

# Paraspinal Blocks: Should they be a Core Competency for all Anesthesiologists?

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# Disclosures

- ◆ No financial disclosures
- ◆ MTP block

# Competency

- ◆ What defines competency
- ◆ How many blocks are enough?
- ◆ Topic worthy of entire talk!

# Paraspinal blocks

- ◆ Definition
- ◆ Potential uses
- ◆ Ultrasound-guided block techniques
- ◆ Evidence

# Paraspinal Blocks

- ◆ Rely on indirect spread to the TPVS

Curr Anesthesiol Rep (2017) 7:212–219  
DOI 10.1007/s40140-017-0212-y

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REGIONAL ANESTHESIA (CJL MCCARTNEY, SECTION EDITOR)

## Regional Techniques for Thoracic Wall Surgery

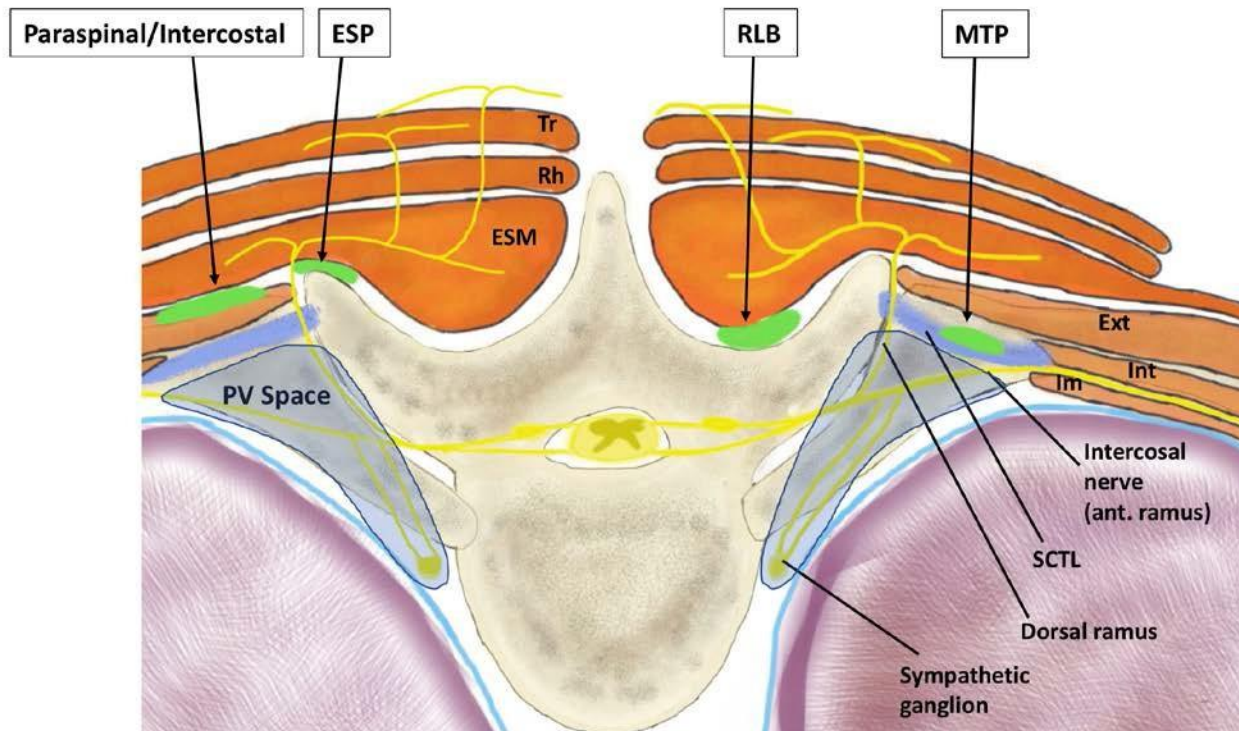
Kim Wild<sup>1</sup> • Ki Jinn Chin<sup>1</sup>

- ◆ Indirect paravertebral
- ◆ Paravertebral by proxy
- ◆ Paravertebral “lite”

# Paravertebral and Paraspinal blocks

- ◆ Applications: thoracic/breast/ rib #/ VATS/other
- ◆ Paravertebral
  - ◆ Landmark
  - ◆ Ultrasound-guided
- ◆ Retrolaminar (RLB)
- ◆ Intercostal/paraspinal
- ◆ Erector spinae plane (ESP)
- ◆ Mid-point transverse process to pleura (MTP)

