Regional Anesthesia

QL and ESP Blocks: The Grail of Truncal Analges

Shane Garner, CRNA

Disclosures

- None

PECS1
PECS2
Serratus anterior plane (SAP) - superficial & deep
Transversus thoracic plane (TTPB)
Pecto-intercostal fascial plane (PIFP)
Retrolaminar
Erector spinae plane (ESP)
Midpoint transverse process-to-pleura (MTP)
Paraspinal - intercostal plane
Rhomboid intercostal subserratus plane (RISS)
Subcostal TAP
Lateral TAP
Posterior TAP
Rectus sheath
Trasversalis fascial plane (TFP)
Lateral quadratus lumborum (QL1)
Posterior quadratus lumborum (QL2)
Transmuscular quadratus lumborum (QL3)

More fascial plane blocks? Why not just perform an epidural or

Epidural Analgesia

Advantages

- Superior analgesia
- Single catheter
- Somatic and visceral coverage
- No ultrasound needed

Epidural Analgesia

Disadvantages

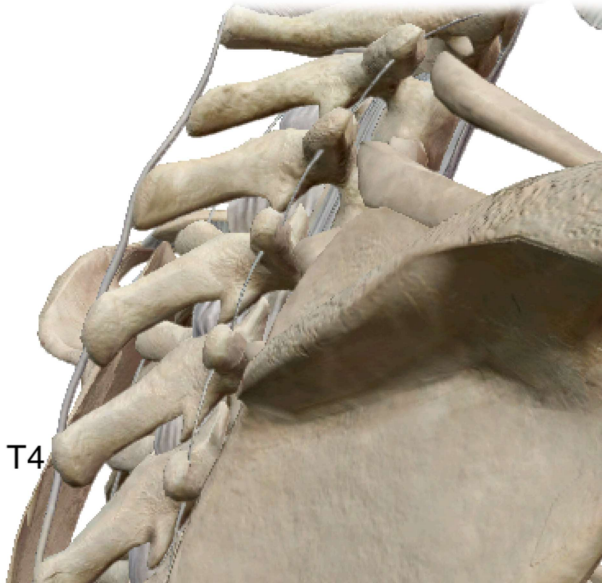
- Block side effects and failure
- Difficult to fast-track
- Costly and labor intensive
- Prophylactic anticoagulant regimens

SPECIAL ARTICLE

Epidural Technique for Postop

Gold Standard No Mor

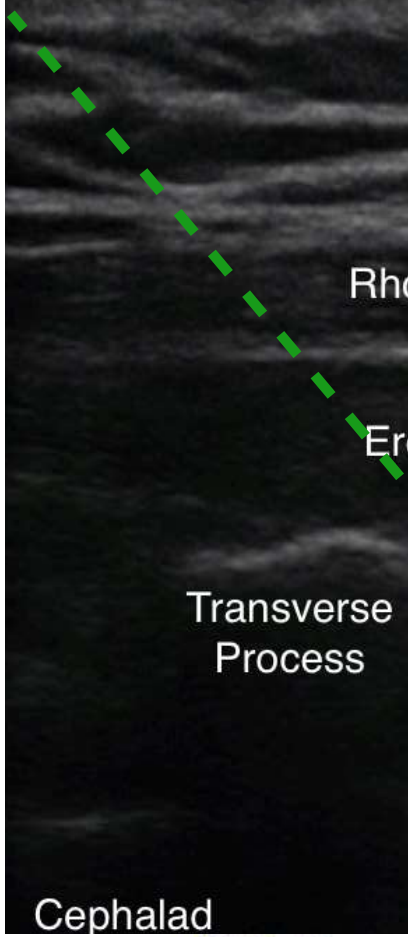
Narinder Rawal, MD, PhD

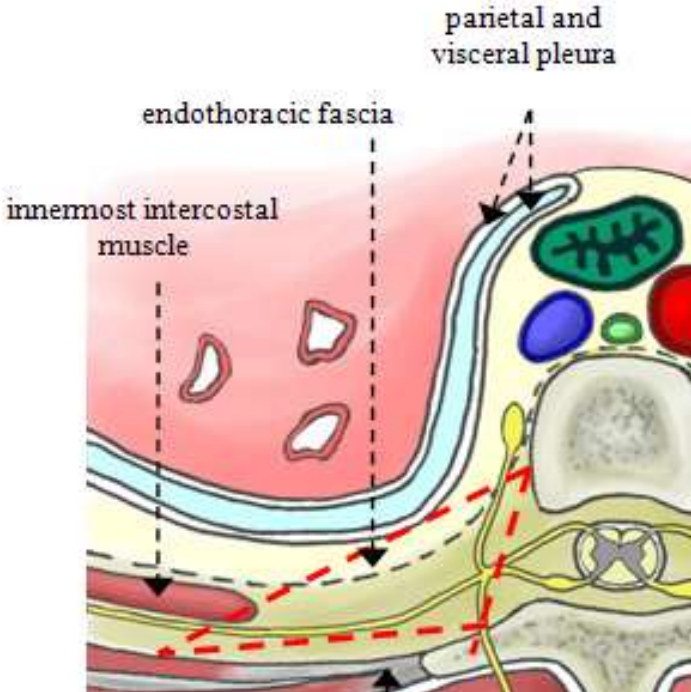


Paravertebral Block

Pros and Cons

- **Effective anesthesia and analgesia**
- **Requires advanced skills**
- **Risk of pneumothorax and sympathetic adverse effects**
- **Difficult in high BMI**





Fascial Plane Blocks

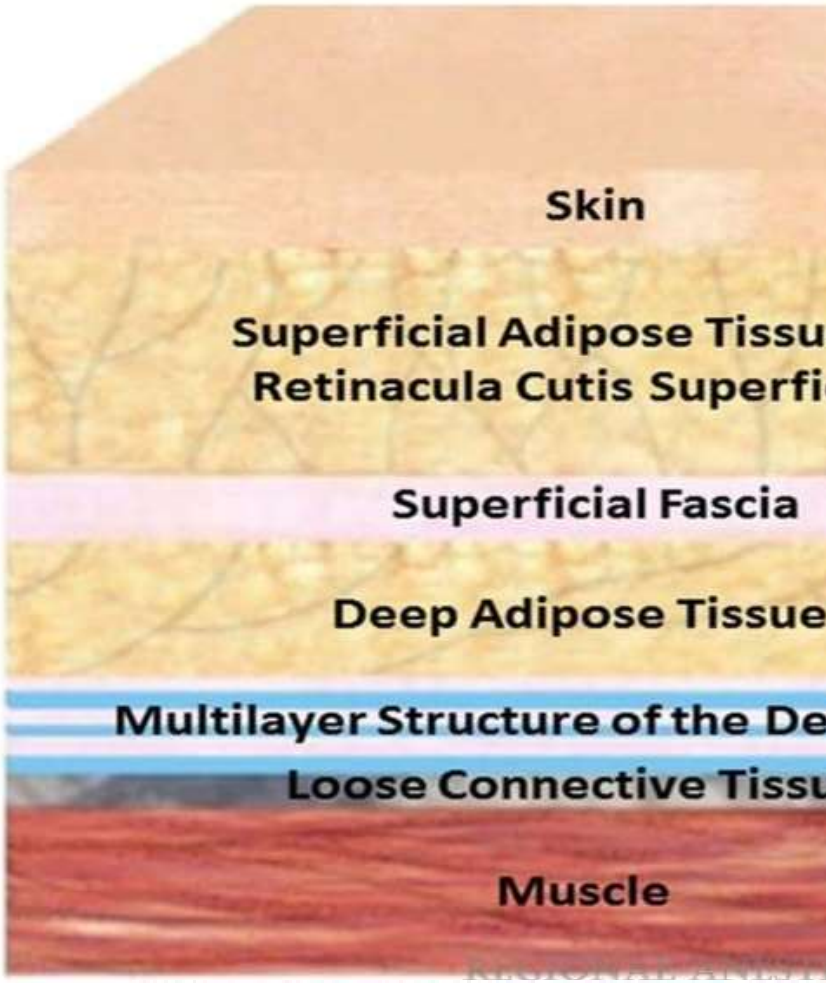
- **Evolving area of regional anesthesia**
  - Evolution of the TAP block
  - Many uncertainties still exist
- **Targeting fascial planes**
  - Technically easier? and theoretically safer than neuraxial
- **Plane blocks can be done in anesthetized patients**
- ***Intensity of nerve blockade is likely to be reduced***

Fascial Planes

3 layers of fascia in the body

Blocks target deep fascia

- Spreads throughout body
- Potential spaces
- Local anesthetic seeks



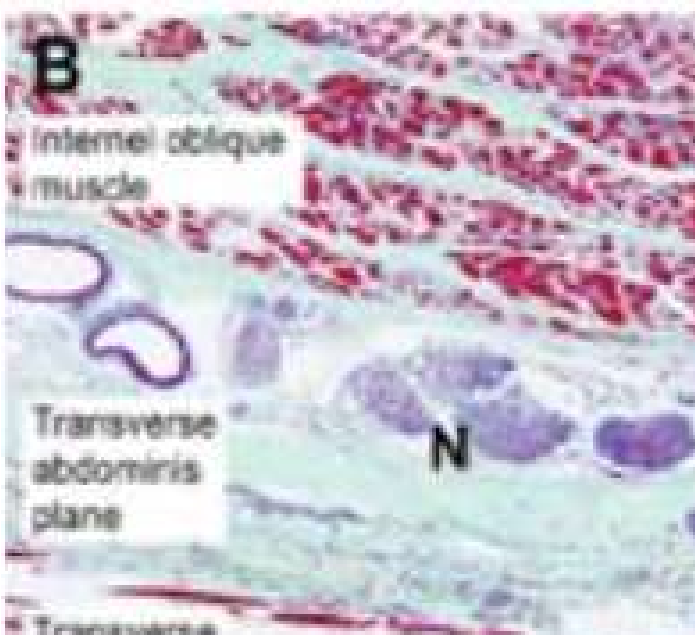


Table. Summary of the Types of Deep Fascia and Relevant Fascial Plane Blocks		
	Epimysial	**Aponeurotic**
Thickness	Thinner (150–200 μm)	Thicker (600–1400 μm)
Grouping	Specific to each muscle	May envelop several muscle
Action	Localized	Transmits muscular forces o
Adherence	Usually adherent to muscles via fibrous septa	Easily separable from muscl
Anatomical location	Found in deep fascia of trunk muscles (eg, pectoralis major and latissimus dorsi) and the epimysium of limbs	Found in the thoracolumbar and deep fascia of limbs
Block examples	PECS II, SAP, and TAP	Adductor canal, ESP, fascia il

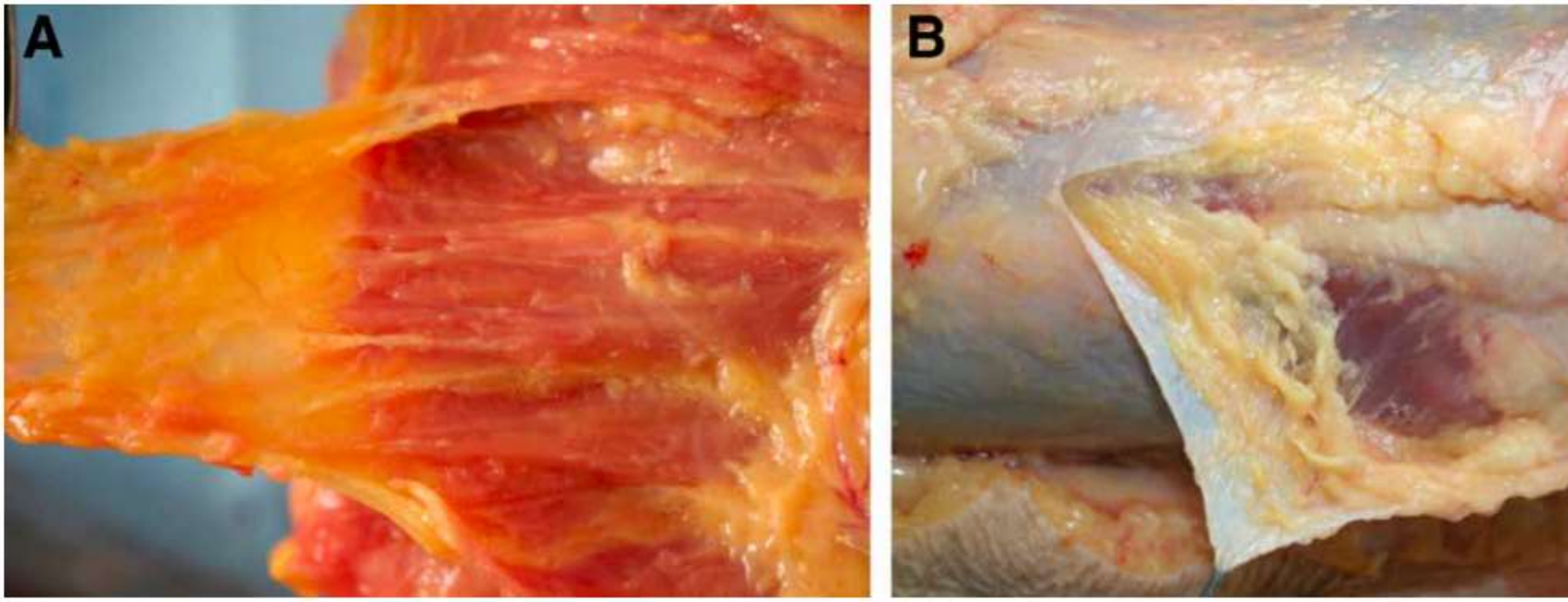
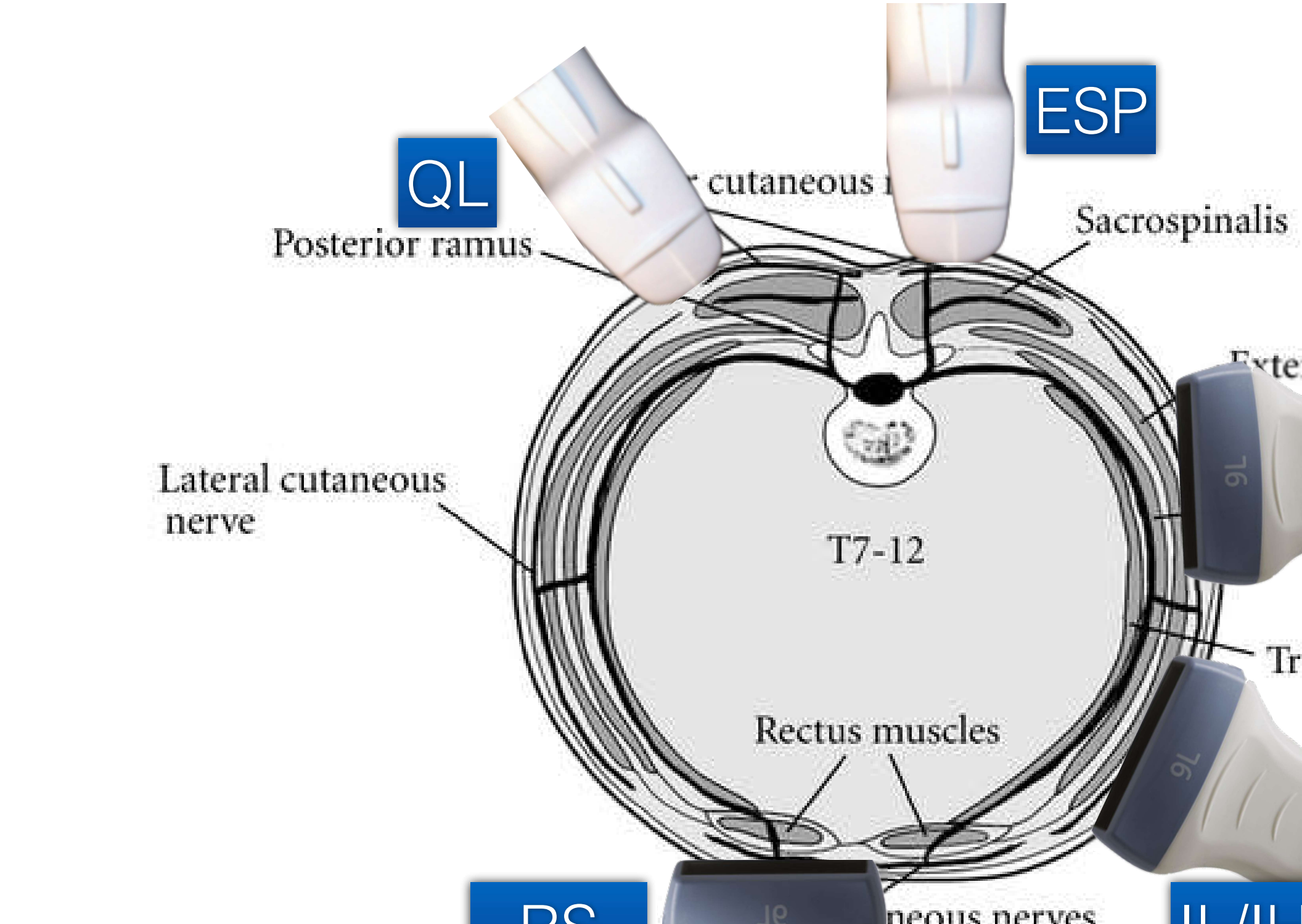
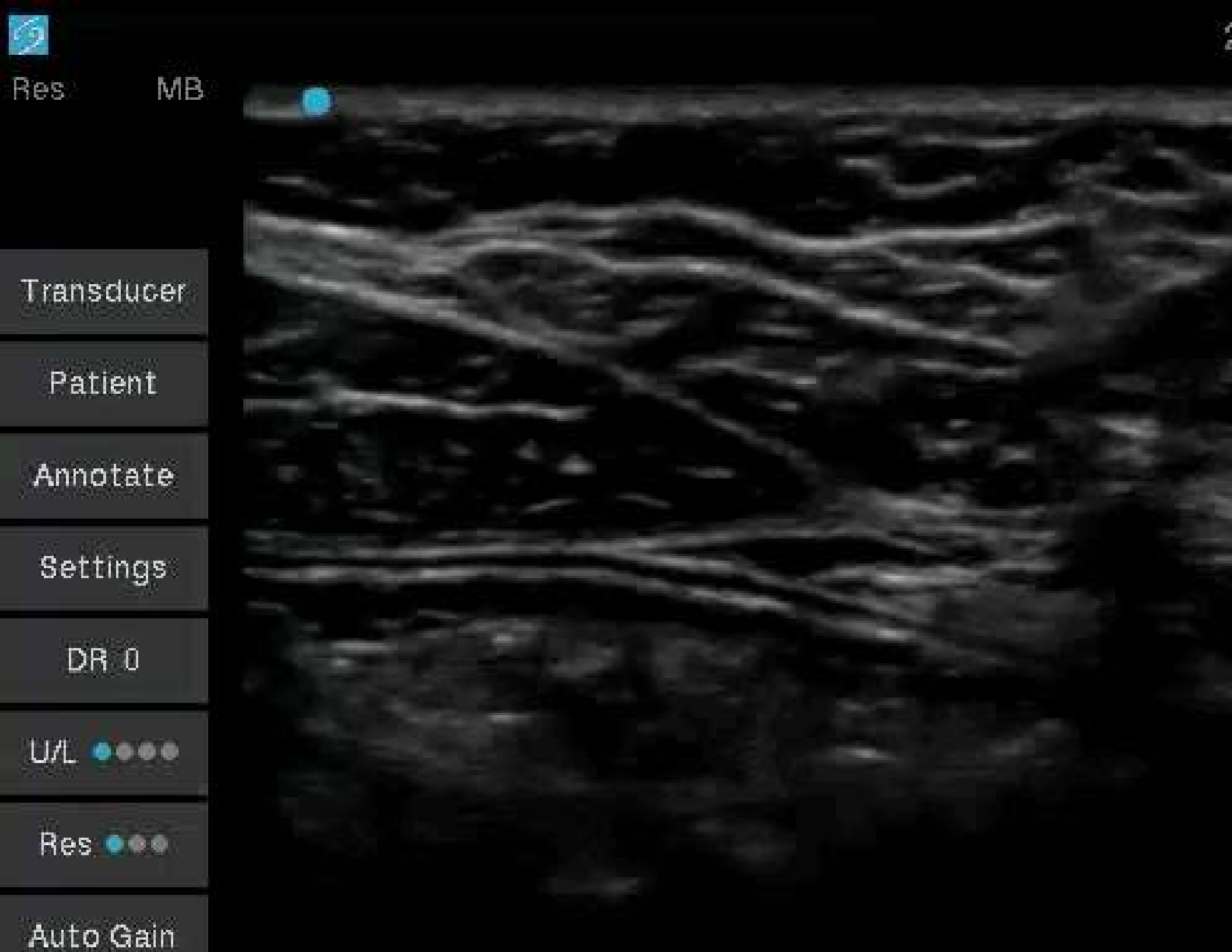


Figure 2. Types of deep fascia. A, Epimysial fascia enveloping the pectoralis major muscle. B, Aponeurotic fascia epimysial fascia is thin and totally adherent to the muscle, while the aponeurotic fascia is a thick fibrous layer s muscle by adipose tissue.

