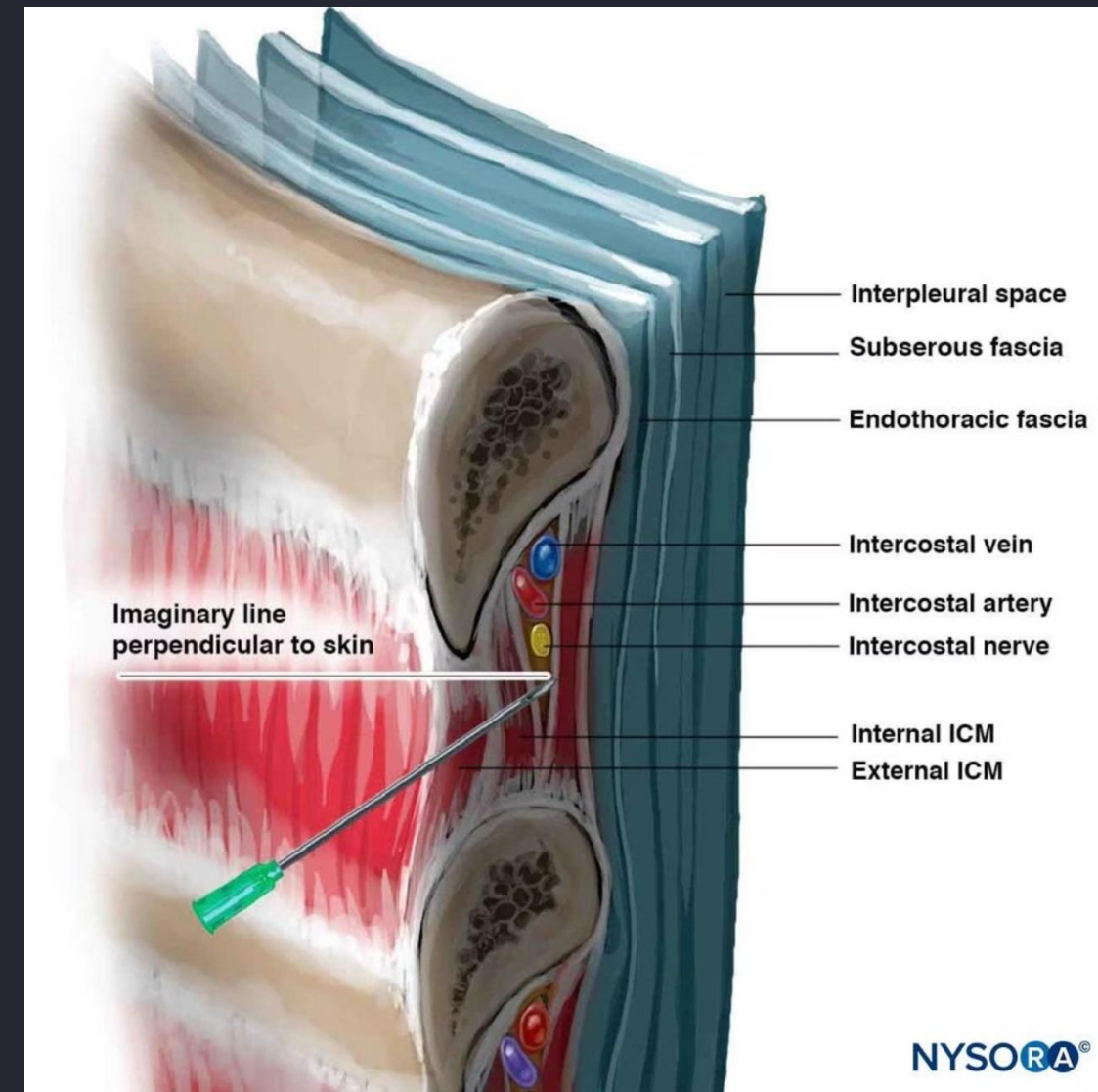