# Paraspinal blocks



Costache, Pawa,  
Abdallah, PVB by proxy,  
*Anaesthesia*, In press

# Paravertebral – the good

- ◆ Decreased narcotic consumption
- ◆ Decreased pain scores
- ◆ Less PONV
- ◆ Faster PACU discharge
- ◆ ?Reduction in persistent postop pain
- ◆ ?Possible decreased cancer recurrence
- ◆ GA free anesthetic





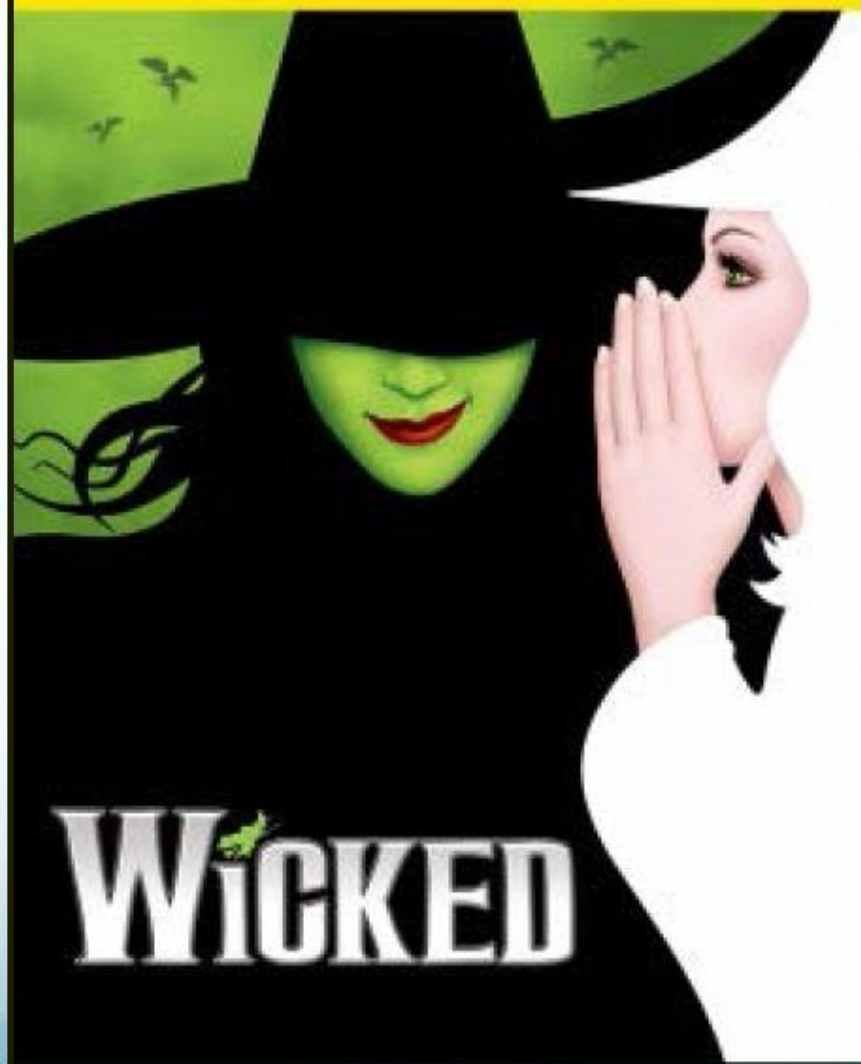
# Paravertebral – the bad

- ◆ Pneumothorax
- ◆ Vascular injury
- ◆ Nerve injury
- ◆ Epidural or intrathecal injection, hematoma
- ◆ Hypotension