Fascial planes communicate - are continuous - pe


ESP
QL
Posterior ramus
Sacrospinalis
Lateral cutaneous
nerve
T7-12
Rectus muscles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Res
Auto Gain

Wait…what about TAP bloc

TAP

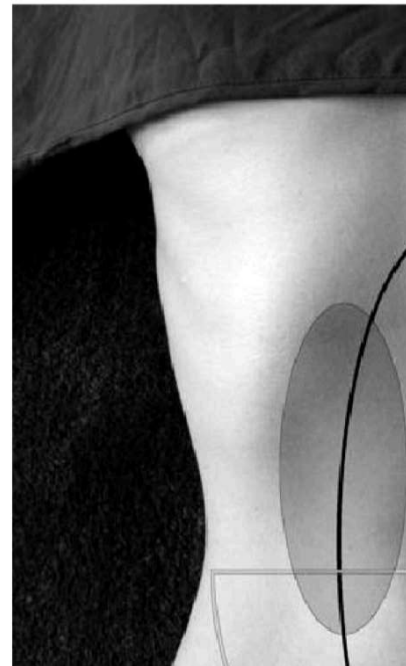
- **Blockade of anterior rami of spinal nerves T**
  - Upper TAP plexus (subcostal): T6-T9
  - Lower TAP plexus: T10-T12, inconsistently L1
  - ***Interindividual variability in spread and efficacy***
- Somatic analgesia only, no visceral analgesia
- Requires injections in all four quadrants to cove abdomen

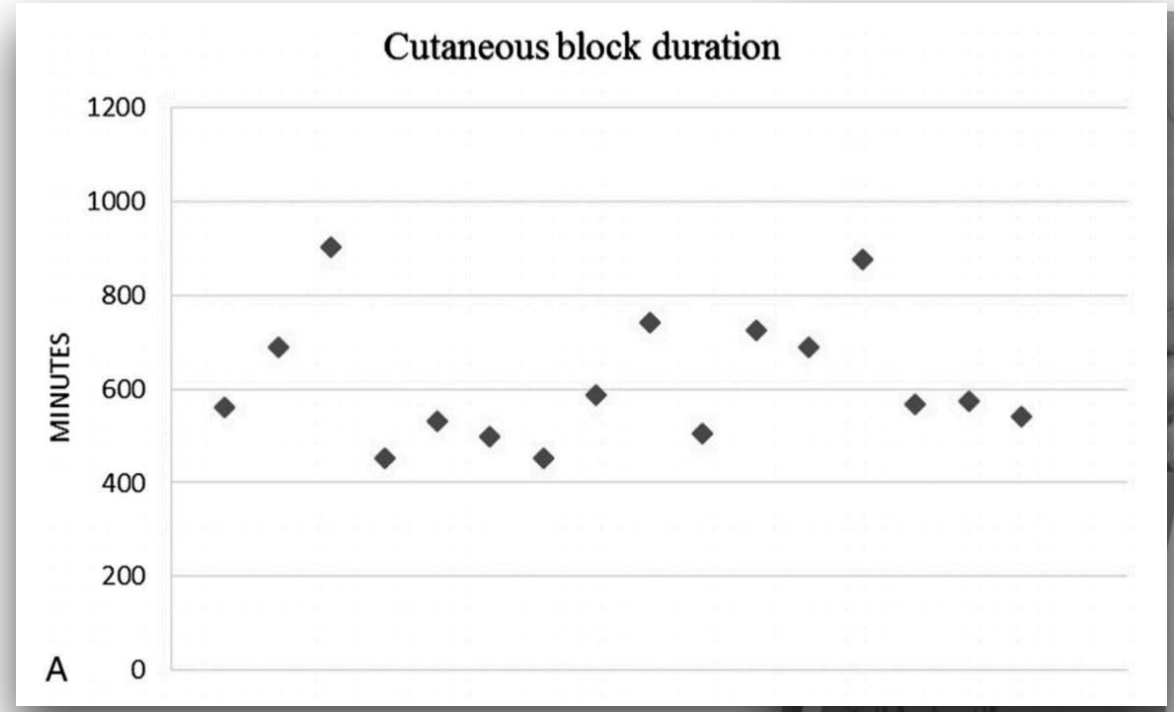
ORIGINAL ARTICLE

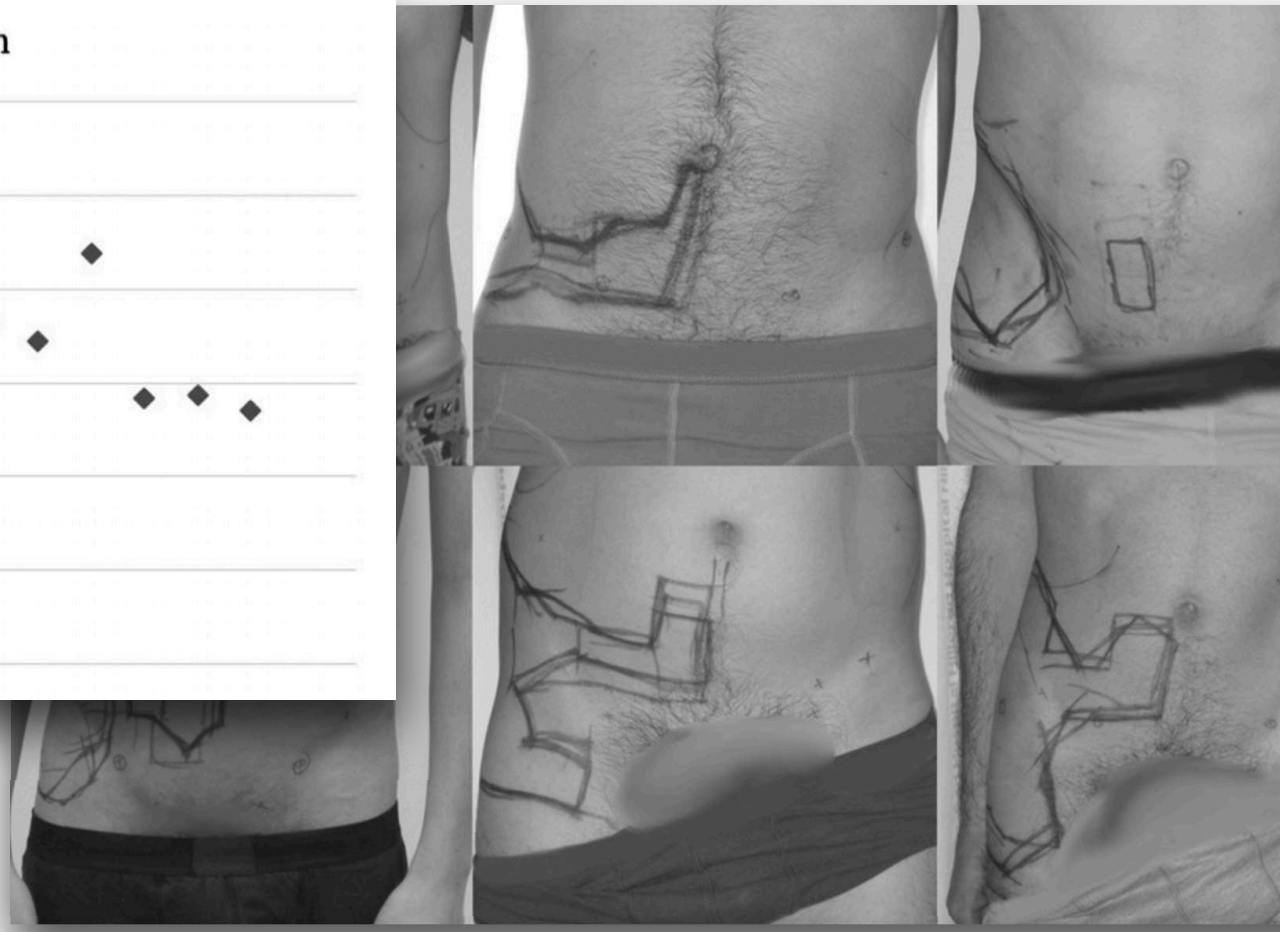
Cutaneous Sensory Block Area, Muscle-Relaxin and Block Duration of the Transversus Abdominis
A Randomized, Blinded, and Placebo-Controlled Study in Healt

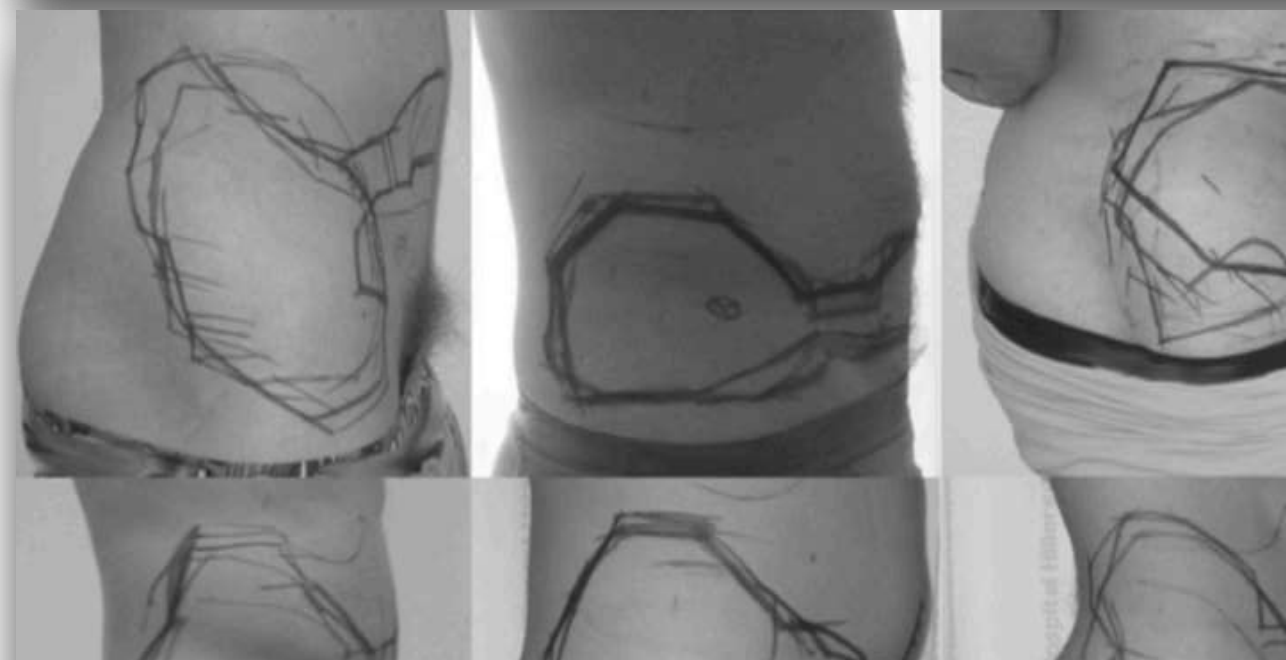
Kion Støving, MD, Christian Rothe, MD, Charlotte V. Rosenstock, MD, PhD, Eske K. Aa
Lars H. Lundstrøm, MD, PhD, and Kai H. W. Lange, MD, DMSc

- 16 healthy volunteers
- Unilateral TAP block with 20 mL ropivacaine 0.75%

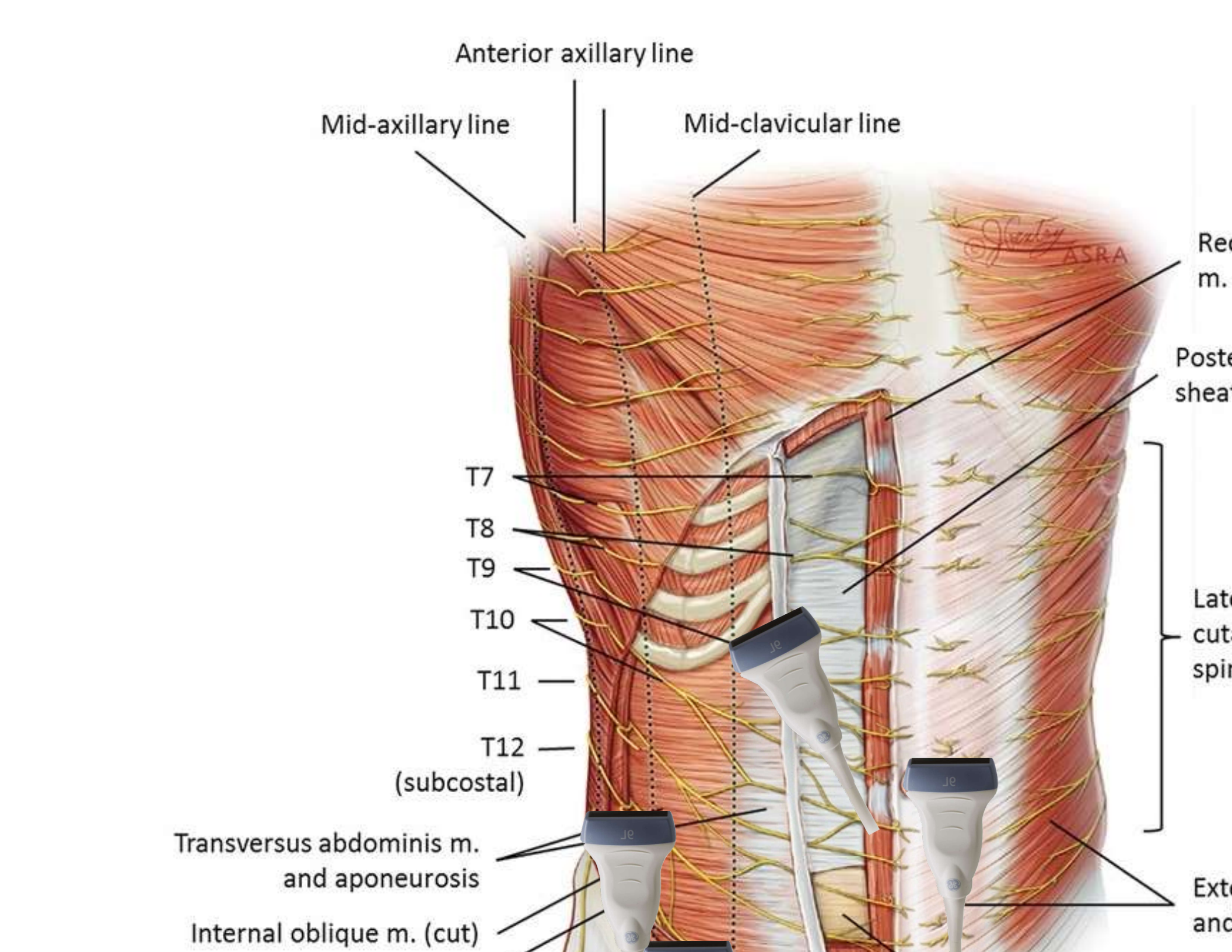








- Sensory block is predominantly lateral
- Nondermatomal and does not cross midline
- Significant and consistent muscle-relaxing effect


Anterior axillary line
Mid-axillary line
Mid-clavicular line
T7
T8
T9
T10
T11
T12
(subcostal)
Transversus abdominis m.
and aponeurosis
Internal oblique m. (cut)
ASRA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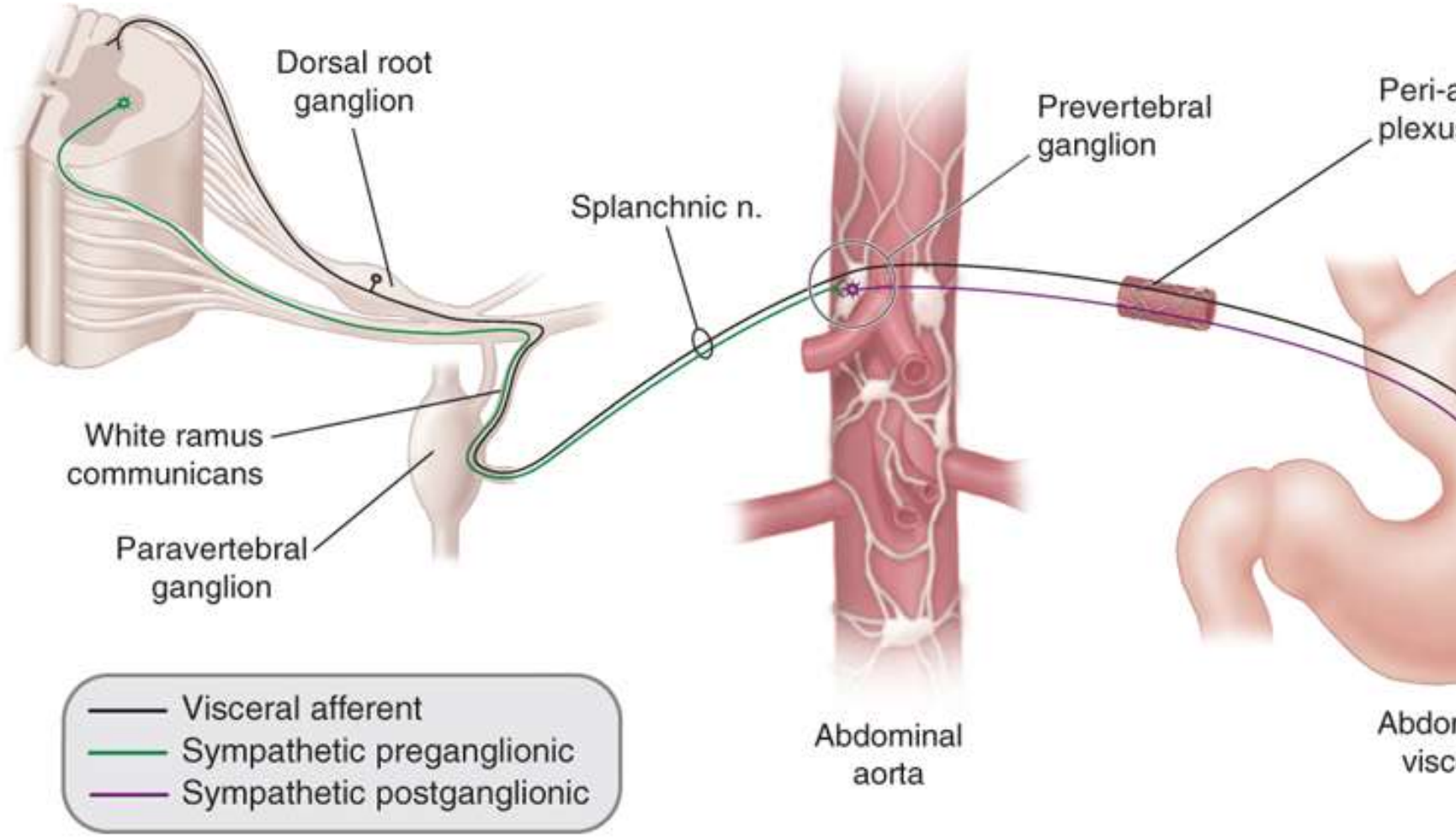
Auto Gain