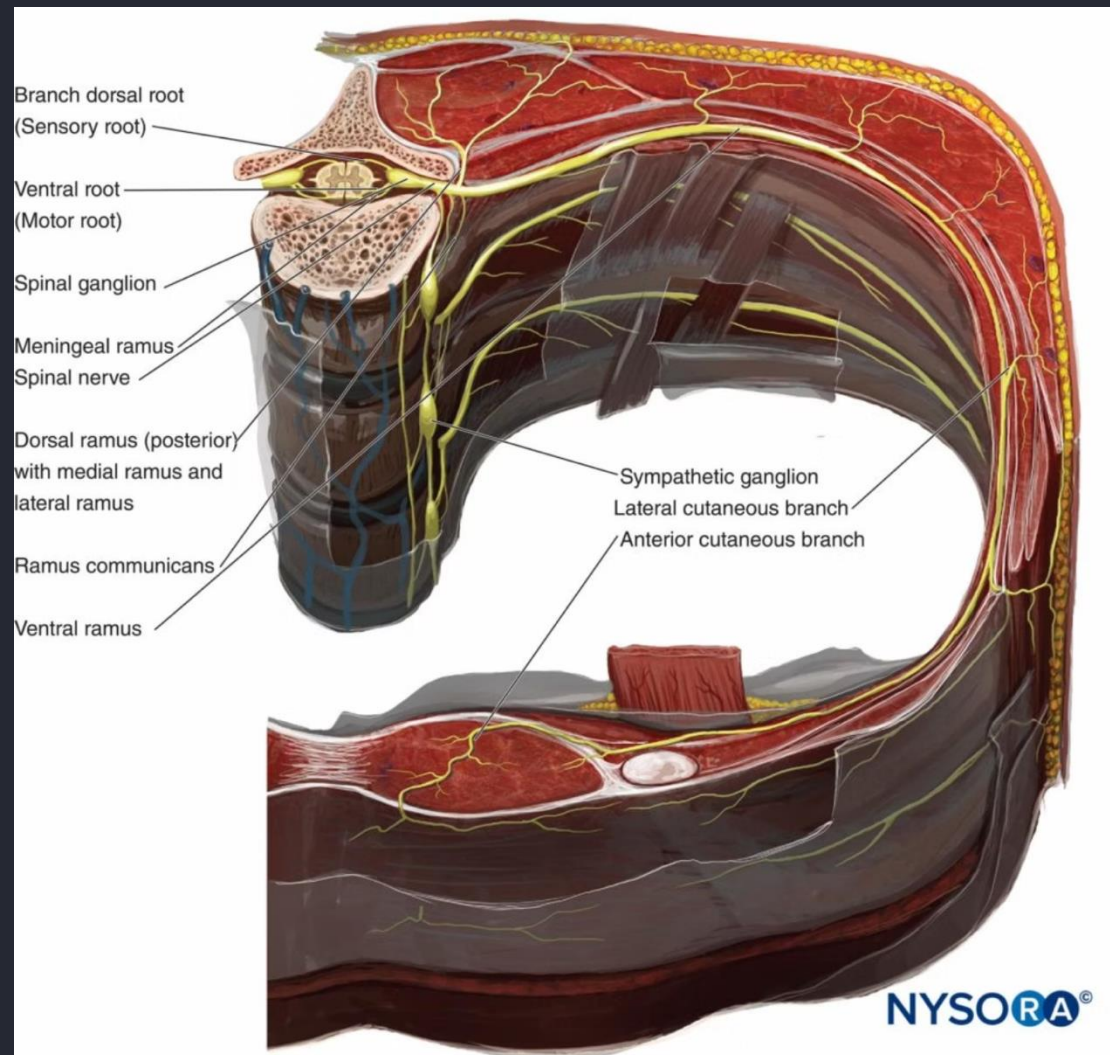
Indications