# PLAYBILL

GERSHWIN THEATRE

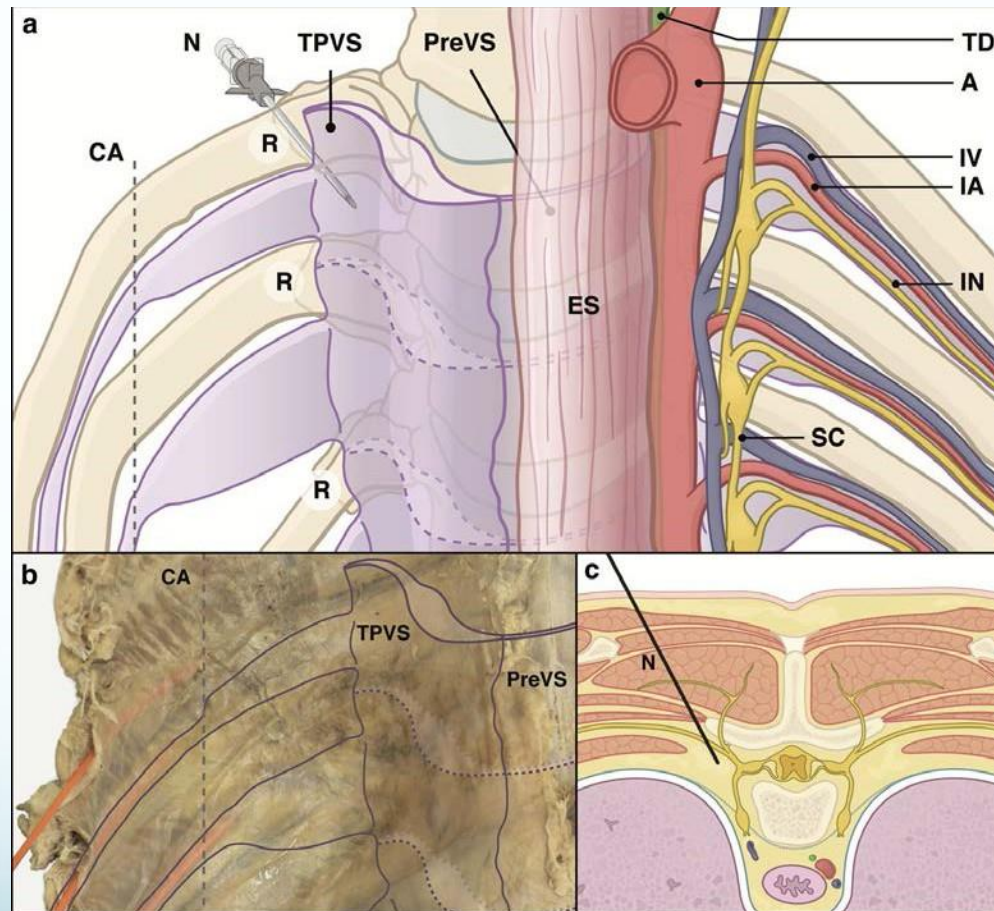


# Paravertebral risks

- ◆ Until recently, based on landmark technique
- ◆ No pneumothorax in recent retrospective study 856 patients (1427) US-guided blocks

Ultrasound-guided thoracic PVB: A Retrospective Study of the Incidence of Complications. Pace et al, *Anesthesia & Analgesia* 2016; 122 (4): 1186-91

Boundaries of the thoracic paravertebral space: potential risks and benefits of the thoracic paravertebral block from an anatomical perspective. Bouman et al, *Surg Radiol Anat* 2017



# Paravertebral-landmark

- ◆ Contact transverse-process (2.5 cm lateral to spinous process), redirect needle and advance 1-
  - 1.5 cm cephalad or caudad
- ◆ Caudal re-orientation preferable as less likely hit lung if initial contact is actually rib and not TP
- ◆ Multiple injections required
- ◆ Only 28% landmark PVB placed needle tip in PVS in high fidelity simulation model
  - Samee, Grant, Gadsden, abstract #1299, ASRA 2016

# Paravertebral-ultrasound-guided

- ◆ “Beyond scope of this text”
- ◆ First described 2010
- ◆ 9 different approaches with parasagittal or transverse scan currently described

## **Different Approaches to Ultrasound-guided Thoracic Paravertebral Block**

### *An Illustrated Review*

Annelot C. Krediet, M.D., Nizar Moayeri, M.D., Ph.D., Geert-Jan van Geffen, M.D., Ph.D.,  
Jörgen Bruhn, M.D., Ph.D., Steven Renes, M.D., Ph.D., Paul E. Bigeleisen, M.D.,  
Gerbrand J. Groen, M.D., Ph.D.