Visceral Pain

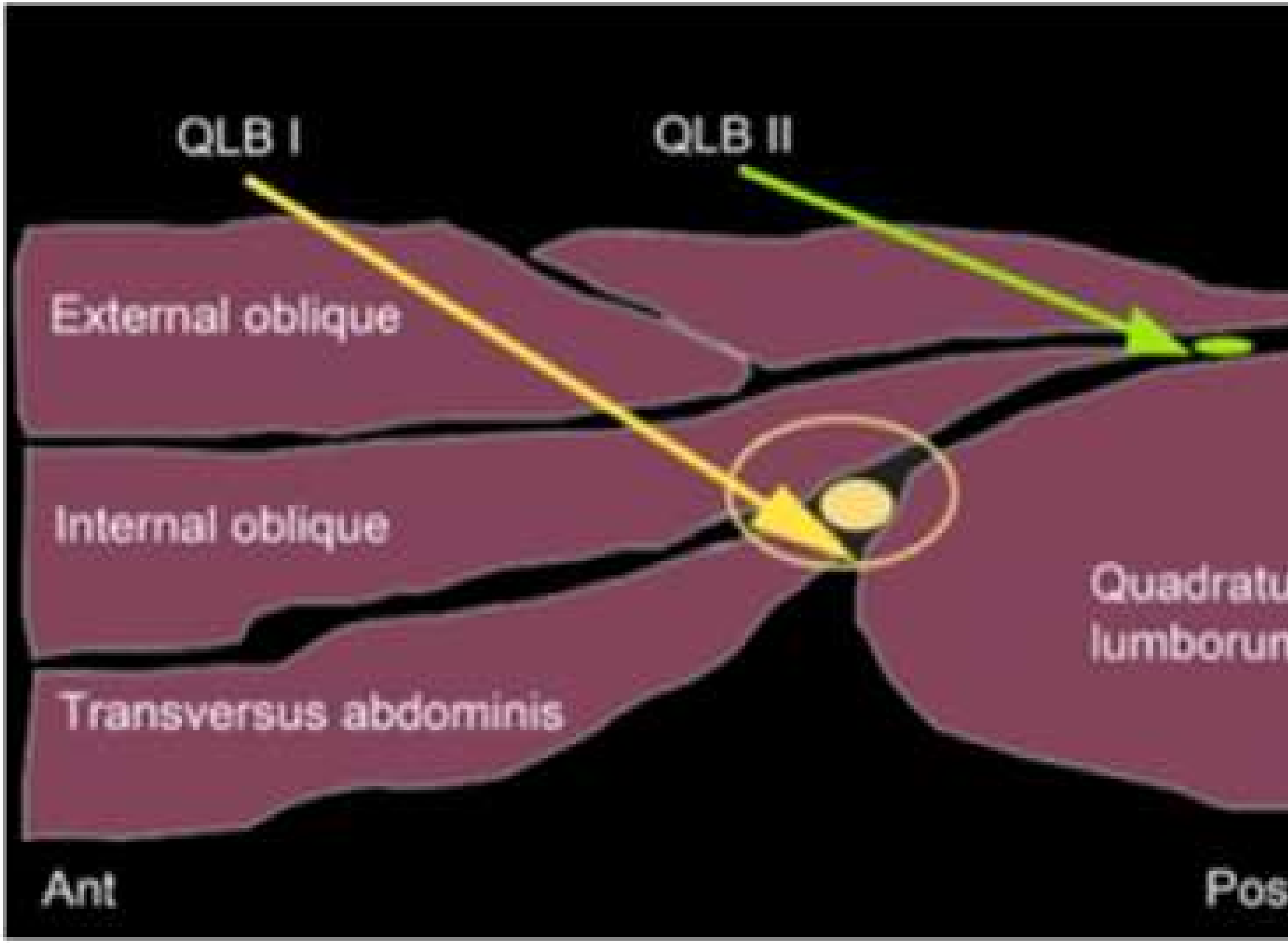


- Visceral afferents share the same anatomical conduit as sympathetic
- Visceral structures are highly sensitive to distension, ischemia, and i

Quadratus Lumborum

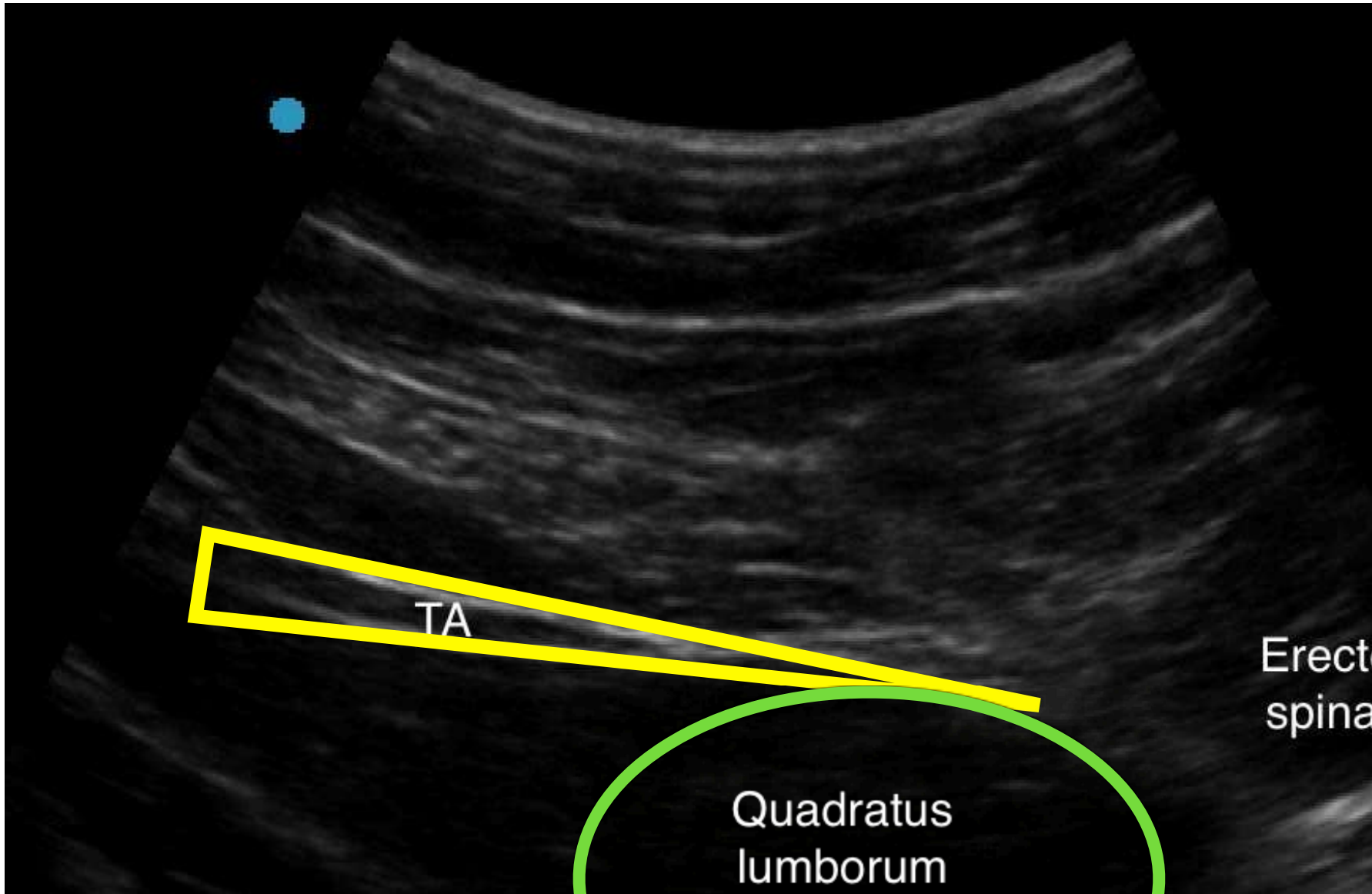
QL Lateral/Posterior/Anterior

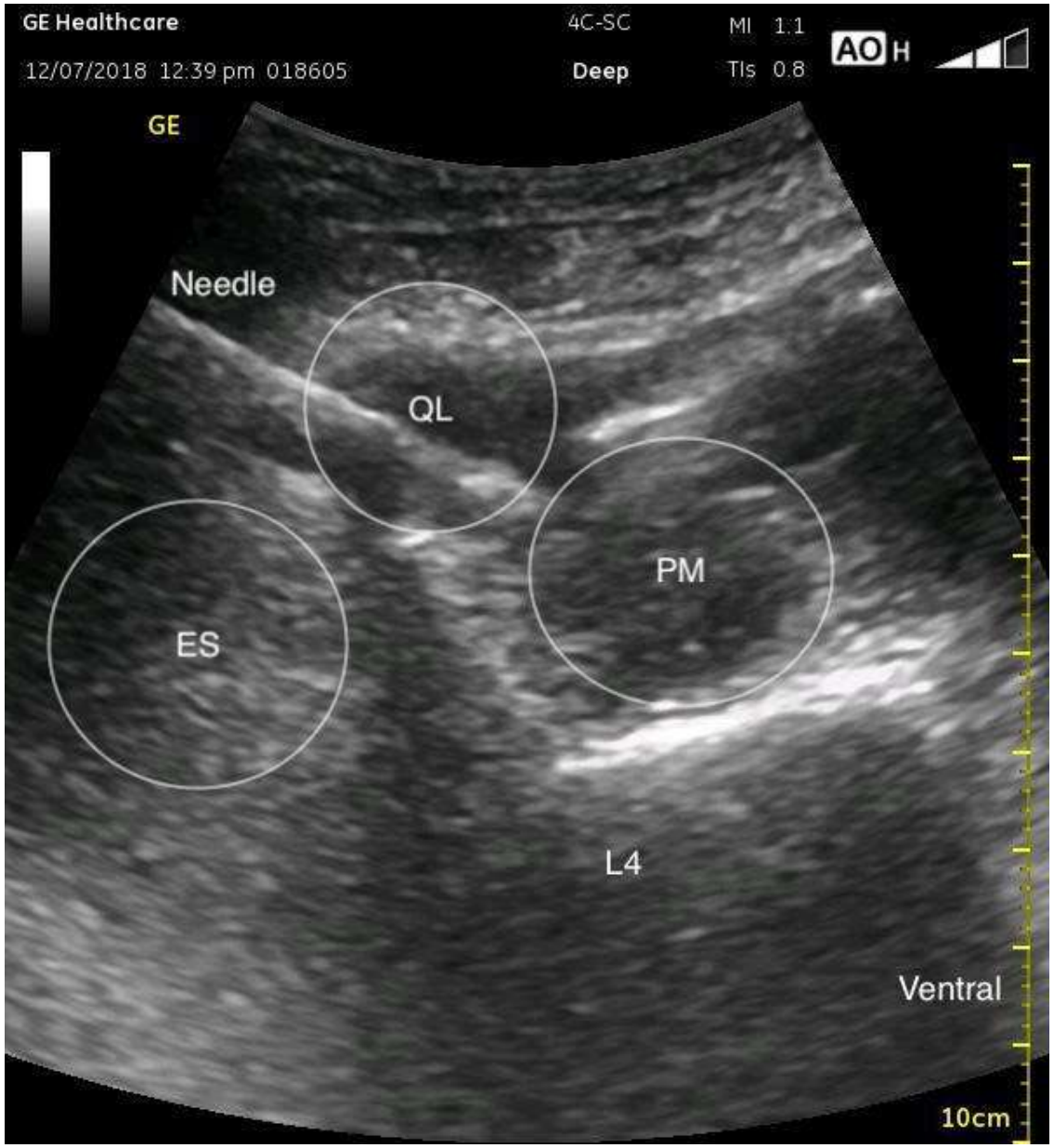
- Targeting T7-L1 spinal nerves
- Somatic and potentially visceral analgesia
- Purely an USG technique
- Indicated for abdominal surgery above or belo

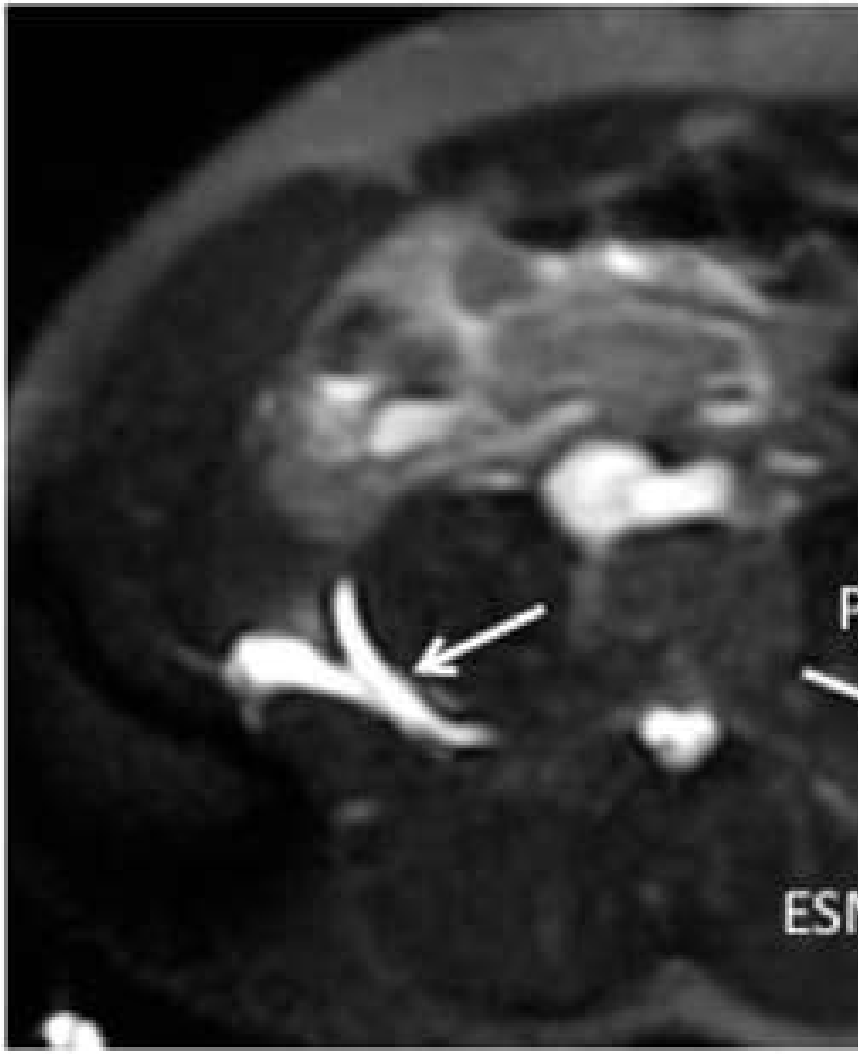


Blanco originally described the QL1,

Quadratus Lumborum







Borglum in 2013 describes transmuscular QL

QL Muscle

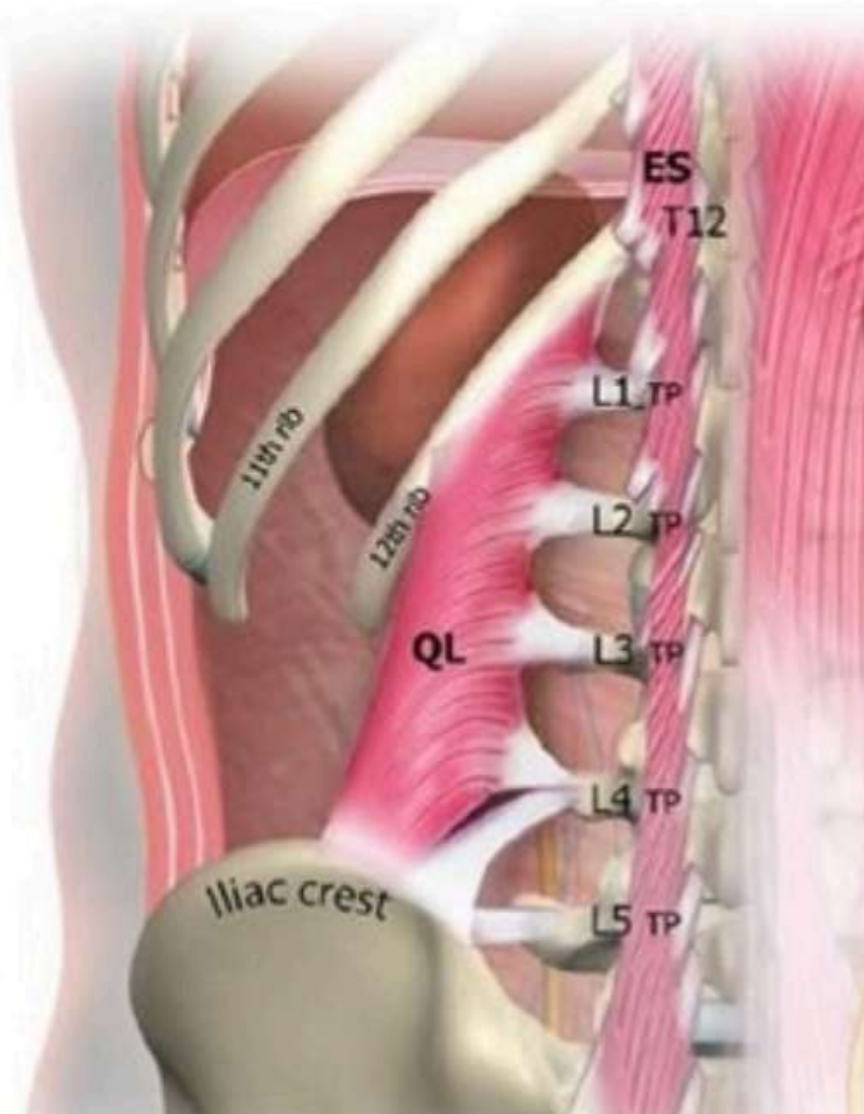
Back muscle

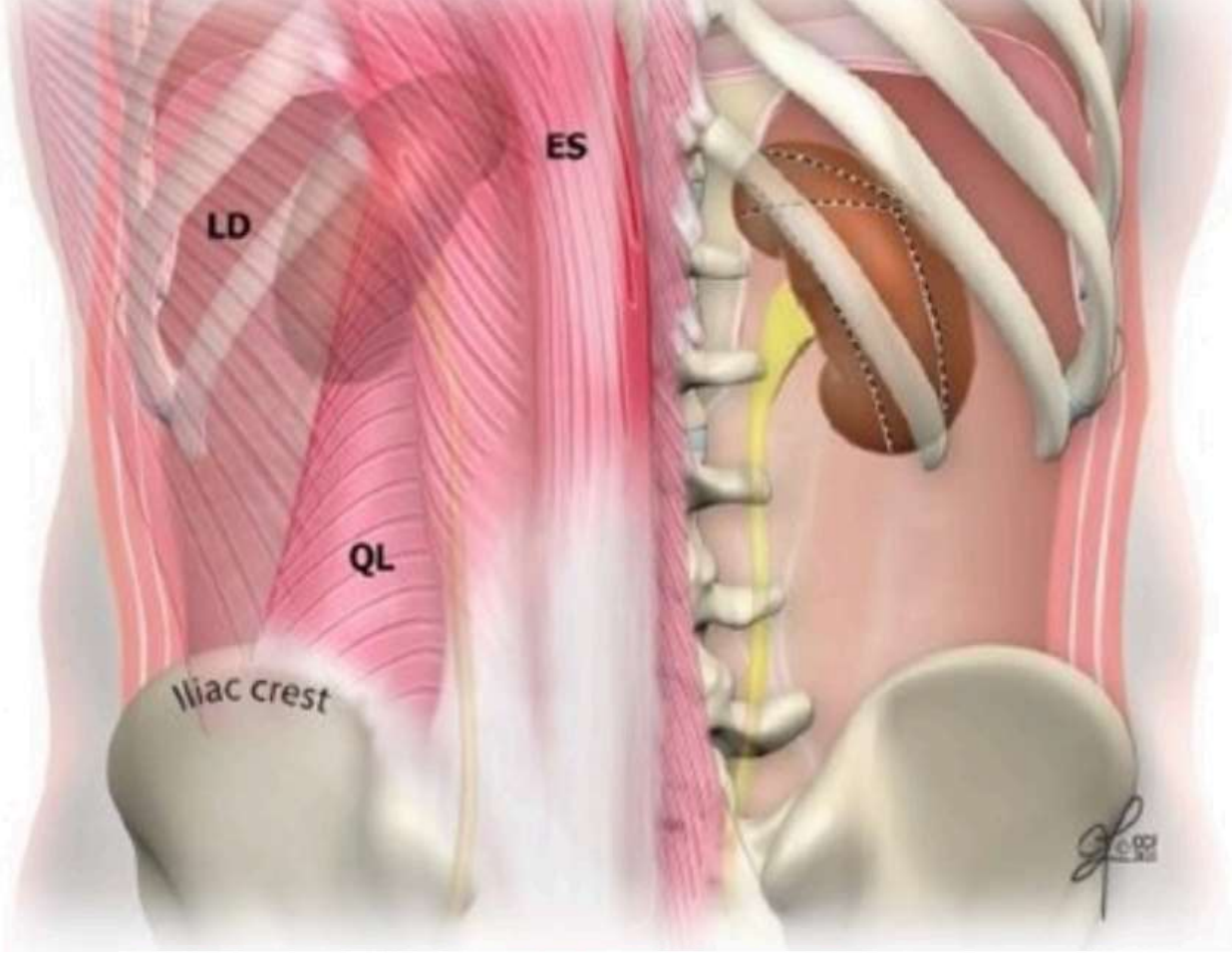
Attachments

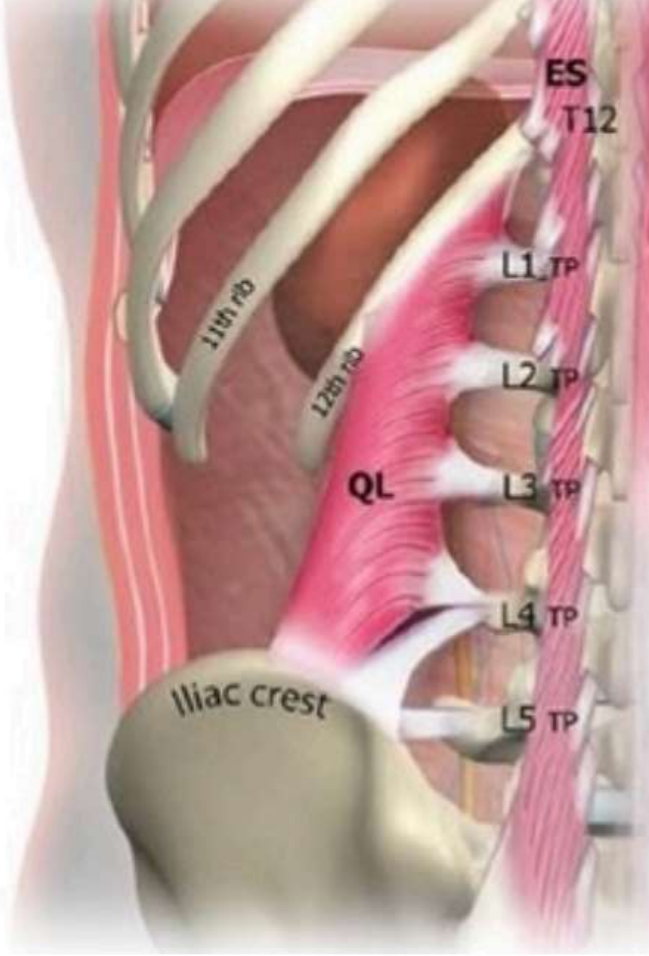
- Superiorly to 12th rib
- Medially to TPs of L1-L4
- Inferiorly to iliac crest