- *Rib fracture Pain*
- *Post-thoracotomy pain*
- *Upper abdominal surgeries*
- *Breast surgery*
- *Post-herpetic neuralgia*
- *Chronic abdominal wall pain*

Contraindications

- *Patient refusal*
- *Infection at injection site*
- *Allergy to local anesthetic*
- *Coagulopathy (relative contraindication)*

Rib Anatomy and Innervation



Technique

- *Patient positioning: sitting, lateral, or prone*
- *Identify rib at target level*
- *Target identified 6-8 cm off midline*
- *Insert needle just inferior to rib, advance until rib contacted*
- *Walk needle off inferior border, advance slightly*
- *Aspirate (avoid intravascular injection)*
- *Inject local anesthetic (3–5 mL per level)*

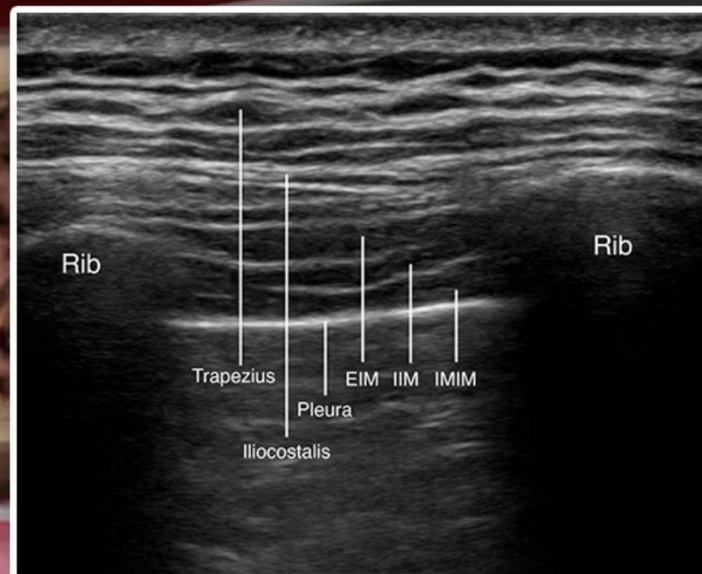


Brought to you by
NYSORA[®]
NERVE BLOCKS APP

Trapezius

Iliocostalis muscle

Rib



EIM

IIM

IMIM

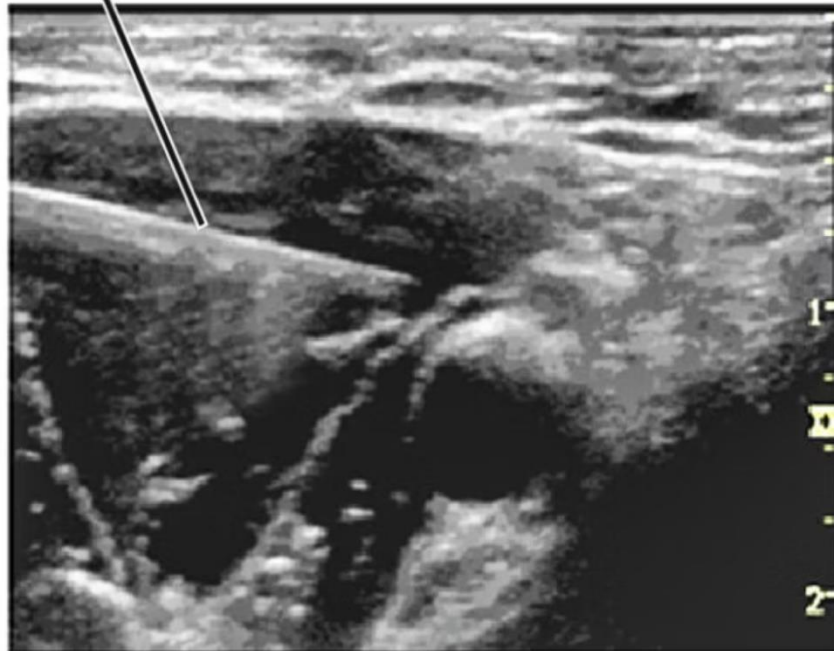
Intercostal
nerve, artery
and vein

Ultrasound Guidance

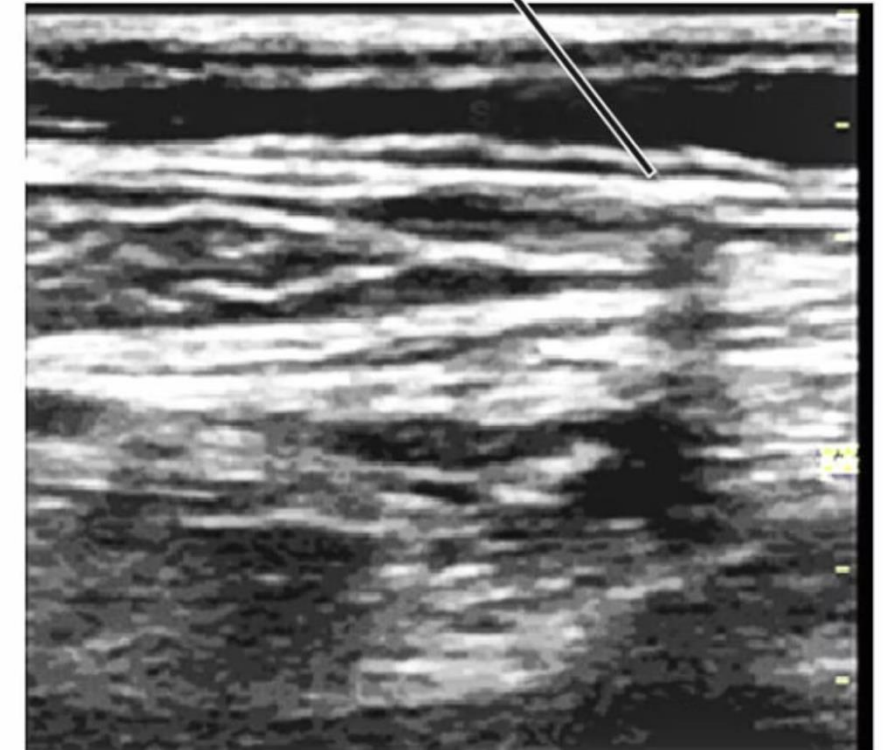
- *High-frequency linear probe*
- *Identify rib, pleura, and neurovascular bundle*
- *Safer and more accurate than landmark-only technique*