## Krediet et al Review Ultrasound-Guided PVB, *Anesthesiology* 2015

Transducer position	US Landmark (Medial/lateral)	Needle Path (In/out of plane)	Publications	Arrow No.
Transversal	Rib (lat)	lat → med IP	Ben-Ari <sup>20</sup> , Paraskeopoulos <sup>15</sup>	1
	Tip of TP (lat)	lat → med IP	Shibata <sup>22</sup> ; Renes <sup>13</sup> , Cowie <sup>16</sup> ; Bouzinac <sup>17</sup>	2
		caudal → cranial OOP	Marhofer <sup>14</sup>	3
	IAP (med)	lat → med IP	Gautier †	4
		med → lat OOP	Luyet <sup>19</sup> , †	5
Sagittal	Rib (lat)	caudal → cranial IP	Paraskeopoulos <sup>15</sup>	6
	TP (med)	caudolat → craniomed IP	Luyet <sup>12</sup>	7
		caudal → cranial IP	O'Riain <sup>11</sup> , Abdallah <sup>18</sup>	8
		caudal → cranial OOP	Hara <sup>10</sup> , Vandepitte*	9

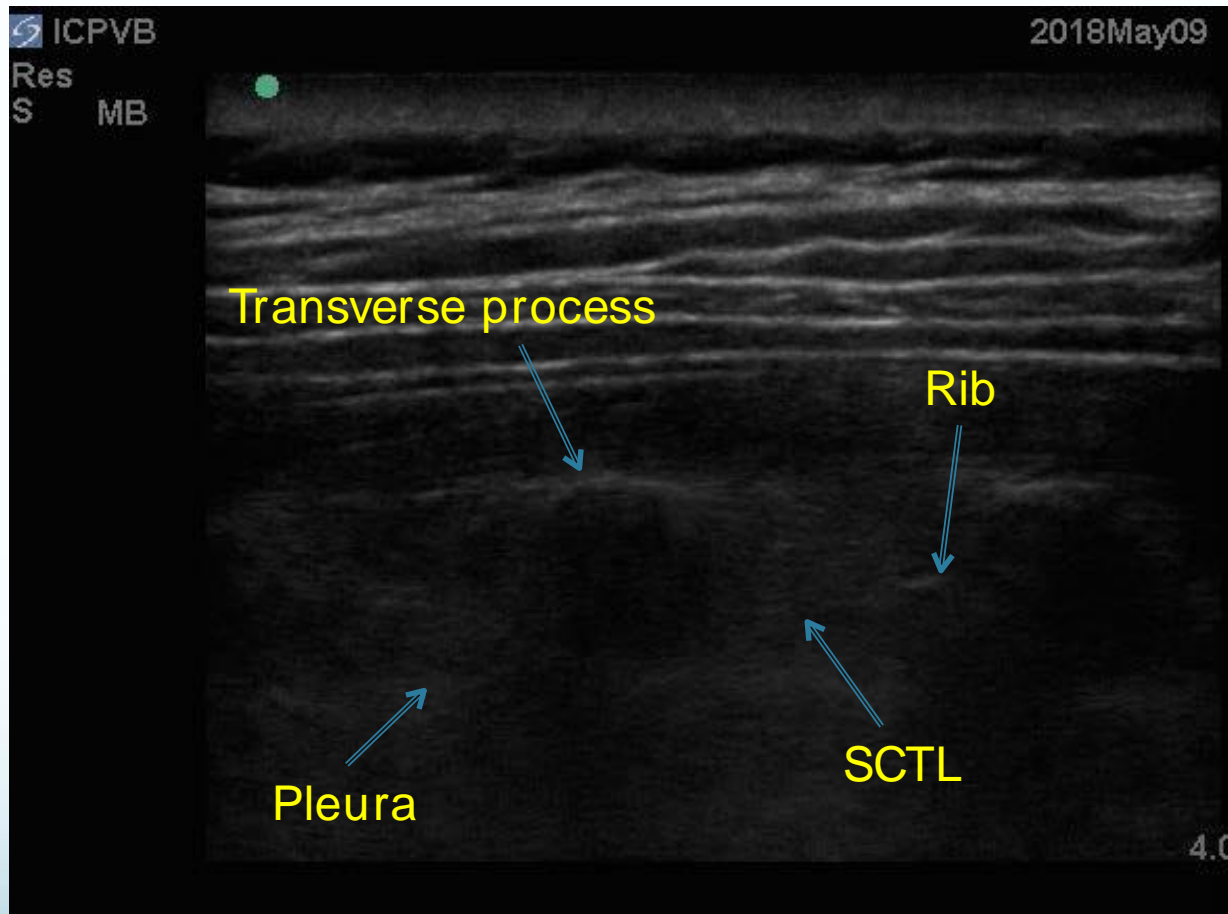


# Paravertebral-ultrasound-guided

- ◆ Multiple injections NOT required to achieve multilevel spread:
  - ◆ Uppal V, Single-injection versus multiple-injection technique of ultrasound-guided paravertebral blocks: a randomized controlled study comparing dermatomal spread. *Reg Anesth Pain Med* 2017
  - ◆ Renes SH, In-Plane ultrasound-guided thoracic paravertebral block: a preliminary report of 36 cases with radiologic confirmation of catheter position. *Reg Anesth Pain Med* 2010
  - ◆ Marhofer D, Magnetic resonance imaging analysis of the spread of local anesthetic solution after ultrasound-guided lateral thoracic paravertebral blockade: A volunteer study, *Anesthesiology* 2013



# Paravertebral: ultrasound-guided (parasagittal scan)

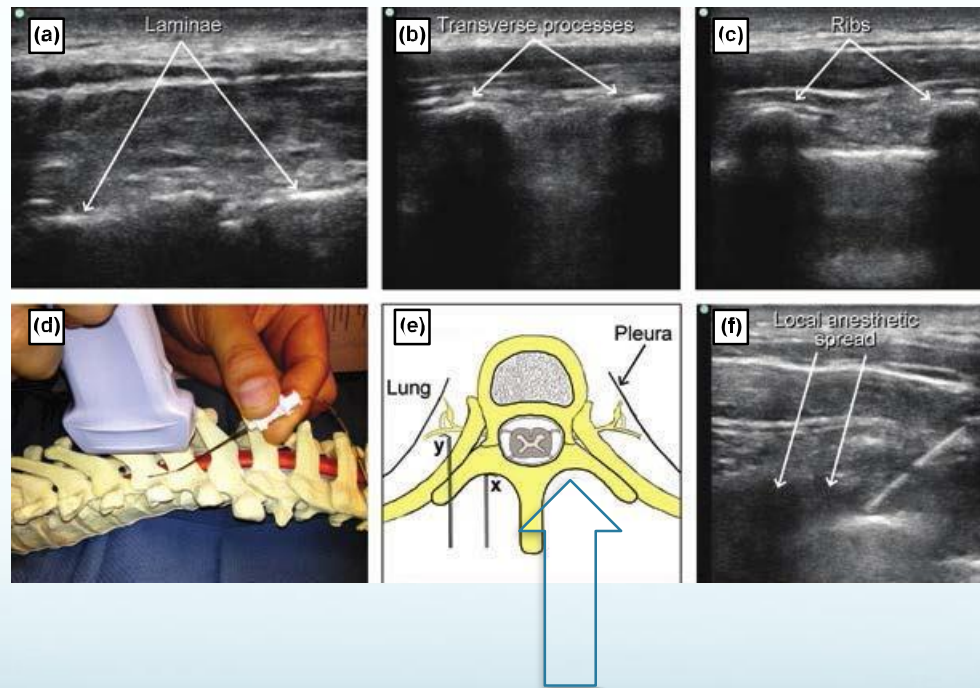


# Retrolaminar PVB

- ◆ First described in 2005, ultrasound approach 2013 by Zeballos
- ◆ Contact lamina and inject in plane between posterior surface of thoracic lamina and erector spinae muscle
- ◆ Higher volumes required than direct PVB
- ◆ Case reports, small RCT RLB vs PVB breast surgery