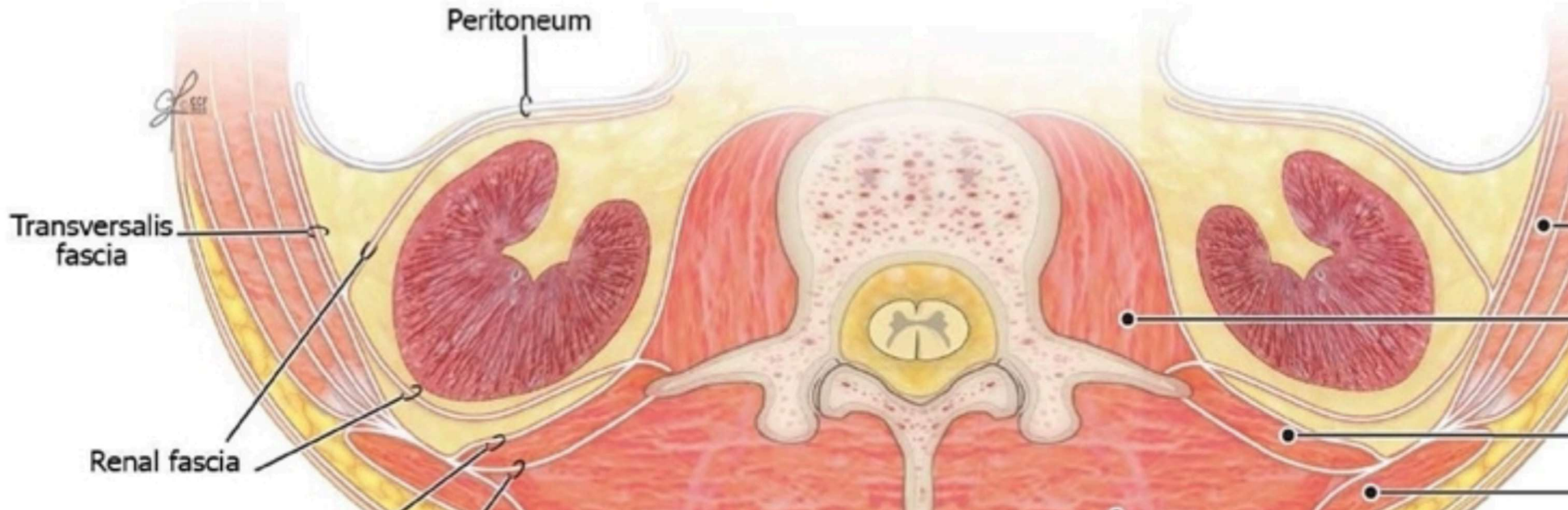
Actions

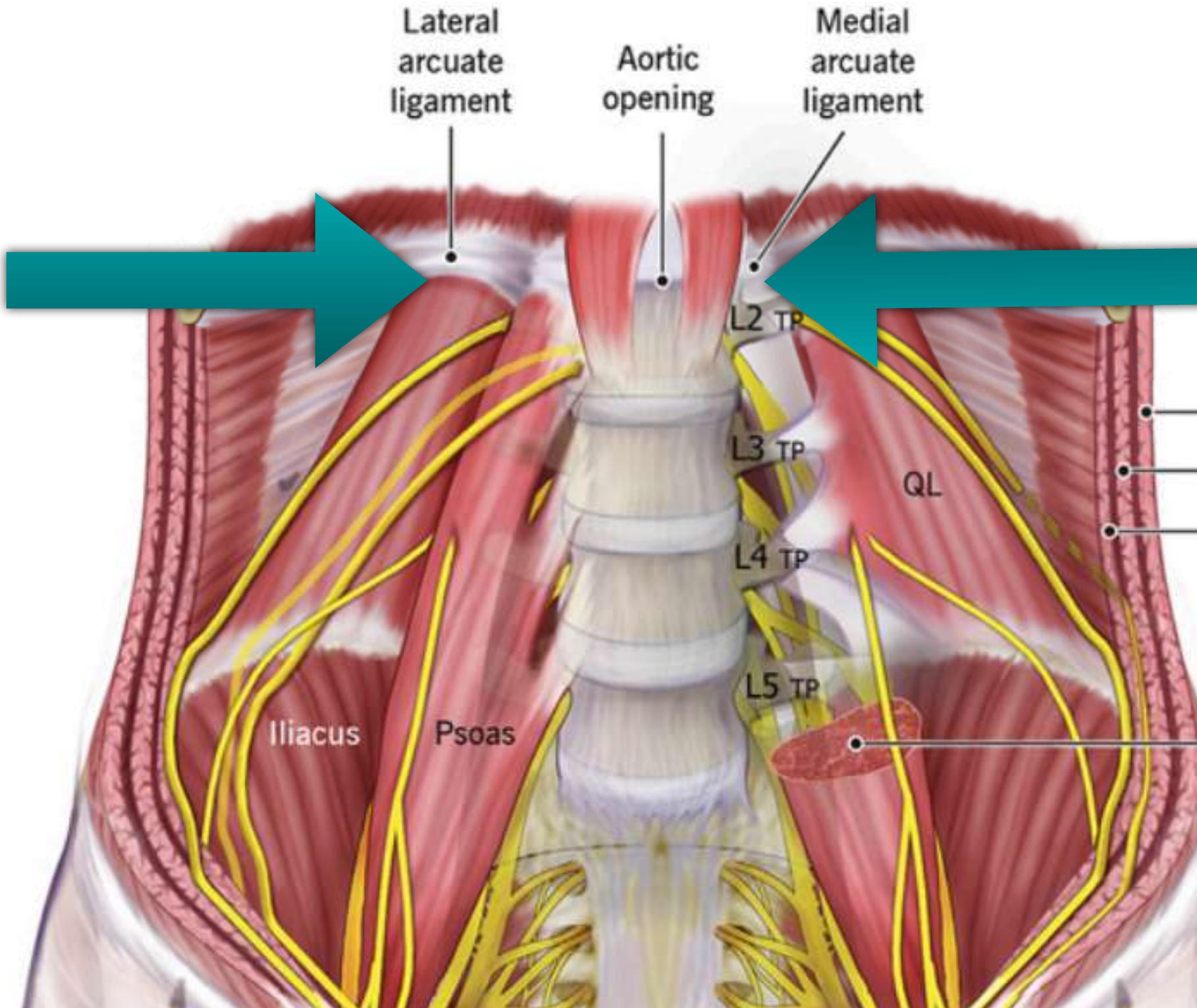
- Lateral flexion of spine




ES
LD
QL
Iliac crest


ES
T12
L1 TP
L2 TP
L3 TP
L4 TP
L5 TP
11th rib
12th rib
QL
Iliac crest


Peritoneum
Transversalis fascia
Renal fascia


Lateral arcuate ligament
Aortic opening
Medial arcuate ligament
L2 TP
L3 TP
L4 TP
L5 TP
QL
Iliacus
Psoas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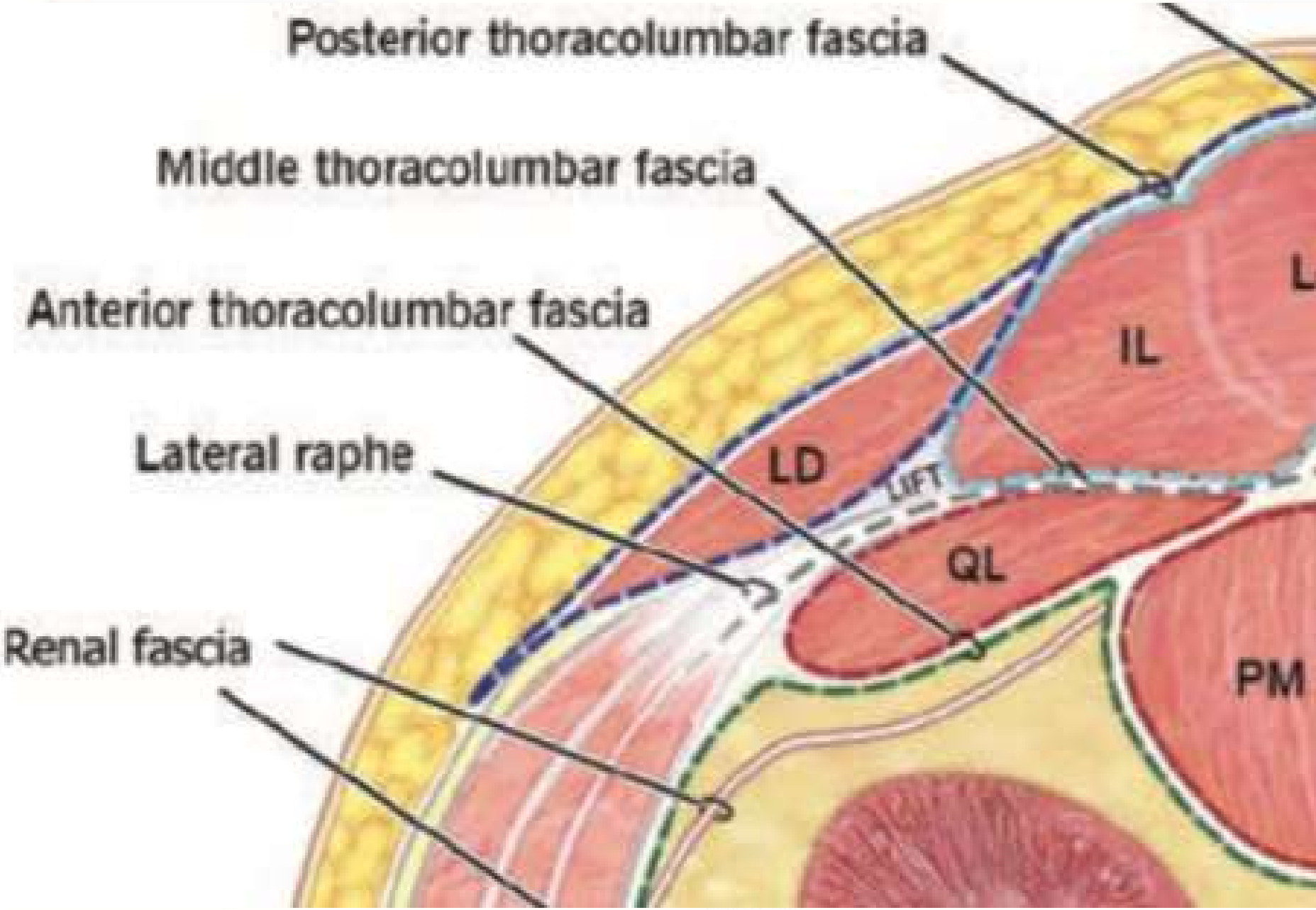
Quadratus Lumborum

Mechanism of Action

- Not fully understood: muscles and connect
  are porous
- Potential spread of local anesthetic
  - **Thoracic paravertebral space**
    - Ventral and dorsal rami, rami communicantes (syn
  - **Lumbar plexus roots and branches**

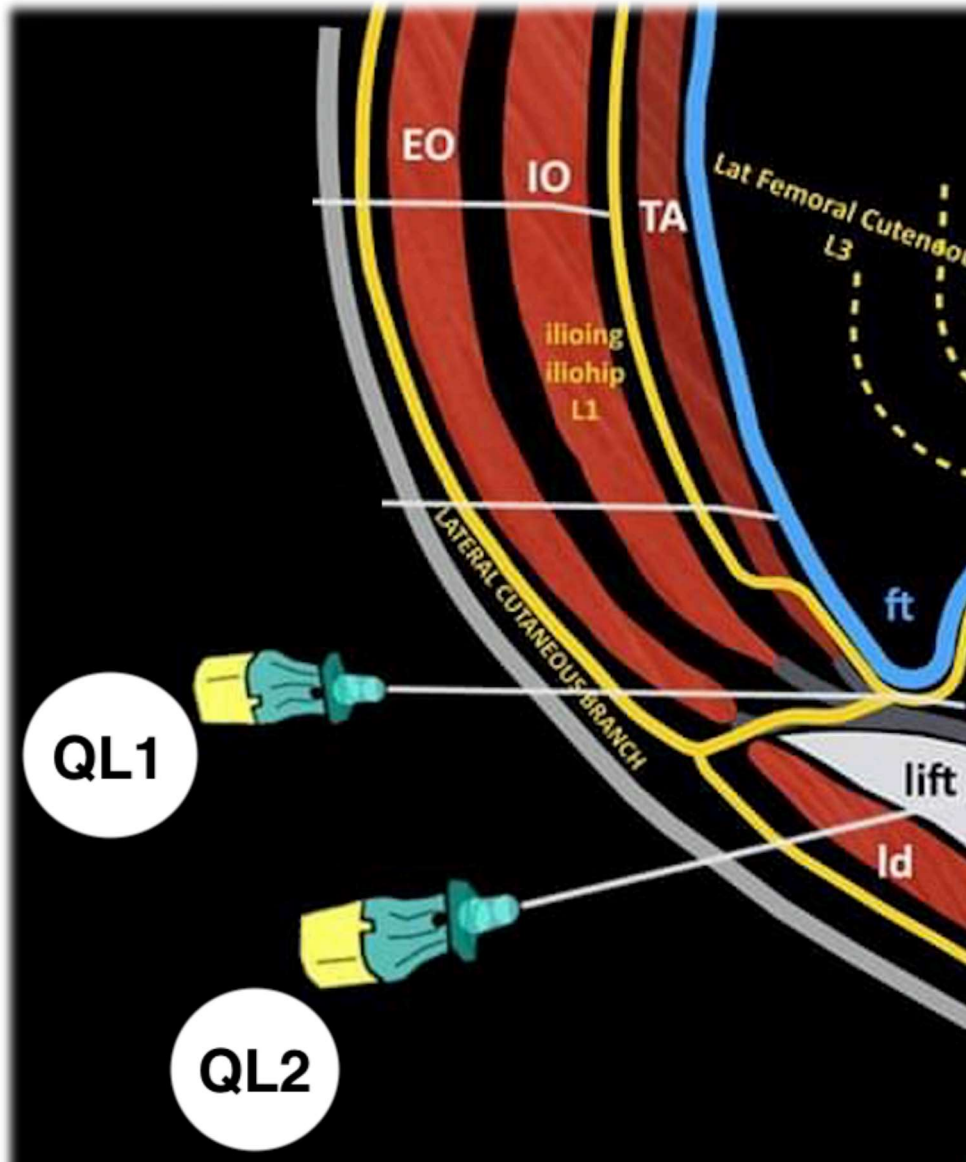


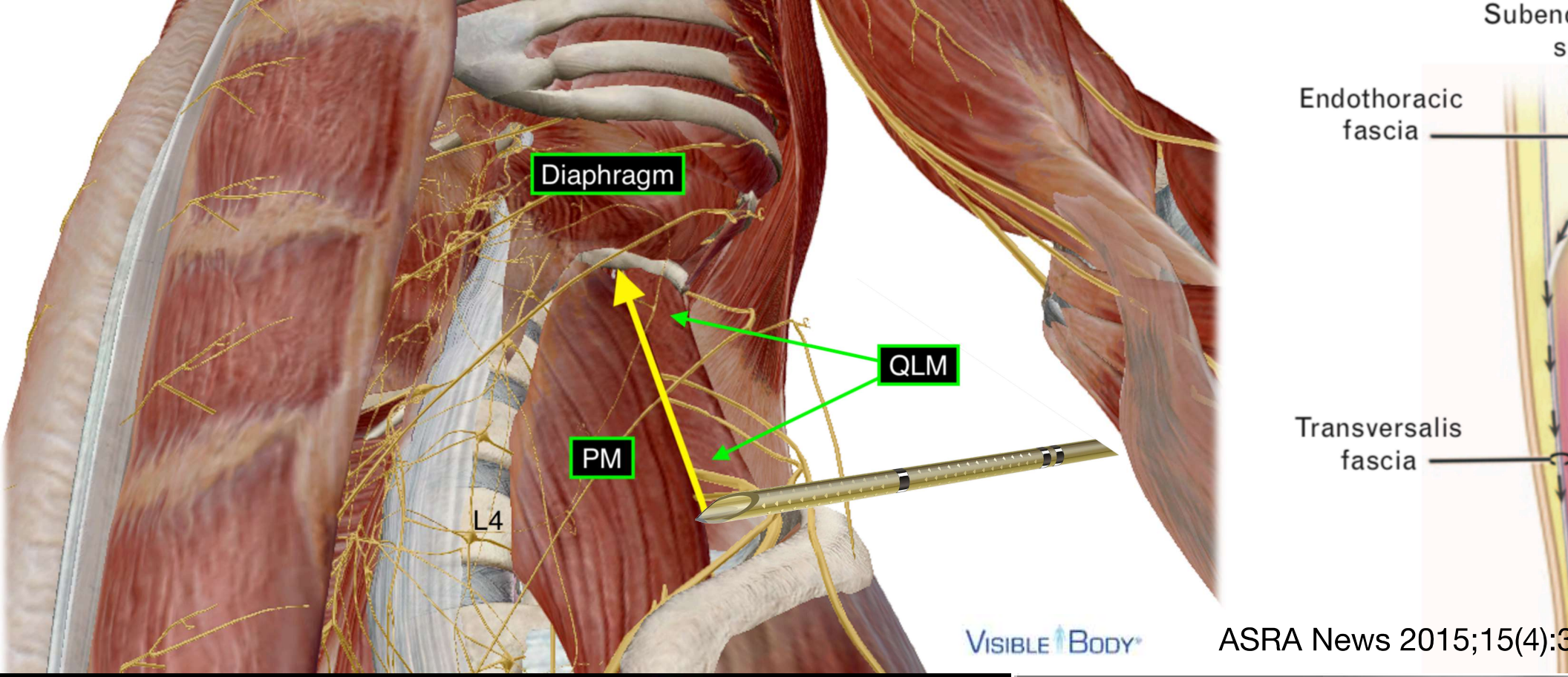
3 layers of thoracolumbar fascia

Anterior, middle, posterior

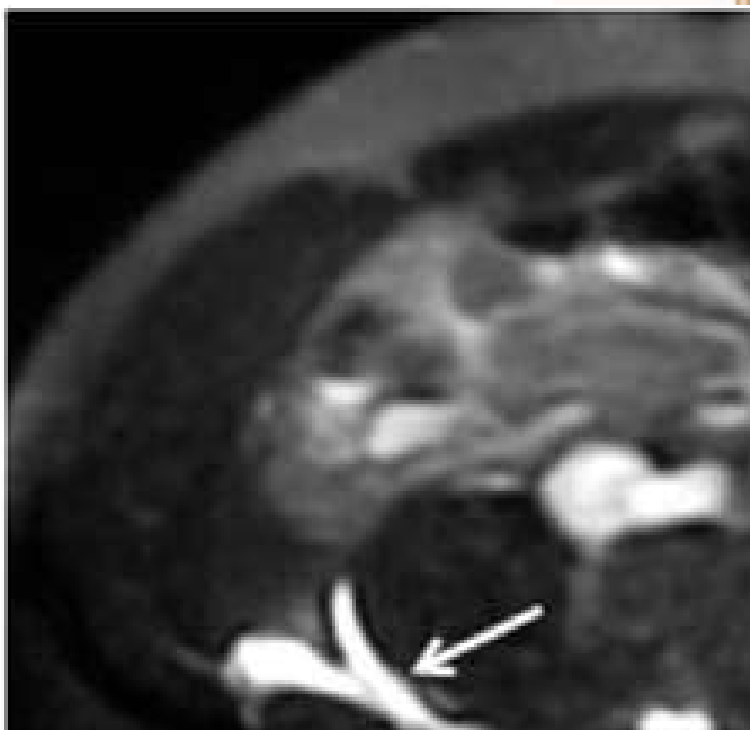
Quadratus Lumborum

- **QL1 (lateral)**: Injection at anterolateral border of QL muscle
- **QL2 (posterior)**: Injection posterior to QL muscle (middle TLF)
- **QL3 (anterior)**: Injection between QL