Needling Techniques

Needle



Needle Shaft



In-plane (Long Axis) Approach

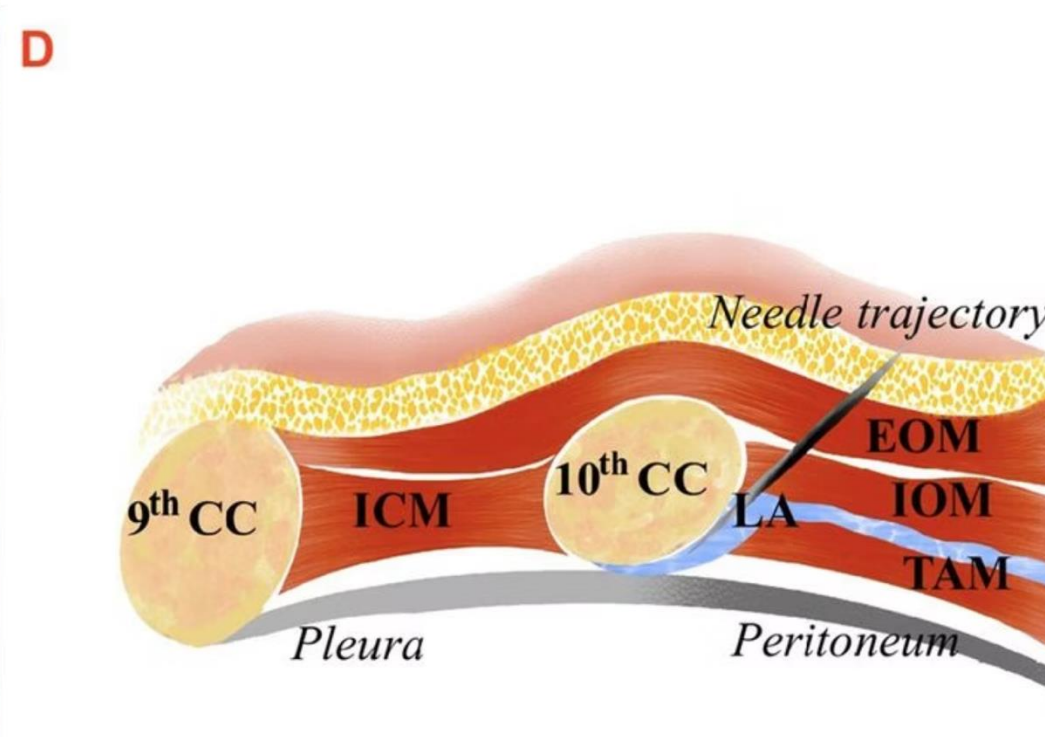