# Ultrasound-guided Retrolaminar PVB

Zeballos JL et al, *Anaesthesia* 2013

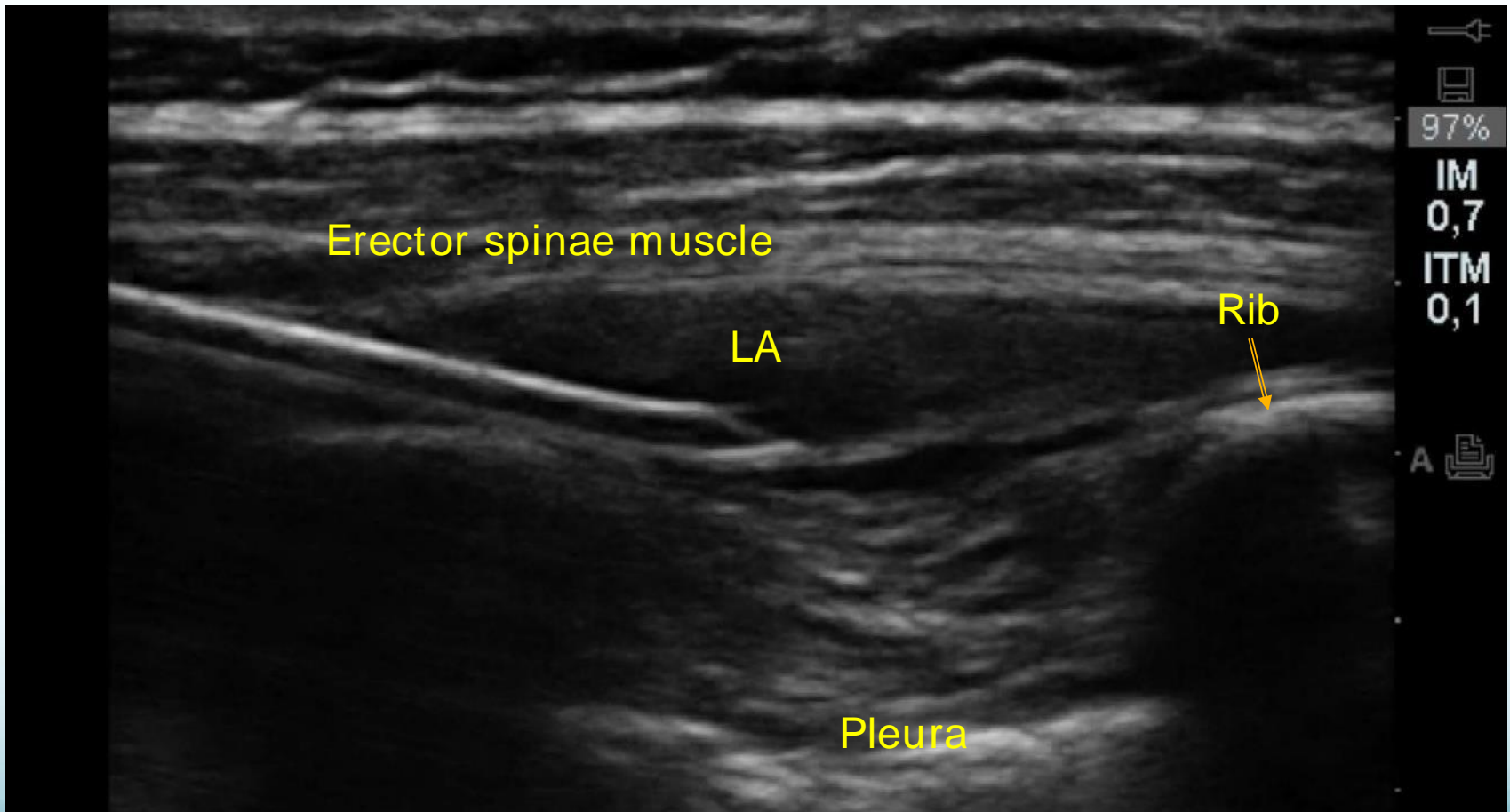


# Intercostal/ Paraspinal

- ◆ First described in 2015 by Roue (2010 by Truitt)
- ◆ Injection posterior to ribs, same interfascial plane as ESP, RLB, rhomboid intercostal, sub-serratus plane
- ◆ Case reports: rib fractures, thoracic surgery