ASRA News 2015;15(4):3



- Anatomical findings in cadaver studies remain at odds with clinical effects

- **Clear evidence of analgesia without clinically detectable sensory loss**
  (Differential sensory block)

- Need controlled clinical

Understan
and Fascial P
A Challenge to

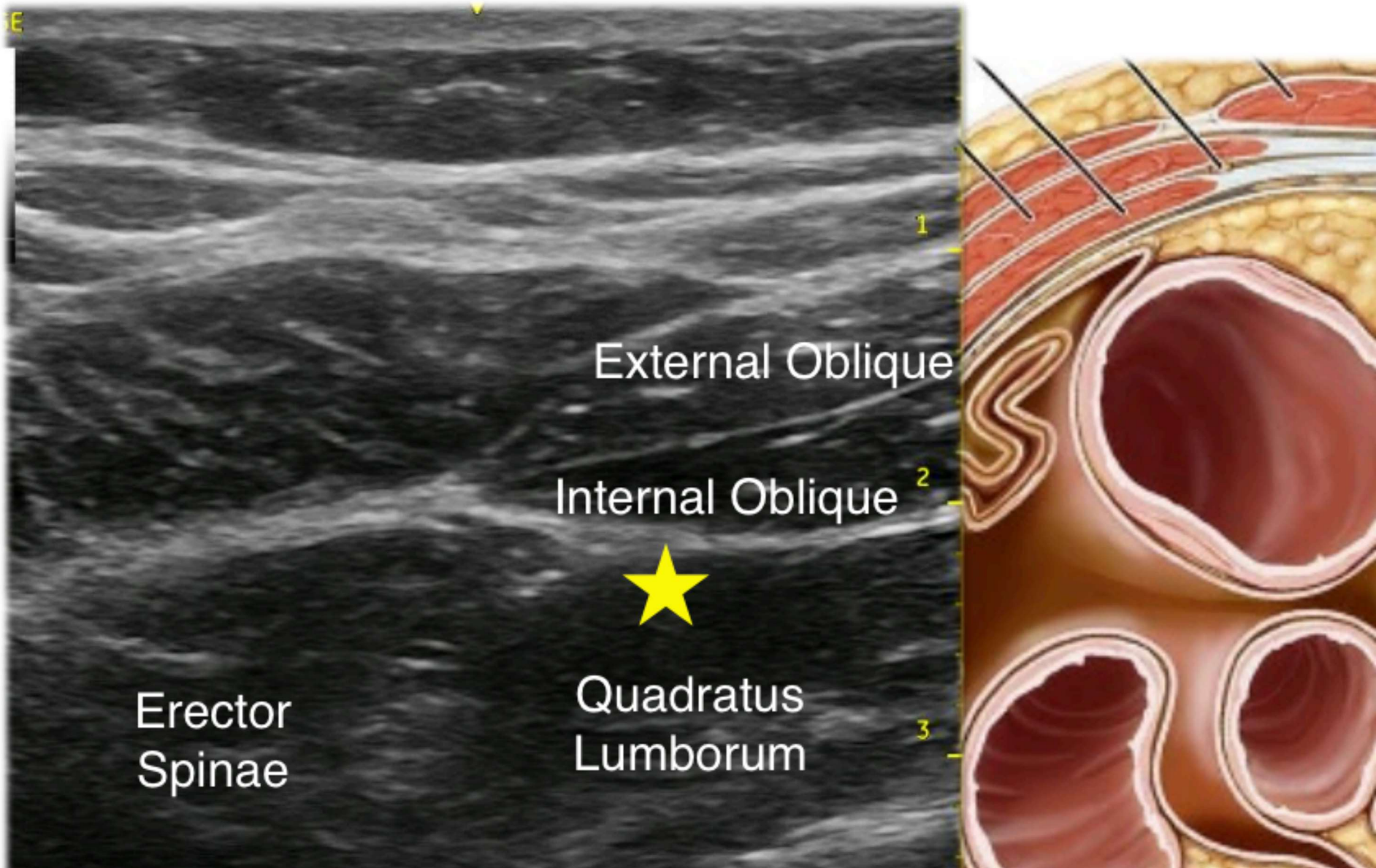
Accepted for publicati

To the Editor:

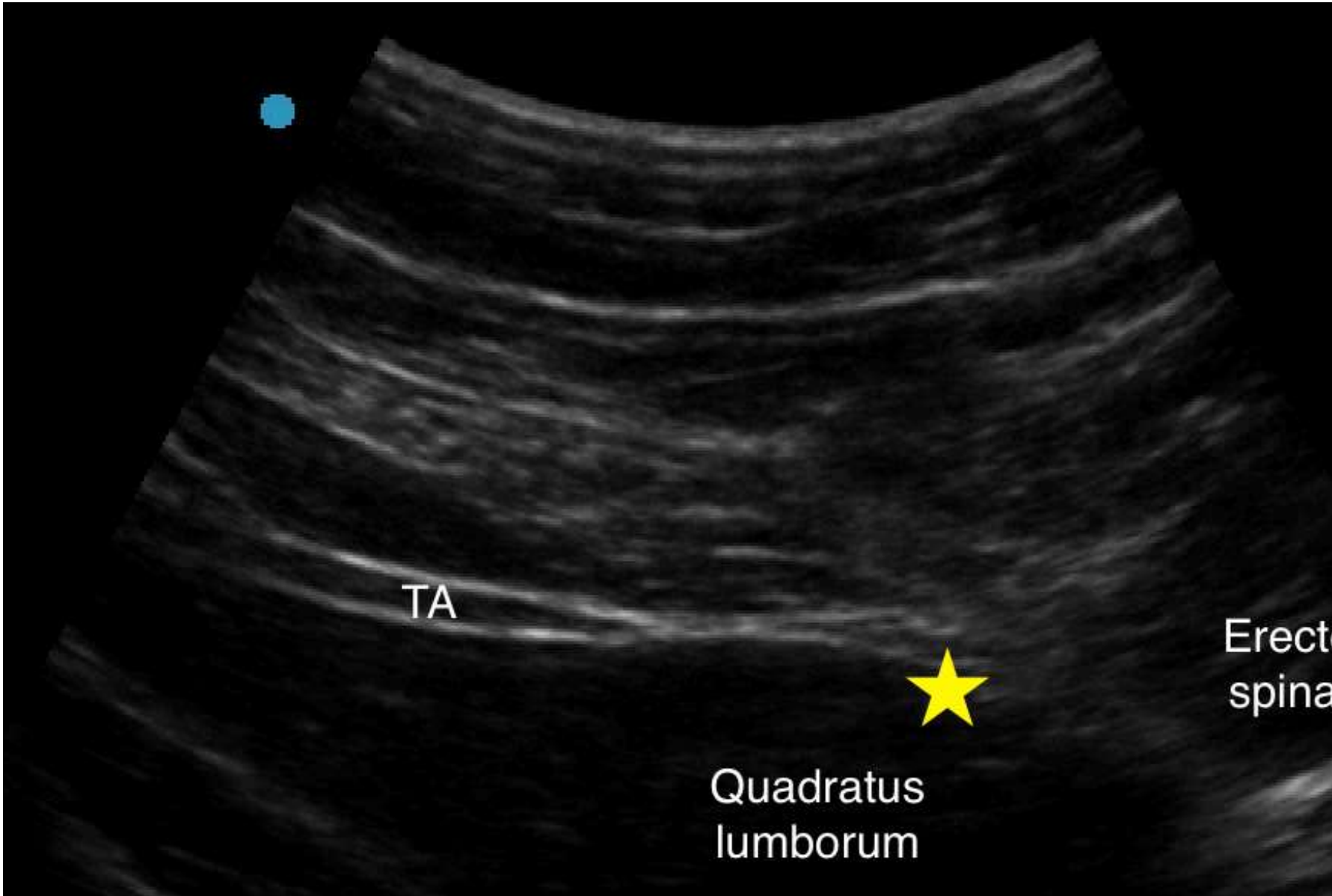
We congratulate Iva

QL 1 - Lateral

QL 2 - Posterior



QL 2 - Posterior

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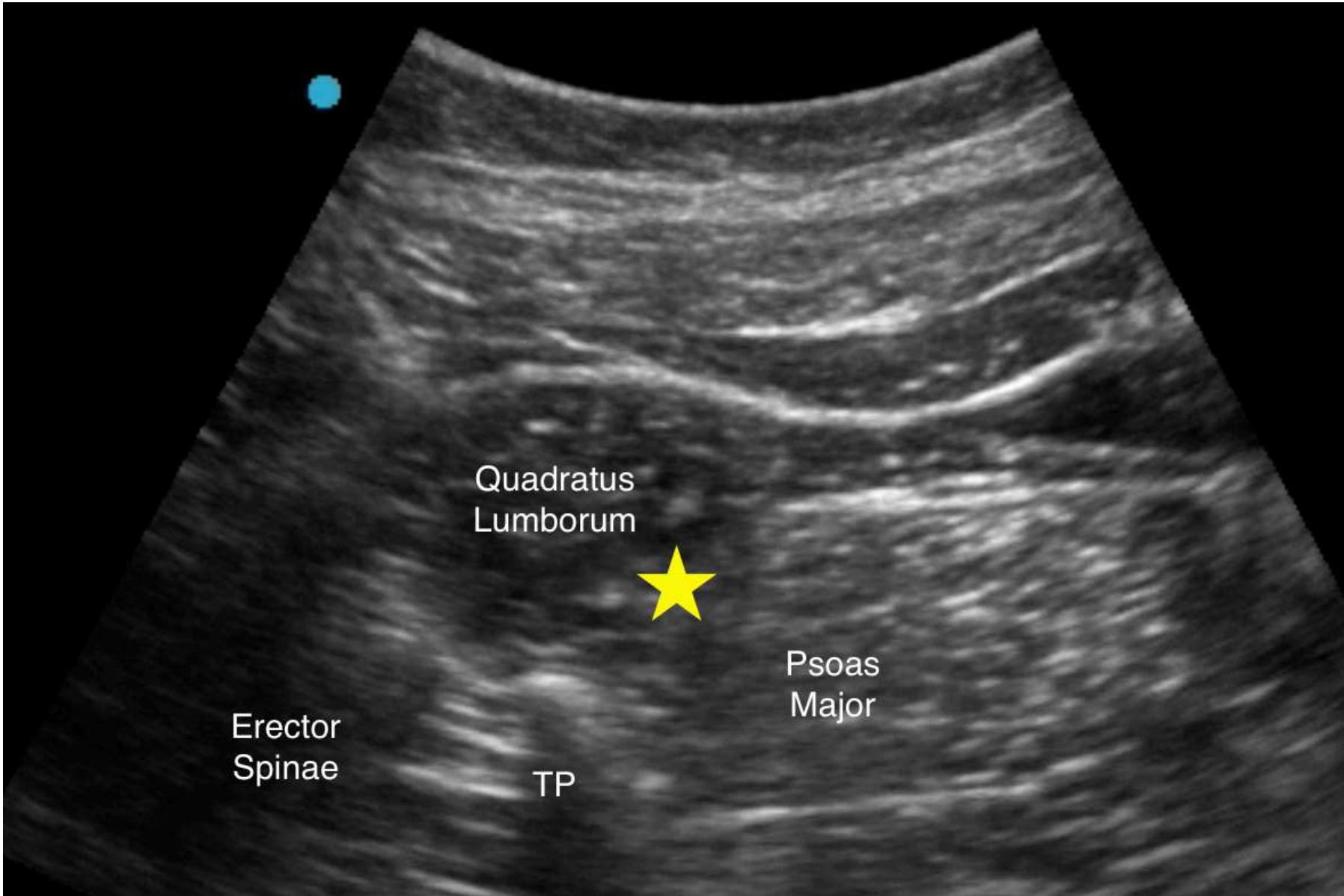
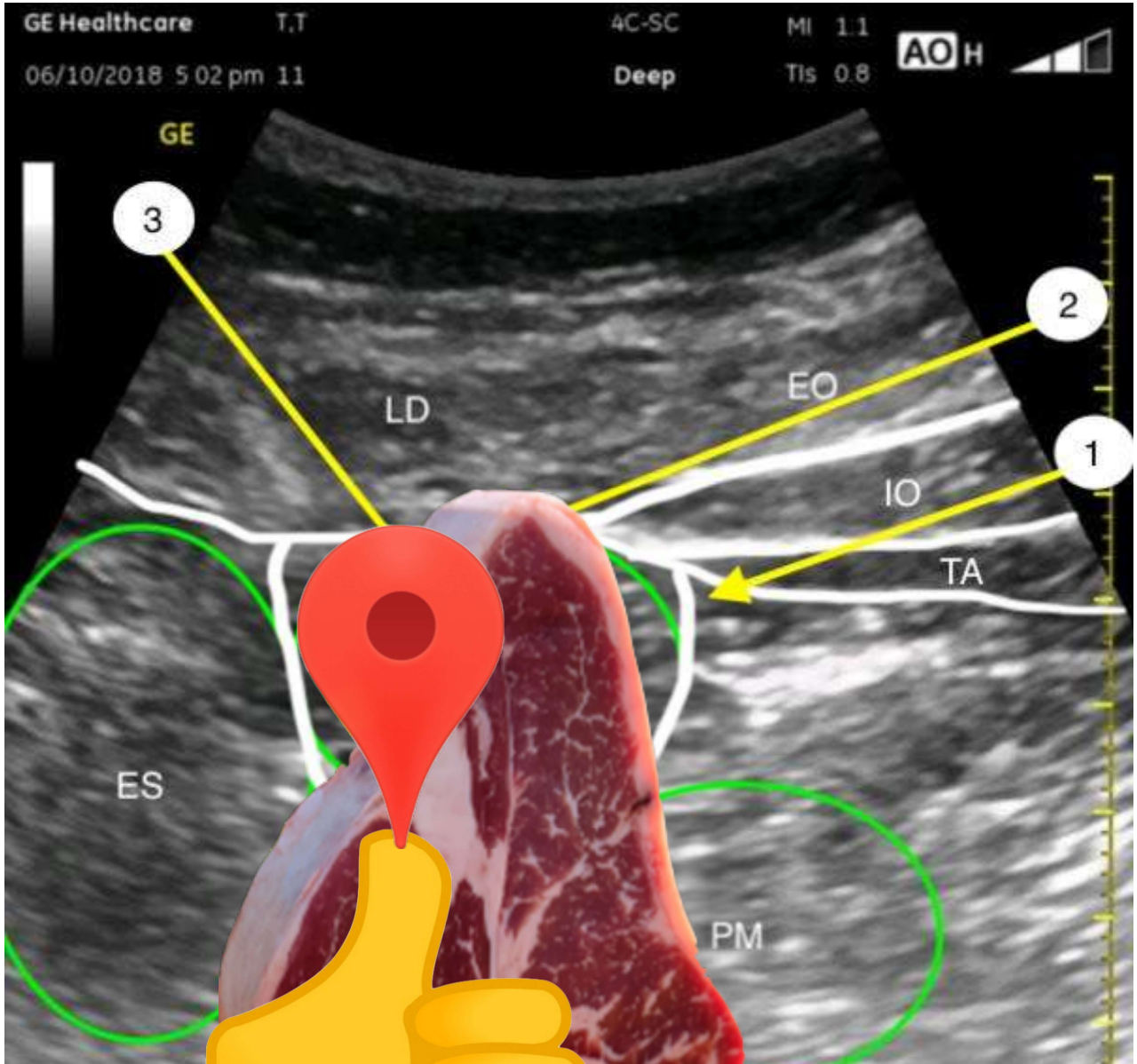
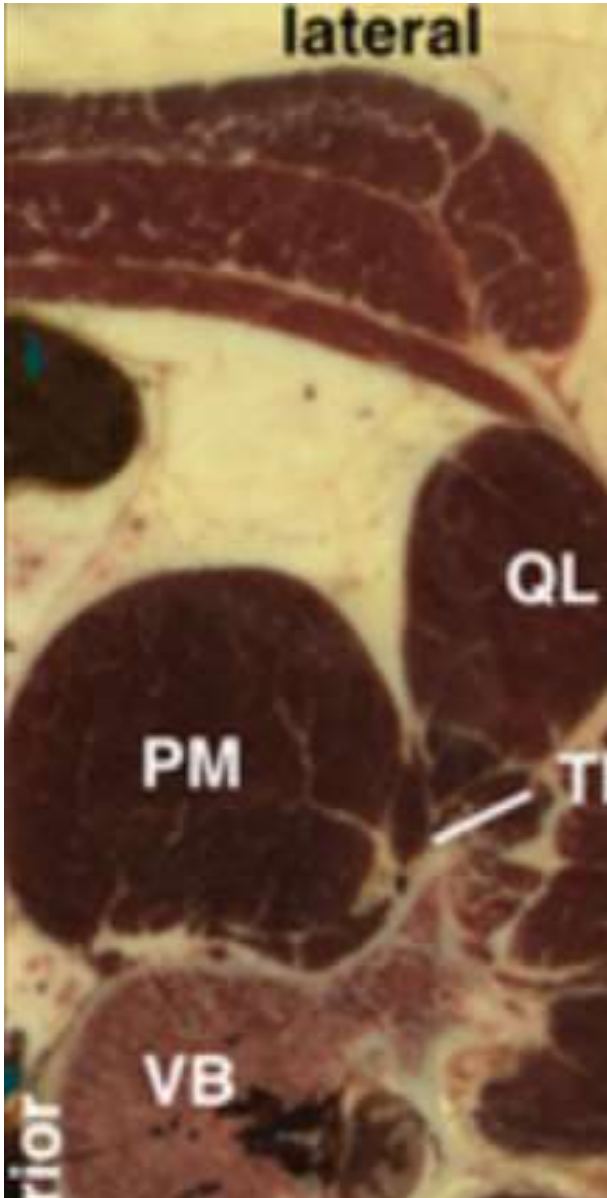
QL 3 - Anterior - TQL



Transmuscular QL



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QL - Nearby Structures

- Liver and spleen
- Peritoneal cavity
- Kidney lies anterior to QLM
  - Separated by perinephric fat
  - Posterior layer of renal fascia
  - Anterior TLF


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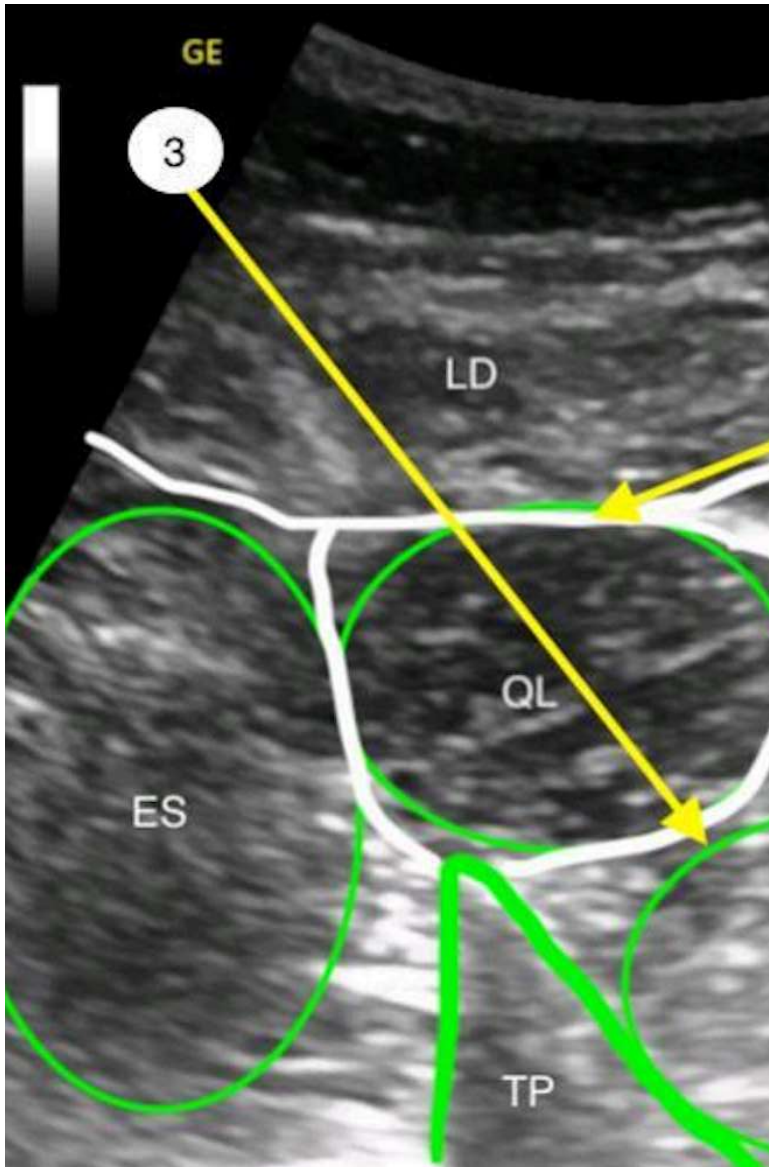
QL Block Tips