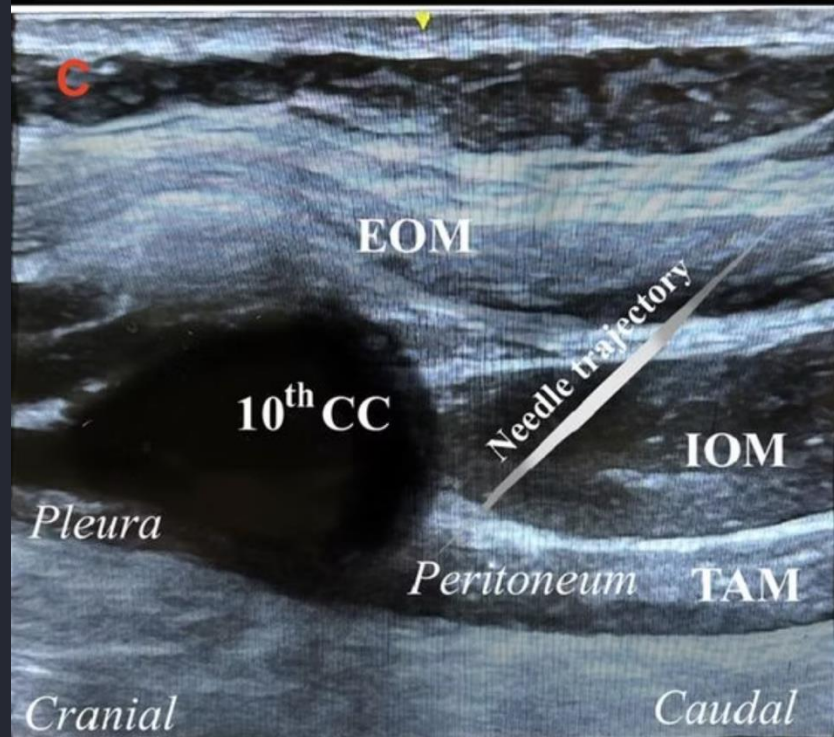
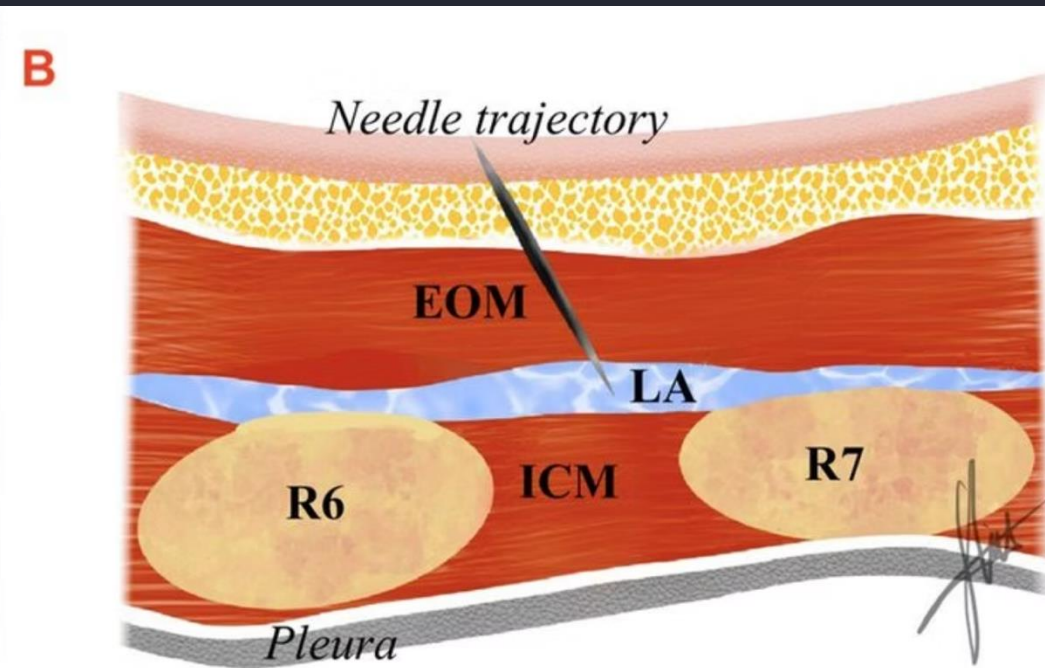
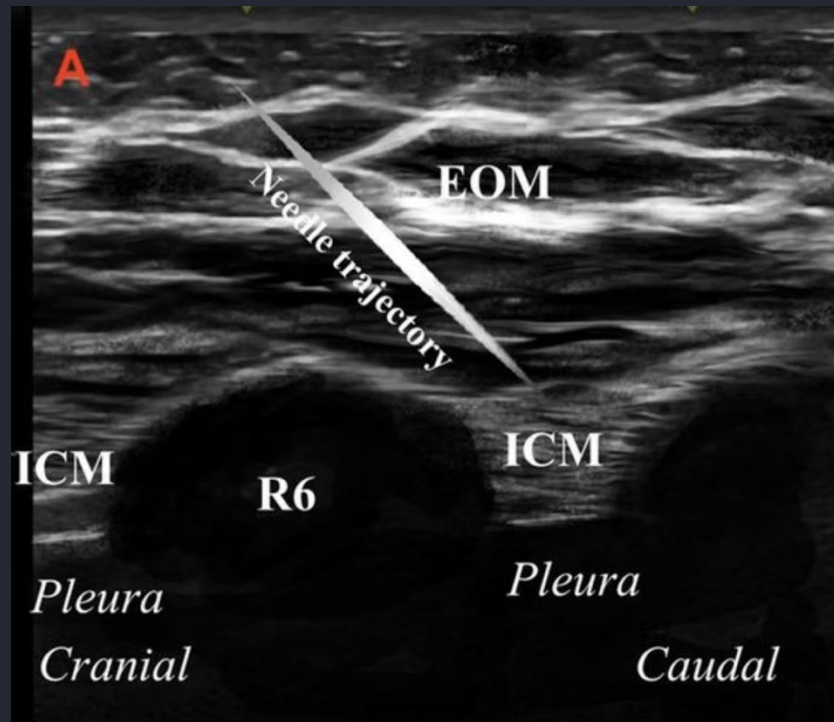
Out-of-plane (Short Axis) Approach