- Patient positioning
- Curved vs linear probe
- **Identify fascial planes**
  - Locate transverse process
- 20-40 mL
- Beware of lumbar plexus



QLB vs TAPB

QLB is superior to TAPB in reducing c consumption and pain scores at 24 h

- QLB2 (T7-12 dermatomes) vs TAPB (T10-12), lo arterial ropivacaine concentrations than TAPB

  Murouchi T, et al. Reg Anest

- C-section under SAB

  Blanco R, et al. Reg Anesth Pain Med 2016;

- Laparoscopic colorectal surgery

  Da Huang S, et al. J Clin

- Inguinal hernia repair in children

QLB in the Literature

Mixed results

- **THA:** QL3 vs LPB, similar opioid consumption, QL3 < quad v

  Gutierrez J, et al. Reg Ane

- **Spinal fusion:** QL2 catheters > 50% opioid reduction at 48 h

  Wilton J, et al. Indian

- **Laparoscopic nephrectomy:** QL3, 43% opioid reduction

  Dam M, et al. Reg Anes

- **Laparoscopic hysterectomy:** QL3, no opioid reduction

  Hansen C, et al. Reg Ane

- **Laparoscopic hemicolectomy:** QL3, no opioid reduction

  Tanggaard K, et al. Reg A

- **Abdominal surgery:** dermatome coverage for lower abdom

  Balocco A, et al. Reg An

  substantial spread to PVS

QL Key Points

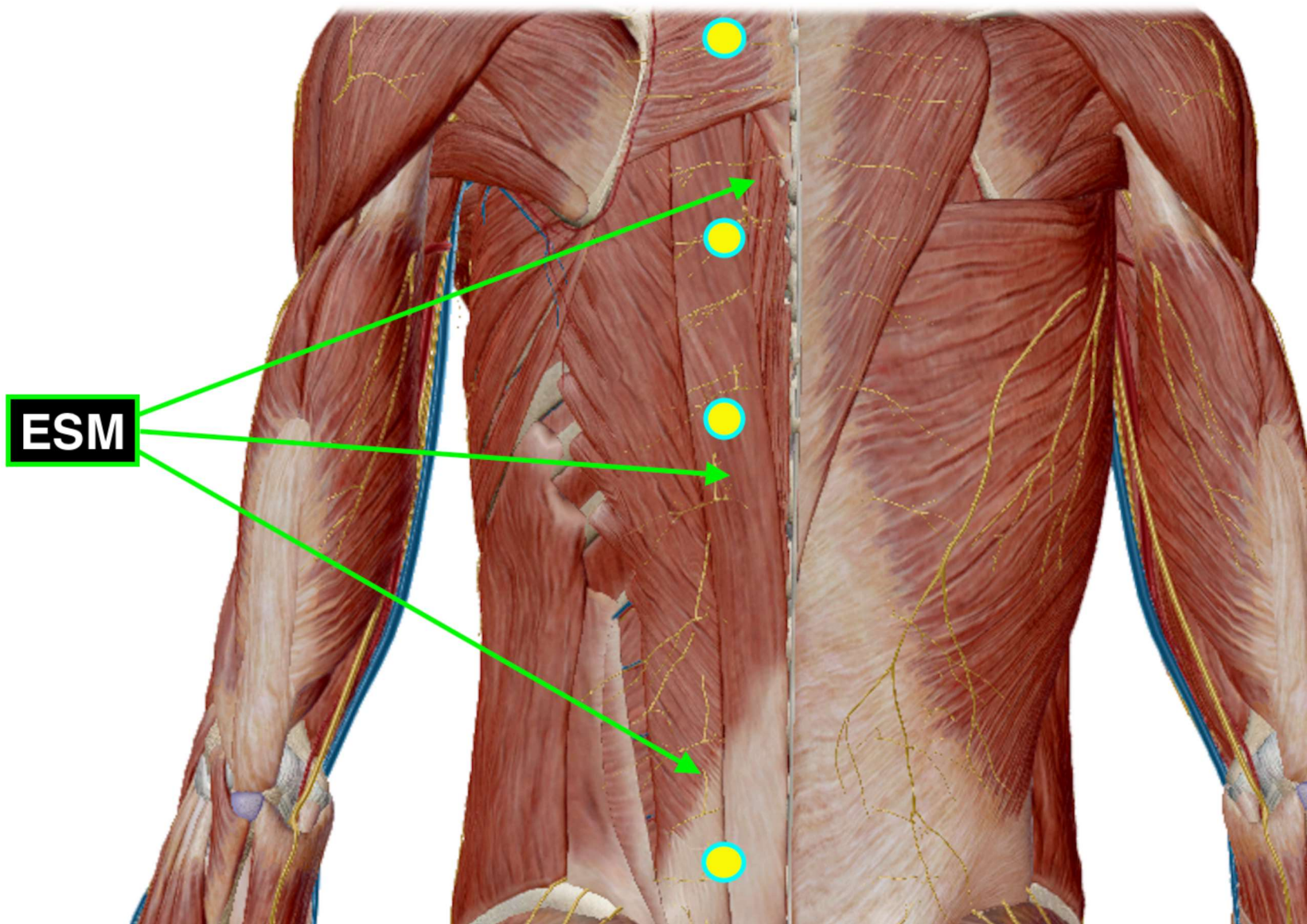
- Identifying the correct plane is not always
- Literature points to analgesia for lower ab surgery
  - Mixed evidence for more extensive analgesia
- Evidence for consistent thoracic paraverte is lacking
  - Cutaneous sensory blockade not always seen

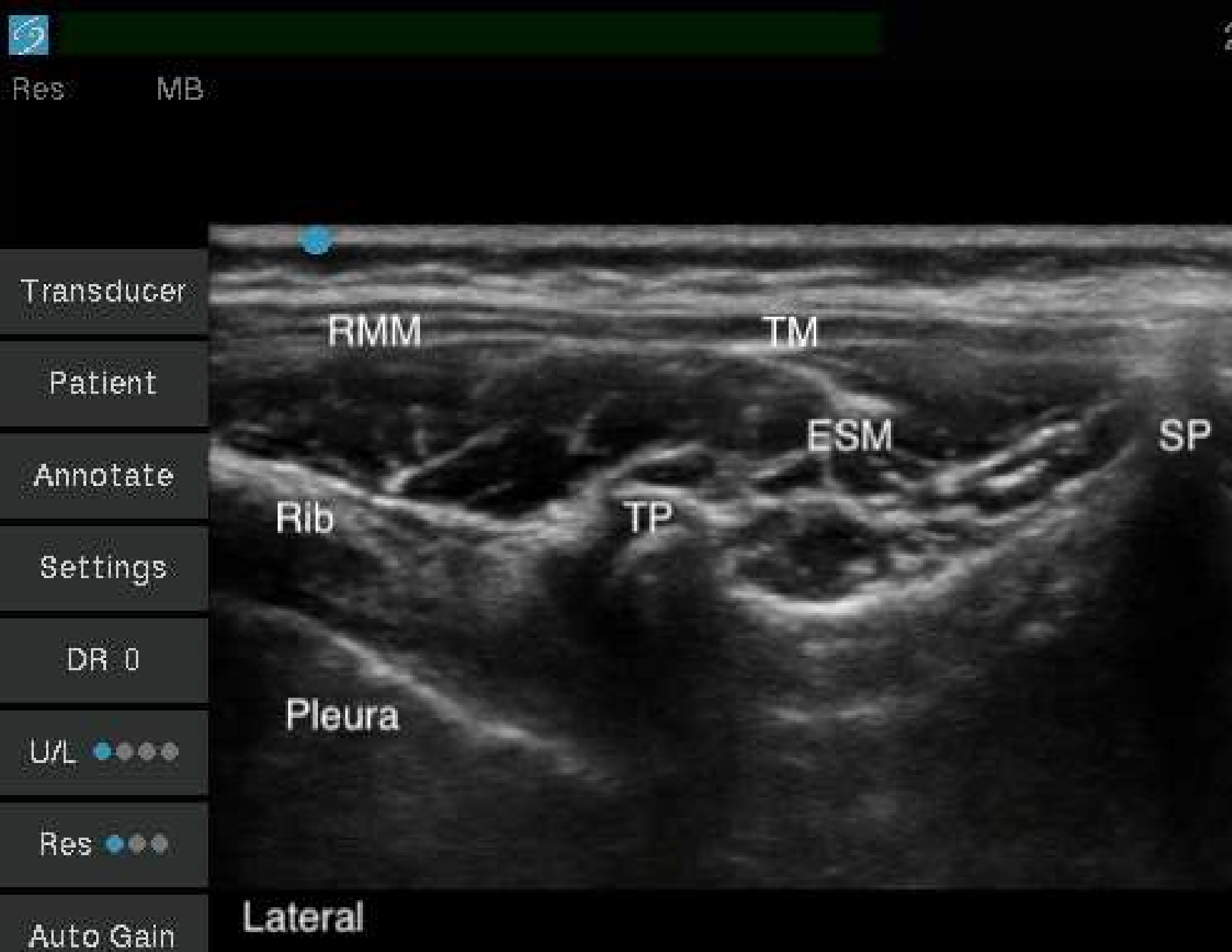
Erector Spinae Plane

- Targeting thoracic and lumbar spinal r
- Somatic and potentially visceral analg
- Can match injection site to surgery
- Indicated for breast, abdominal surge
  or below umbilicus, rib fractures, thora
  surgery, back surgery, pain conditions

Erector Spinae Plane

Erector Spinae Plane

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RMM
TM
ESM
SP
Rib
TP
Pleura
Lateral

CHRONIC AND INTERVENTIONAL PAIN

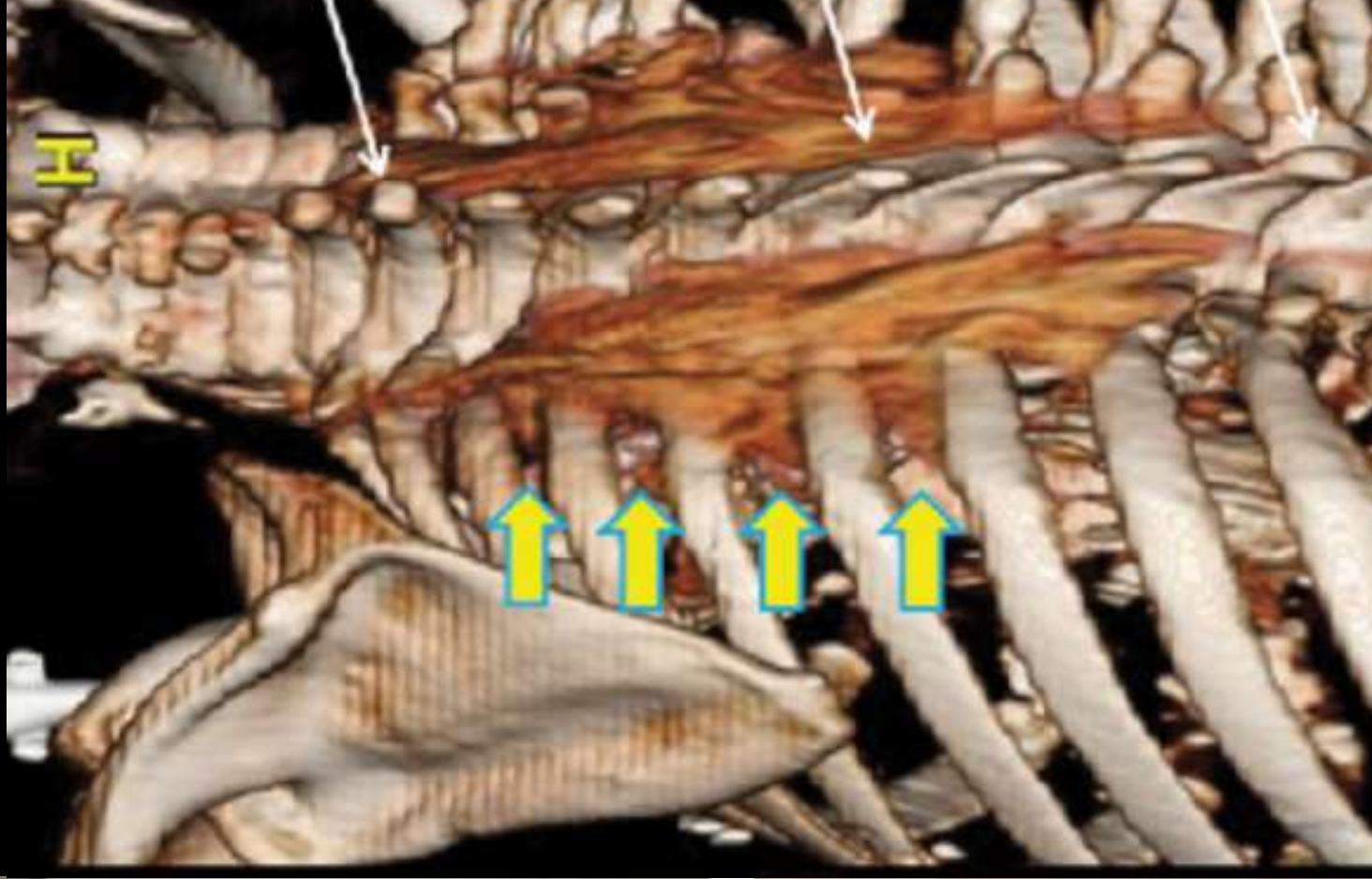
BRIEF TECHNICAL REPORT

The Erector Spinae Plane Block

A Novel Analgesic Technique in Thoracic Neuropathi

Mauricio Forero, MD, FIPP, Sanjib D. Adhikary, MD,† Hector Lopez,*
Calvin Tsui, BMSc,§ and Ki Jinn Chin, MBBS (Hons), MMed, FRCP

- 4 cases, ESP with 20 mL
- Resolution of bony neuropathic pain
  extensive cutaneous block of posteri
  lateral, and anterior chest wall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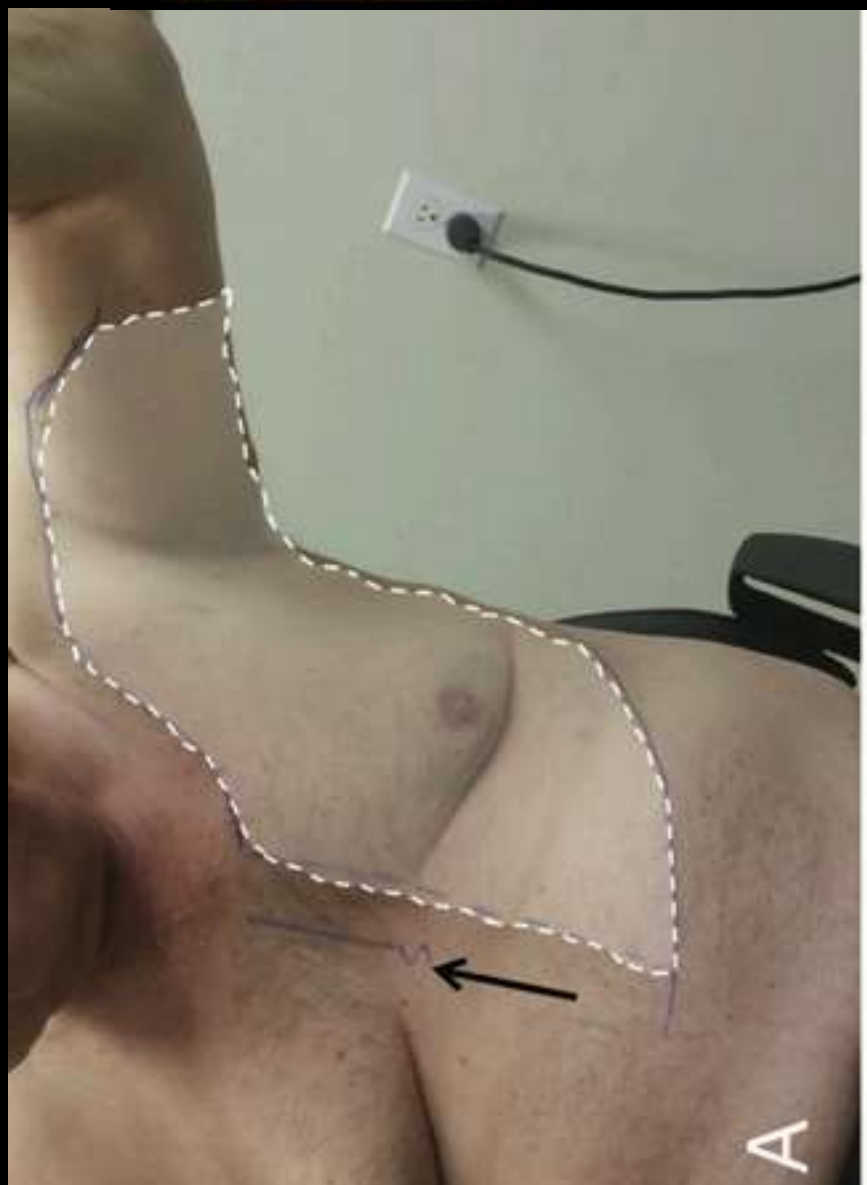
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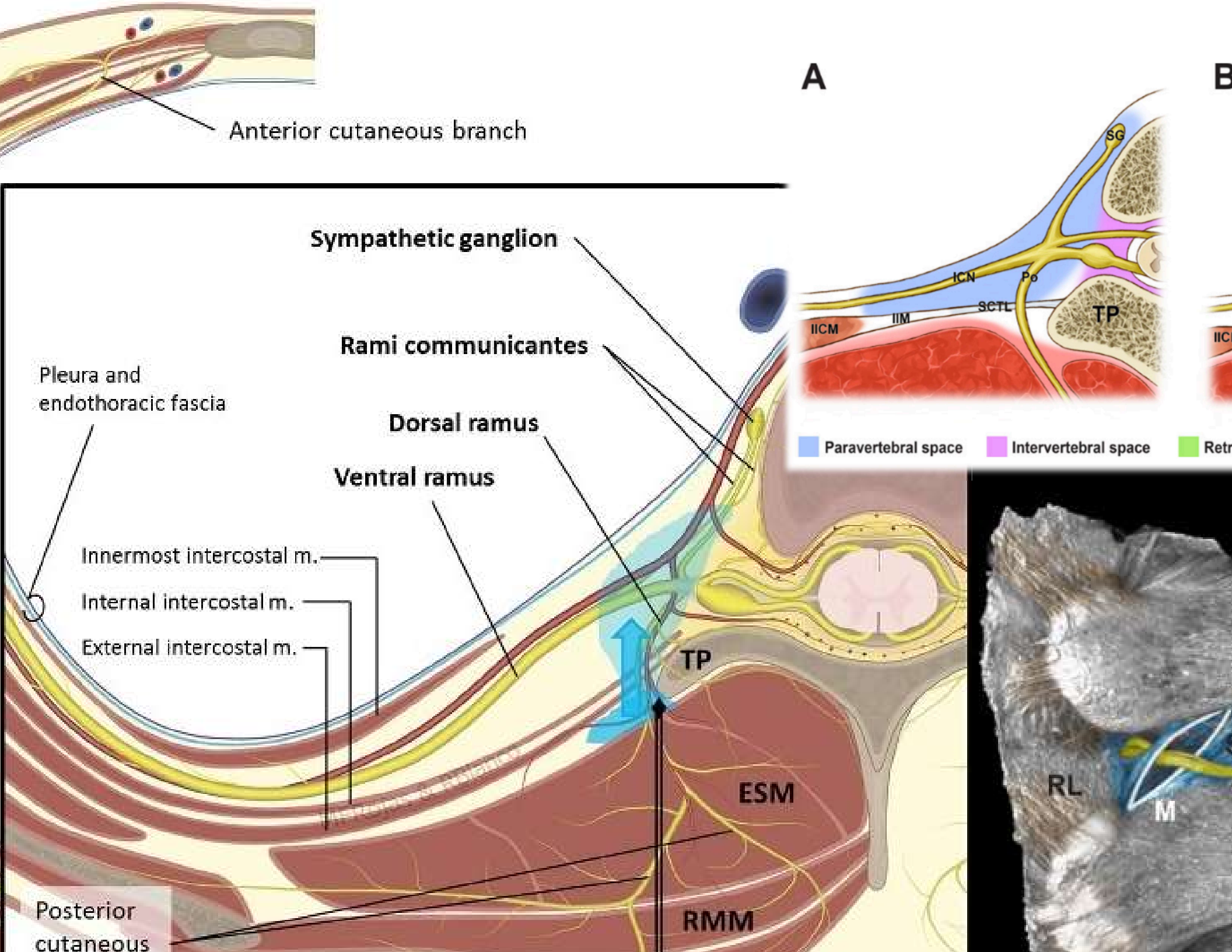
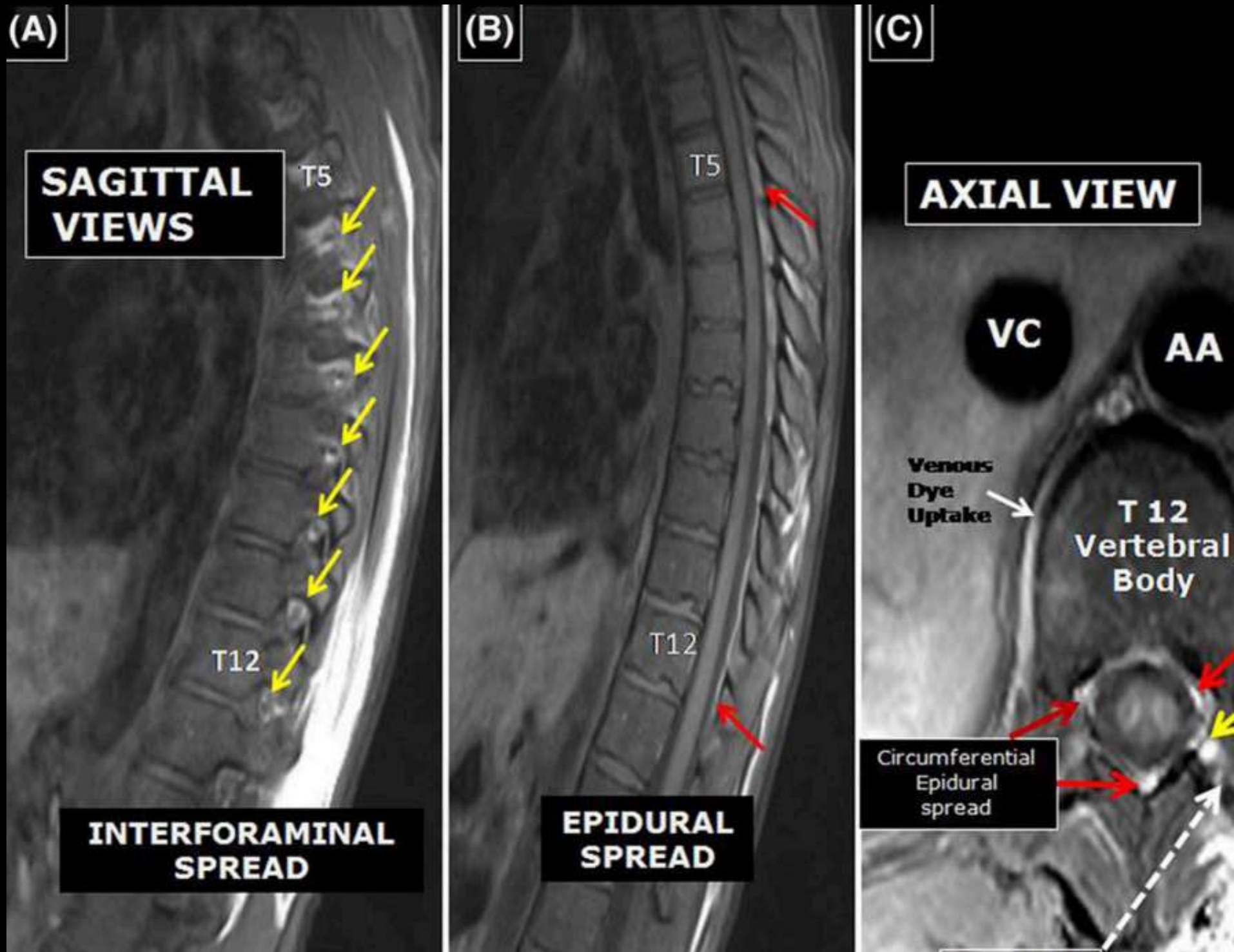
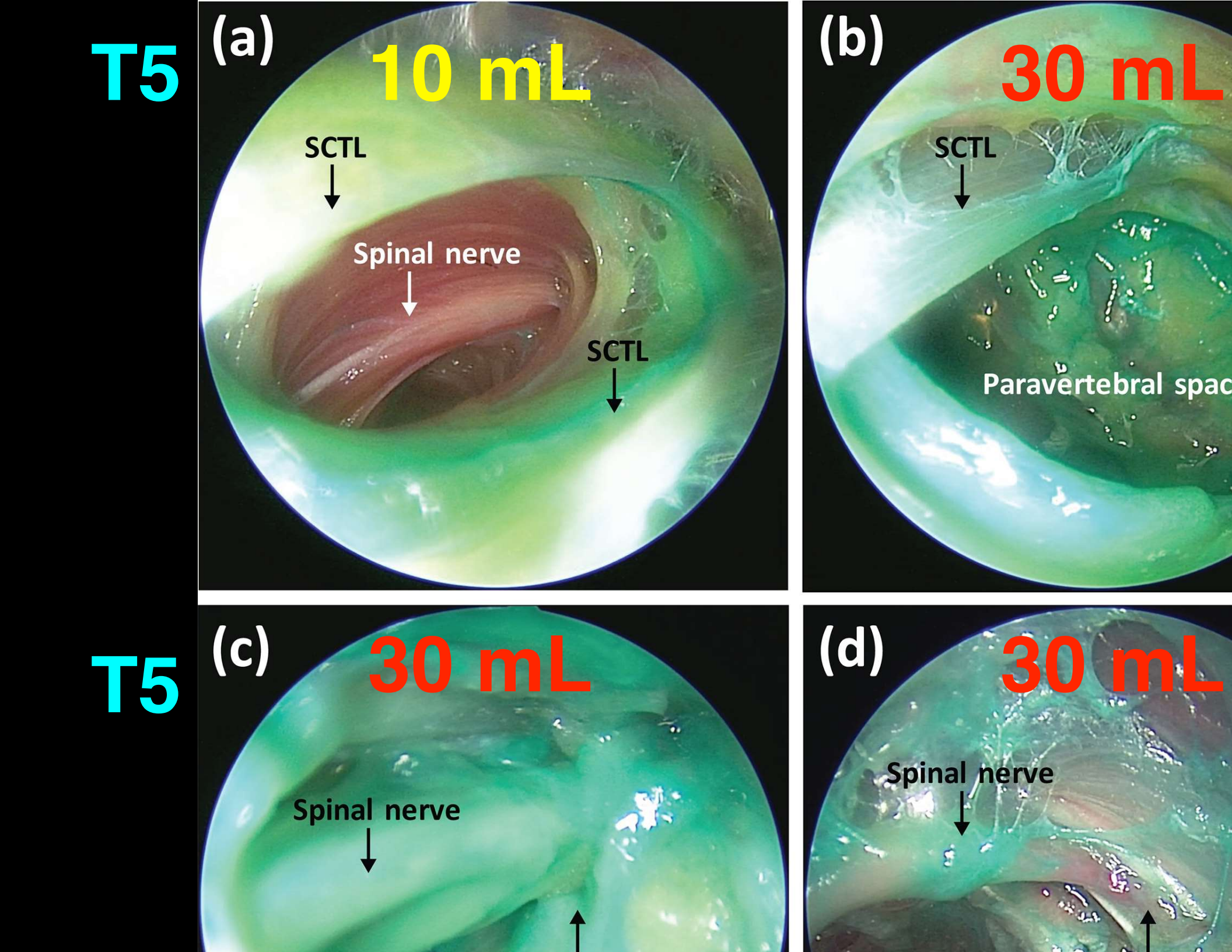
Erector Spine Plane

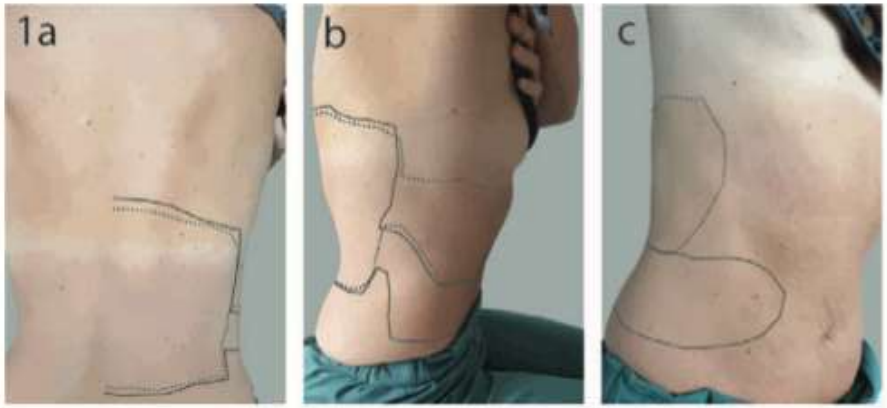
Mechanism of action

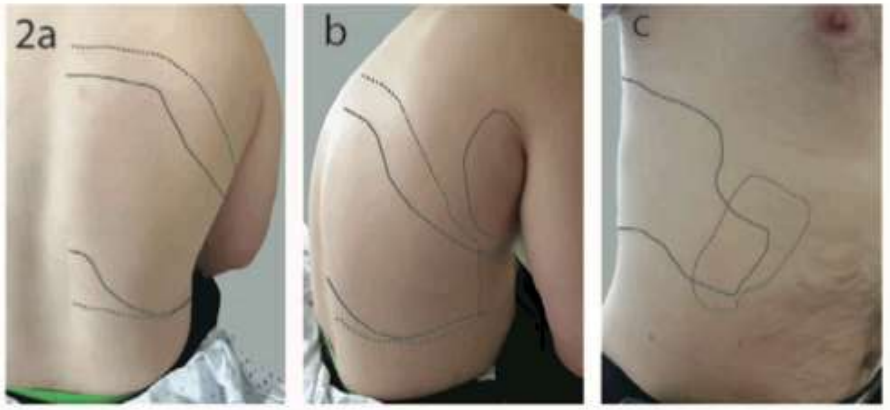
- Not fully understood: muscles and connective porous
- Potential spread of local anesthetic
  - **Dorsal rami**
  - **Lateral cutaneous branch of the intercostal nerve**
  - **Thoracic paravertebral space**

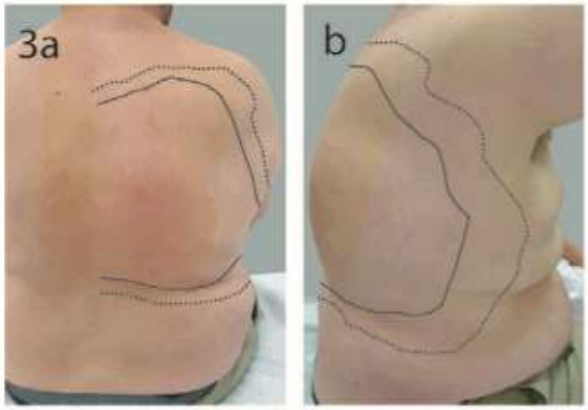

Anterior cutaneous branch
A
B
SG
ICN
Po
SCTL
TP
IICM
IIM
Paravertebral space
Intervertebral space
Sympathetic ganglion
Rami communicantes
Pleura and endothoracic fascia
Dorsal ramus
Ventral ramus
Innermost intercostal m.
Internal intercostal m.
External intercostal m.
TP
ESM
RMM
Posterior cutaneous
RL
M


(A)
SAGITTAL VIEWS
T5
T12
INTERFORAMINAL SPREAD
(B)
T5
T12
EPIDURAL SPREAD
(C)
AXIAL VIEW
VC
AA
Venous Dye Uptake
T 12 Vertebral Body
Circumferential Epidural spread

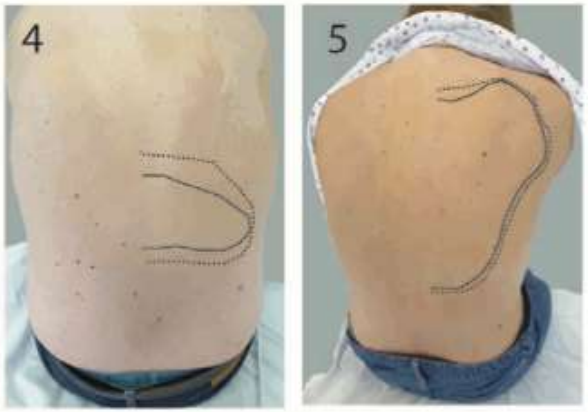

T5
(a)
10 mL
SCTL
Spinal nerve
SCTL
(b)
30 mL
SCTL
Paravertebral spac
T5
(c)
30 mL
Spinal nerve
(d)
30 mL
Spinal nerve

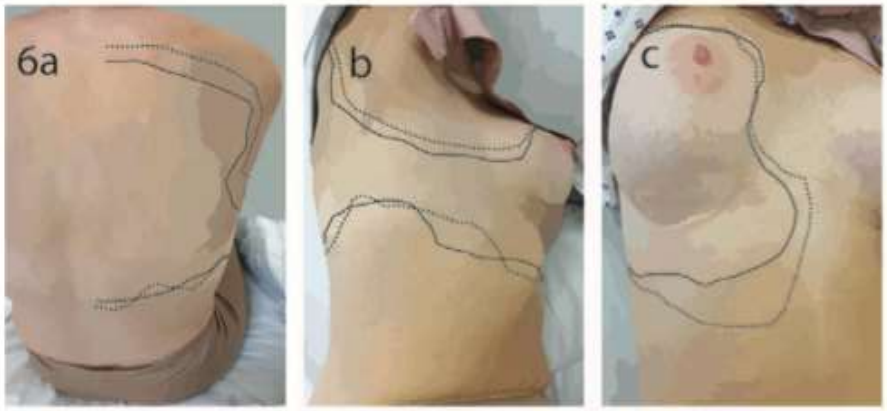






Ropivacaine 0.25% 30 mL with contrast at T7





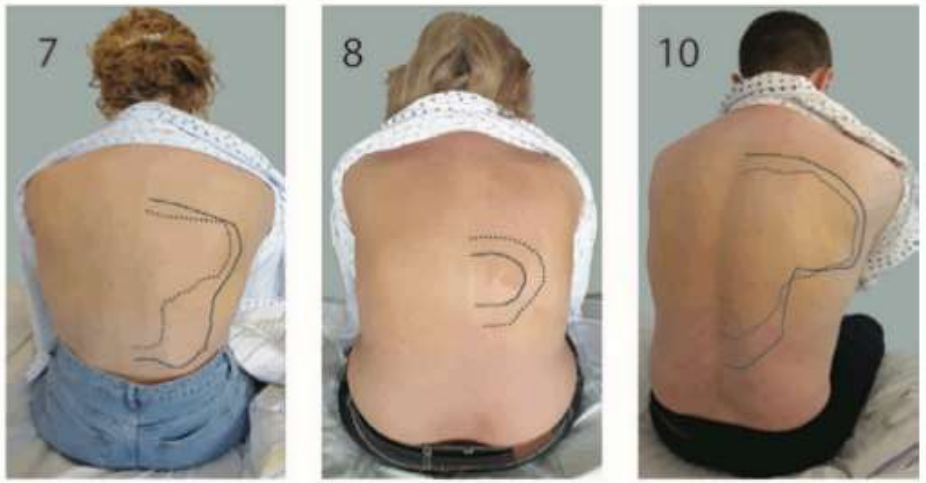
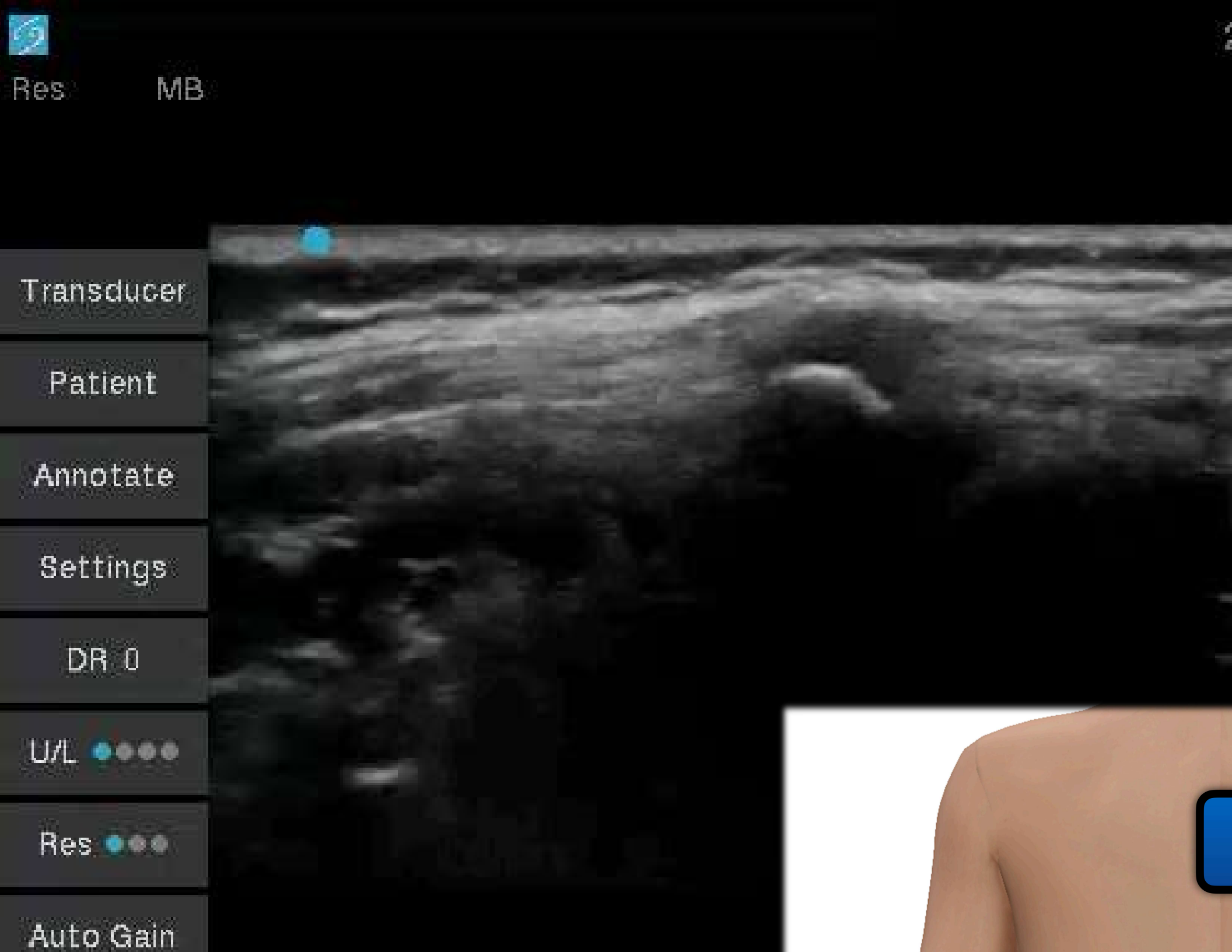