In-Plane Technique

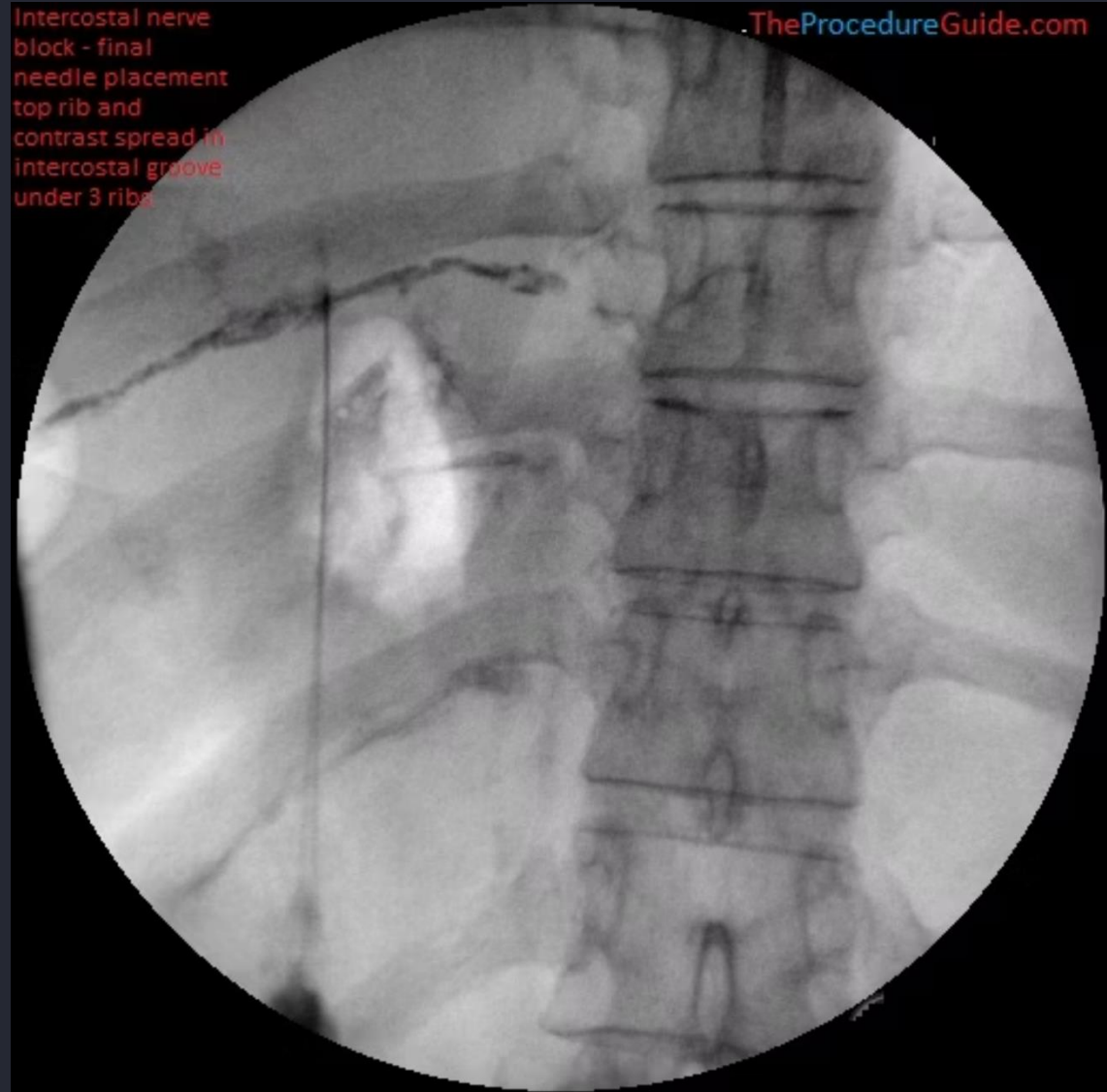
- *Advance through:*
 - *Skin/subcutaneous tissue*
 - *External intercostal*
 - *Internal intercostal → Stop just superficial to the **pleura**, between internal and innermost muscles.*
- *Needle tip in view at all times*
- *Slowly inject 3–5 mL of local anesthetic per level, observing spread along the neurovascular bundle.*

Out-of-Plane Technique

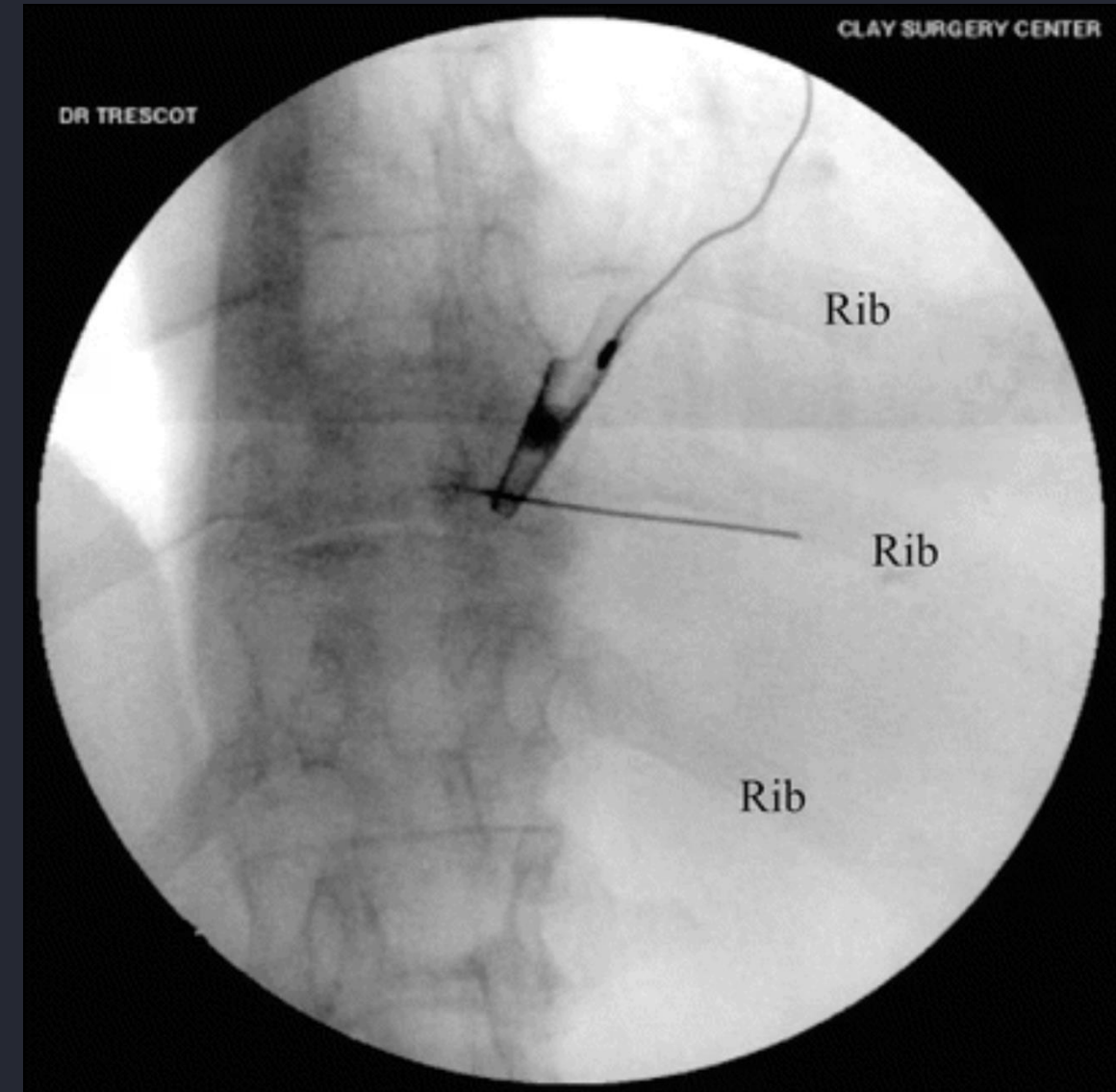
- *Advance through:*
 - *Skin/subcutaneous tissue*
 - *External intercostal*
 - *Internal intercostal → Stop just superficial to the **pleura**, between internal and innermost muscles.*
- *Needle tip only visualized closer to target site*
- *Hydro-dissection aids needle localization*
- *Slowly inject 3–5 mL of local anesthetic per level, observing spread along the neurovascular bundle.*



Fluoroscopic Techniques



Radiofrequency Ablation



Complications

- *Pneumothorax*
- *Local anesthetic systemic toxicity (LAST)*
- *Abdominal viscera trauma (lower levels)*
- *Infection*
- *Bleeding /Hematoma*
- *Increased Pain*

Clinical Pearls

- *Multiple levels often required centered around site*
- *Use of imaging decreases complications*
- *Anticoagulation risks are risk/benefit*
- *Limit total anesthetic dose to avoid toxicity*

Summary

- *Intercostal nerve blocks are effective for thoracic and upper abdominal pain control*
- *RFA is a viable procedure for longer lasting relief*
- *Safe when performed with anatomical knowledge and precautions*
- *Useful in trauma, surgery, and chronic pain management*

References

- *Netter FH. Atlas of Human Anatomy. 7th ed. Elsevier; 2018.*
- *New York School of Regional Anesthesia (NYSORA). Intercostal nerve block – techniques and anatomy. Accessed October 2025.*
<https://www.nysora.com>
- *Hadzic A, ed. Hadzic's Textbook of Regional Anesthesia and Acute Pain Management. 2nd ed. McGraw-Hill Education; 2017.*
- *Horlocker TT, Vandermeulen E, Kopp SL, Gogarten W, Leffert LR, Benzon HT, et al. Regional anesthesia in the patient receiving antithrombotic or thrombolytic therapy: Fifth edition evidence-based guidelines. Reg Anesth Pain Med. 2025; Publish Ahead of Print.*
[doi:10.1136/rapm-2024-105766](https://doi.org/10.1136/rapm-2024-105766).
- *Hebl JR, Neal JM. Regional anesthesia in the patient receiving antithrombotic or thrombolytic therapy: ASRA guidelines. Reg Anesth Pain Med. 2019;44(3):225-262.*
- *Marhofer P, Chan VWS. Ultrasound-guided regional anesthesia: current concepts and future trends. Br J Anaesth. 2020;124(5):641-655.*