Table 2 Spread of LA/gadolinium

Volunteer no	1	2	3	4	5	6	7	8	9	10

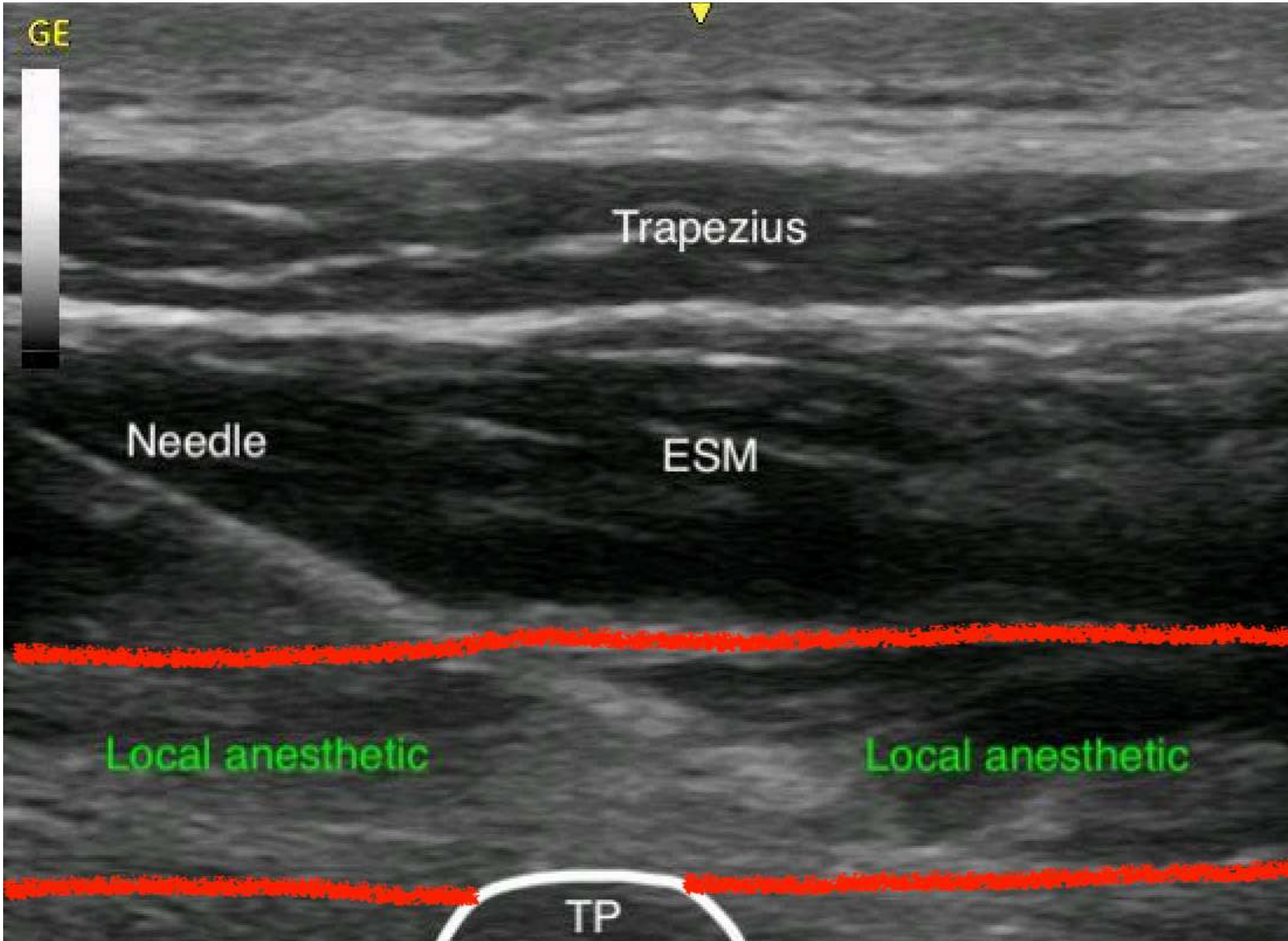
- S
i
i
a
c
- I
I
a
e

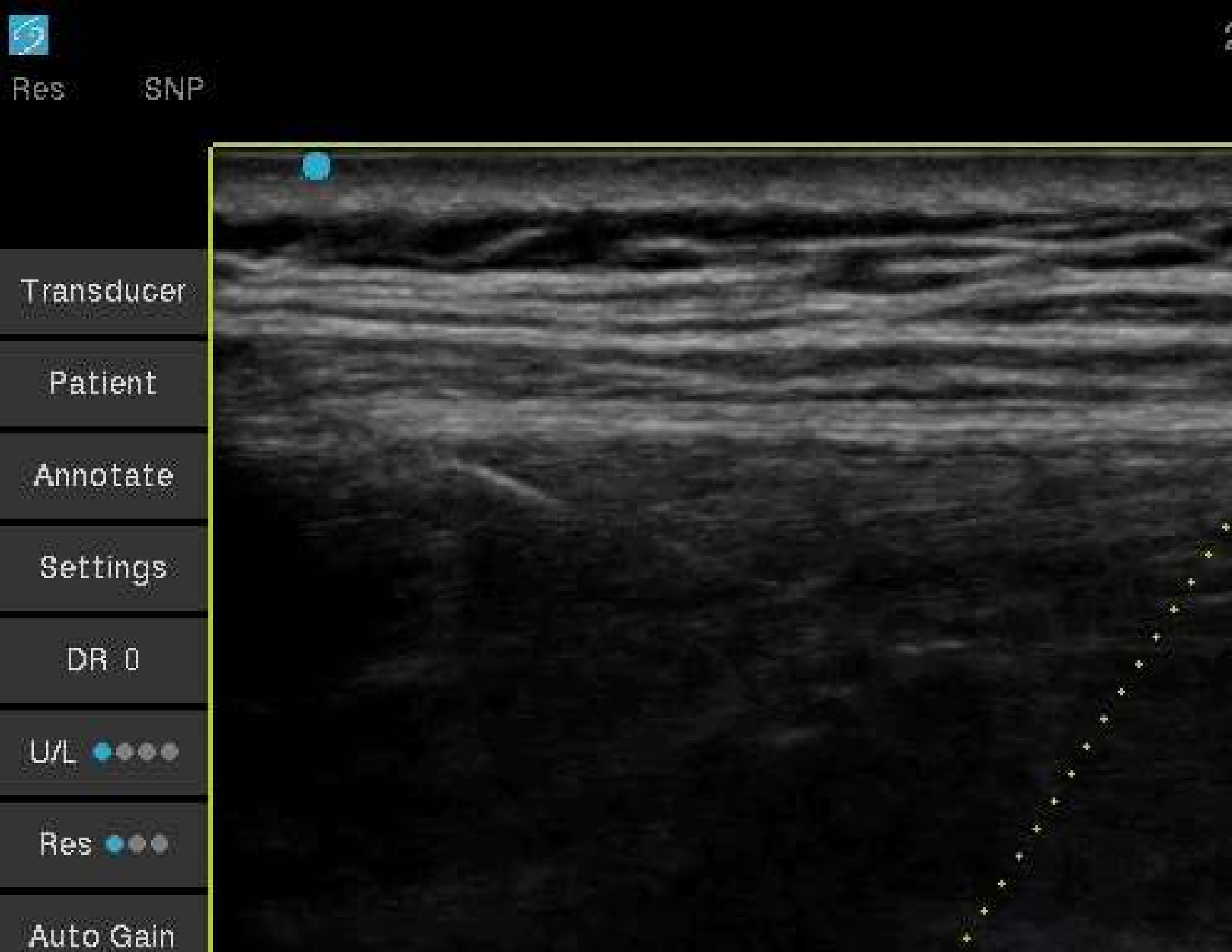
Erector Spinae Plane

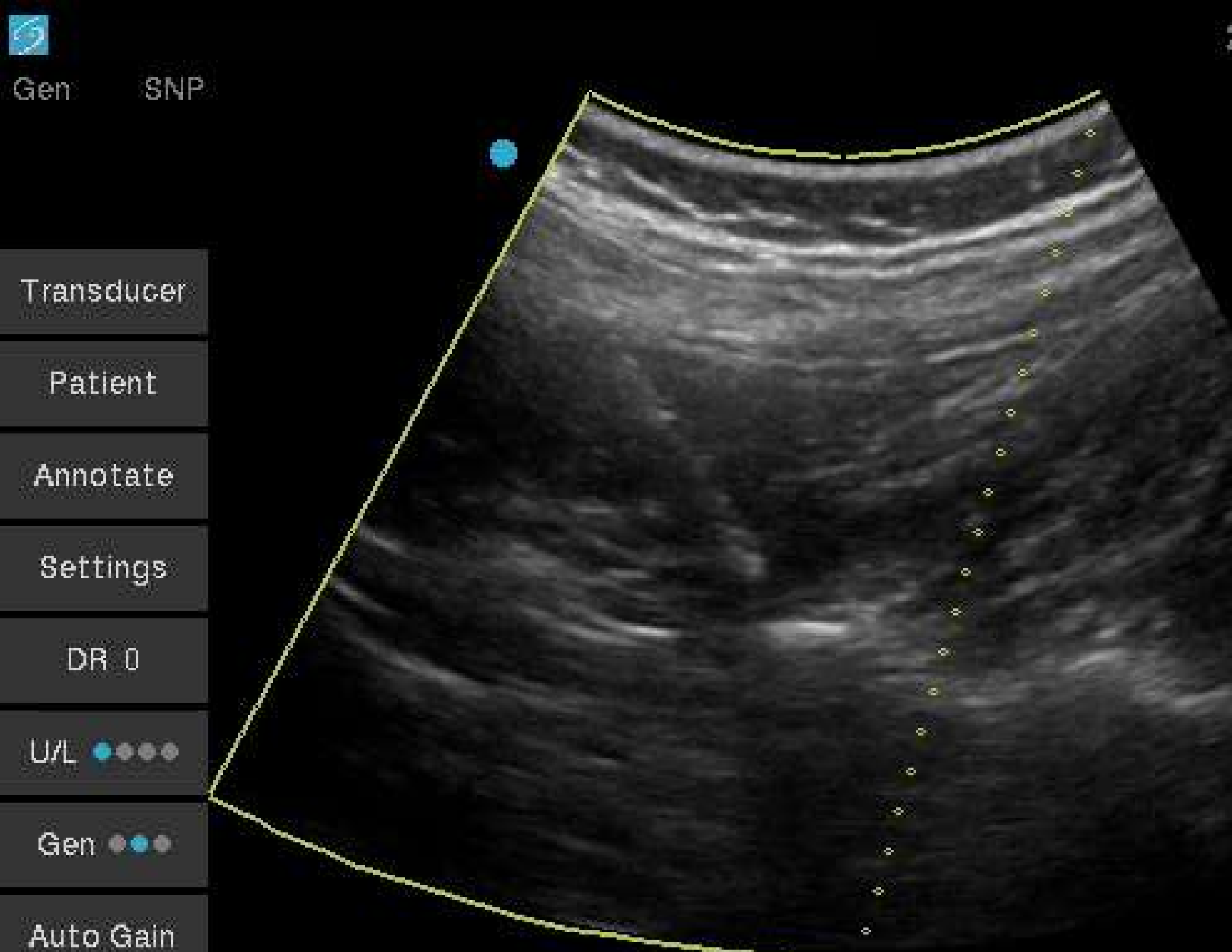

Res
MB
Transducer
Patient
Annotate
Settings
DR 0
U/L
Res
Auto Gain

Erector Spinae Plane

Erector Spinae Plane

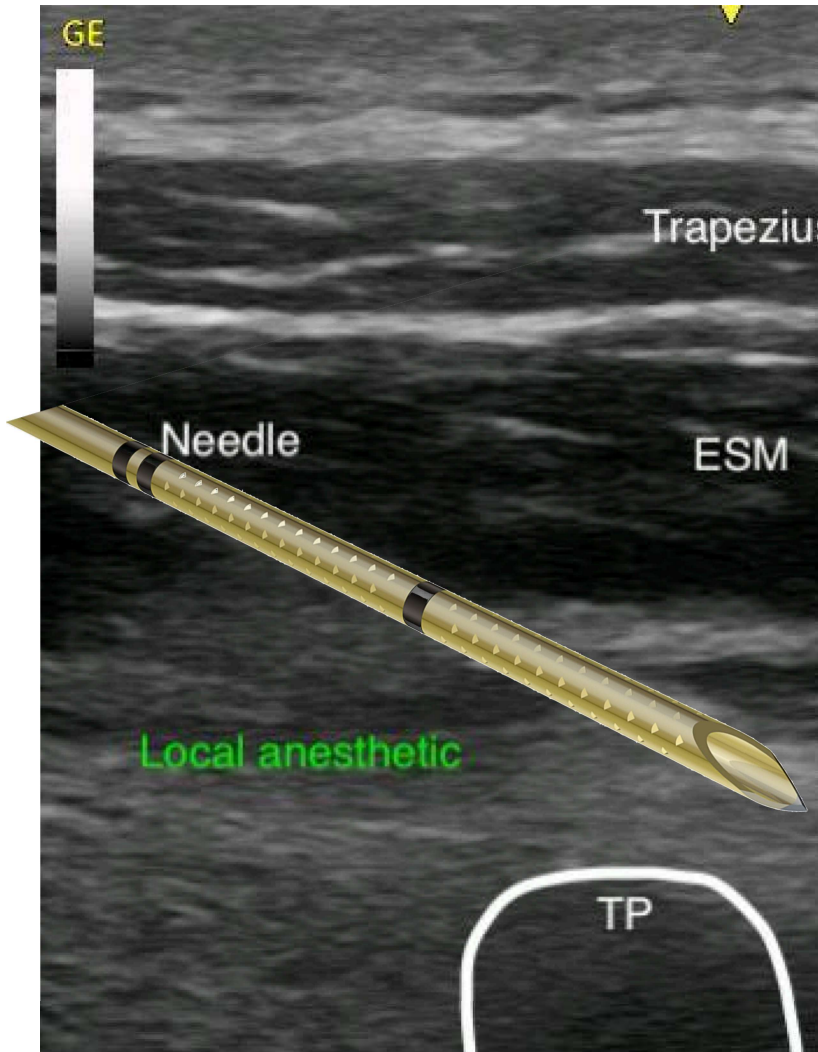



Res
SNP
Transducer
Patient
Annotate
Settings
DR 0
U/L
Res
Auto Gain


Gen
SNP
Transducer
Patient
Annotate
Settings
DR 0
U/L
Gen
Auto Gain

ESP Block Tips

- Patient positioning
- Curved vs linear probe
- Appropriate level
- Identify transverse processes
- Contact corner of TP
- **Linear spread of LA lifting ESM off TP**



ESP in the Literature

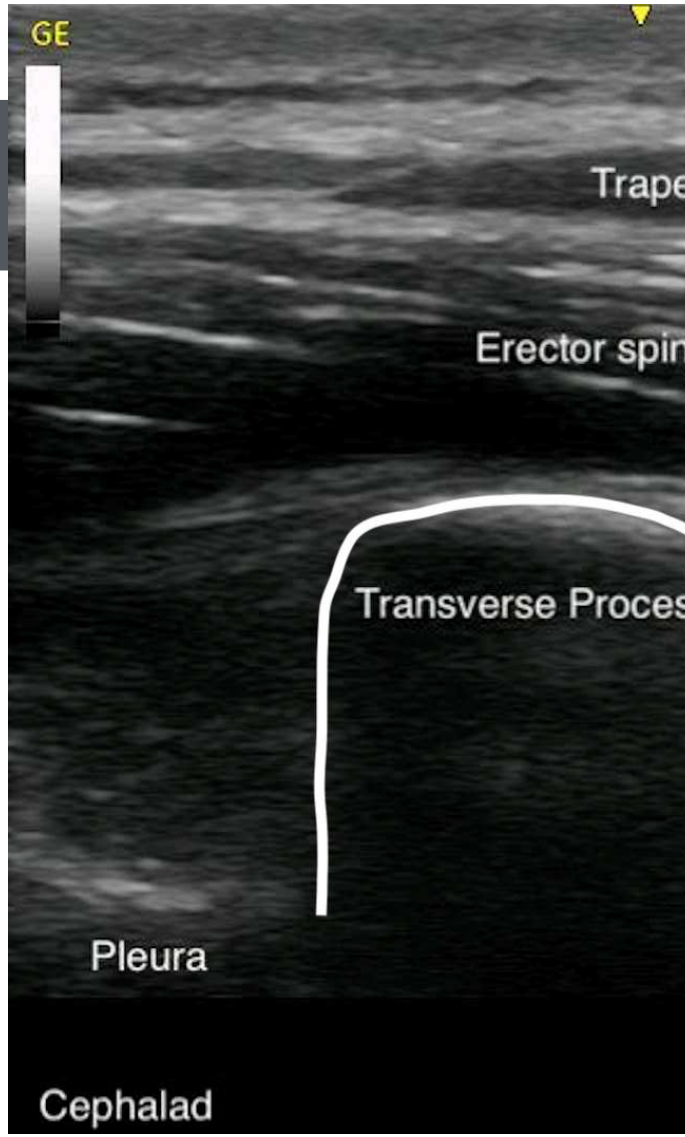
Mixed results

- **Volunteer study injection at T5:** extensive sensor
  only the posterior thorax — Zhang J, et al. BMC An
- **Cadaver lumbar ESP:** spread to dorsal rami, no sp
  rami or PVS — Harbell M, et al. Reg Anes
- **Breast meta-analysis:** statistically significant but c
  unimportant short-term benefit — Hussain N, et al. Reg An
- **Lumbar spine:** evidence for post-op analgesia

Anticoagulation

ASRA - no recommendation

- Based upon
  - Site compressibility
  - Vascularity
  - Consequences of



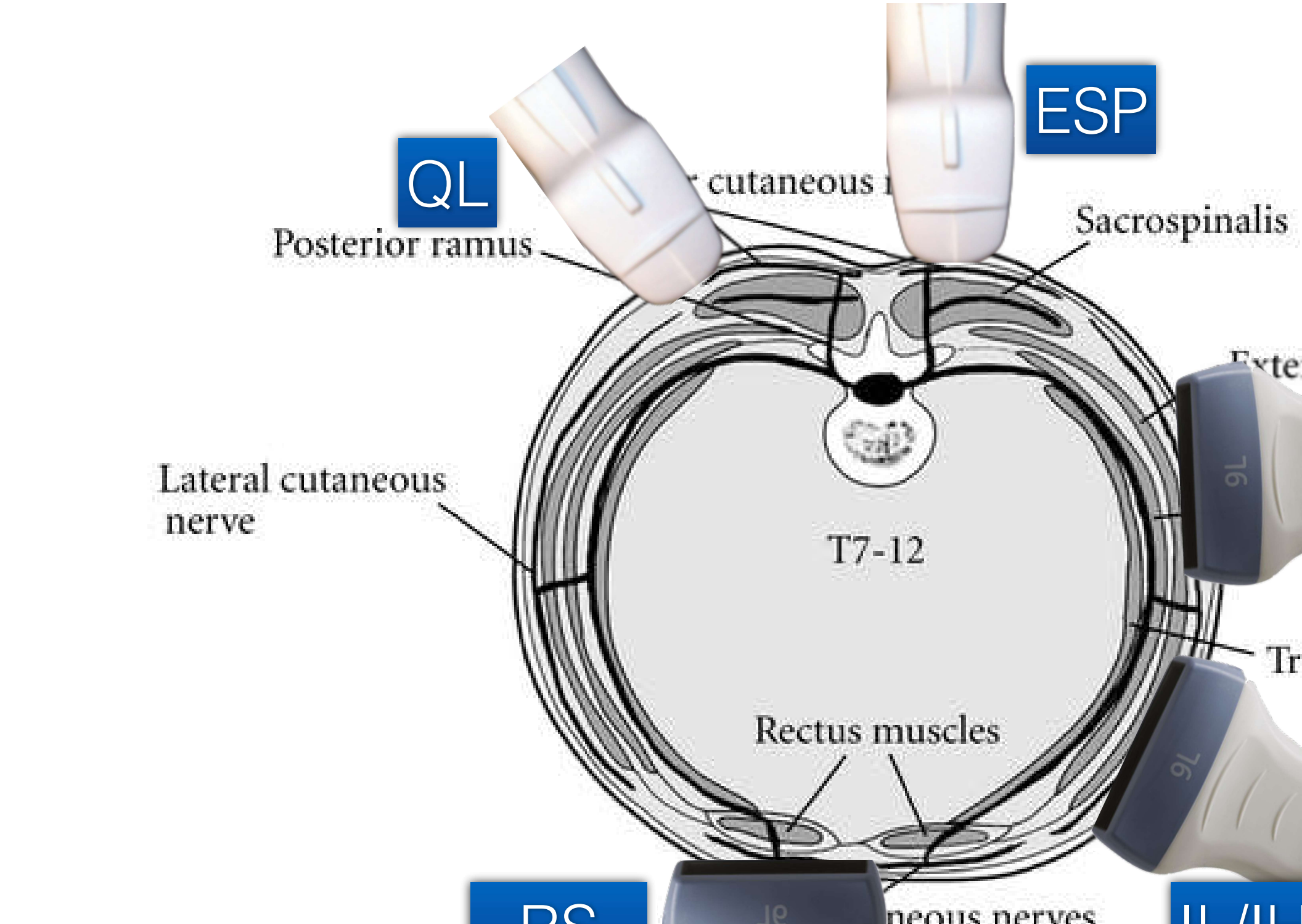
Superficial Peripheral Block

16.0 Anesthetic Management of the Patient Undergoing Plexus or Peripheral Block

16.2 For patients undergoing other

ESP Key Points

- Identify the transverse process, not the
- Anatomical studies support dorsal ram
  - Limited involvement of ventral rami
- Evidence for consistent paravertebral s lacking
  - Cutaneous sensory blockade not always seen


ESP
QL
Posterior ramus
Sacrospinalis
Lateral cutaneous
nerve
T7-12
Rectus muscles

Uncertainties

- Determinants of LA spread throughout the liv body for specific blocks
- The potential analgesic role of vascular absc
- **Ideal block technique and LA volume and concentration**
  - ***It may be a technique closer to the paravertebral sp***
- The role of LA adjuncts

Clinical Pearls

- ***More high-quality RCTs needed***
- Fascial plane blocks are potential alternative analges
  neuraxial and paravertebral blocks
  - Set realistic expectations - *analgesia not anesthesia, variable effica*
- ***Technique matters***
- ***These are volume blocks***
  - Calculate total dose of local anesthetic
- ***Part of a multimodal analgesic regimen***

Thank You

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