# Intercostal/ Paraspinal

Roue, *Anaesthesia* 2016

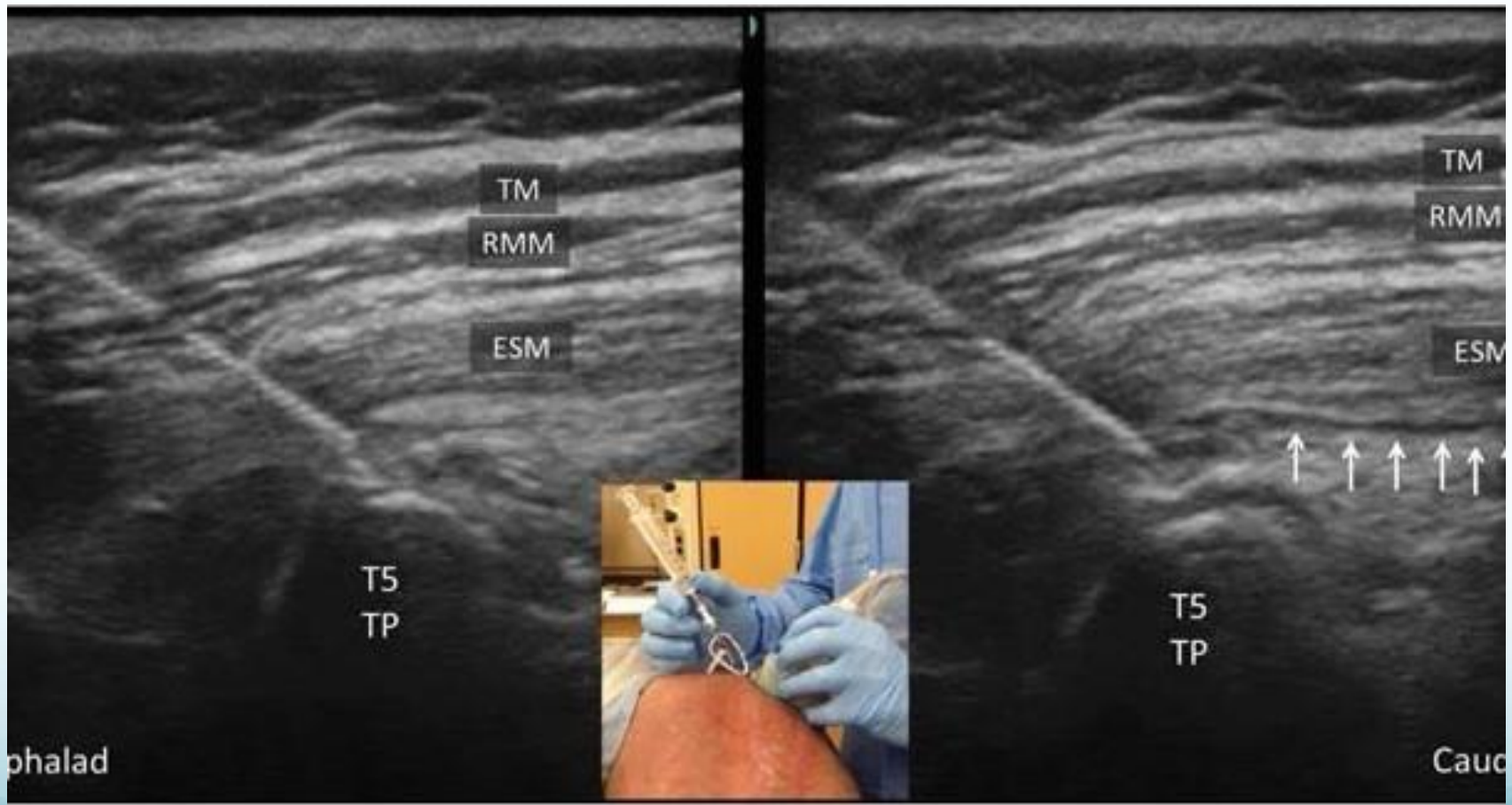


# Erector Spinae Plane Block

- ◆ First described by Forero et al 2016 in treatment thoracic neuropathic pain
- ◆ Extensive cranial caudad spread with 1 injection (T5 for thoracic, T7 for abdominal surgery)
- ◆ Injection between TP and erector spinae muscle
- ◆ Mechanism of action not definitively described

# The Erector Spinae Plane Block A Novel Analgesic Technique in Thoracic Neuropathic Pain

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



# ESP block



# Erector Spinae Plane Block

- ◆ Less risk than PVB or epidural
- ◆ ESP catheter preferable to single shot (variable duration with single shot)
- ◆ Analgesic rather than anesthetic block
- ◆ Risk of LAST
- ◆ Case reports for: breast surgery/ rib # /VATS/ ventral hernia/ other
- ◆ No RCTs (yet)

# Mid-point transverse process to pleura (MTP) block

- ◆ Clinical observations during transition from landmark to ultrasound-guided PVB
- ◆ Pleural displacement noted with needle tip and injection clearly posterior to SCTL



# Anaesthesia

Journal of the Association of Anaesthetists of  
Great Britain and Ireland

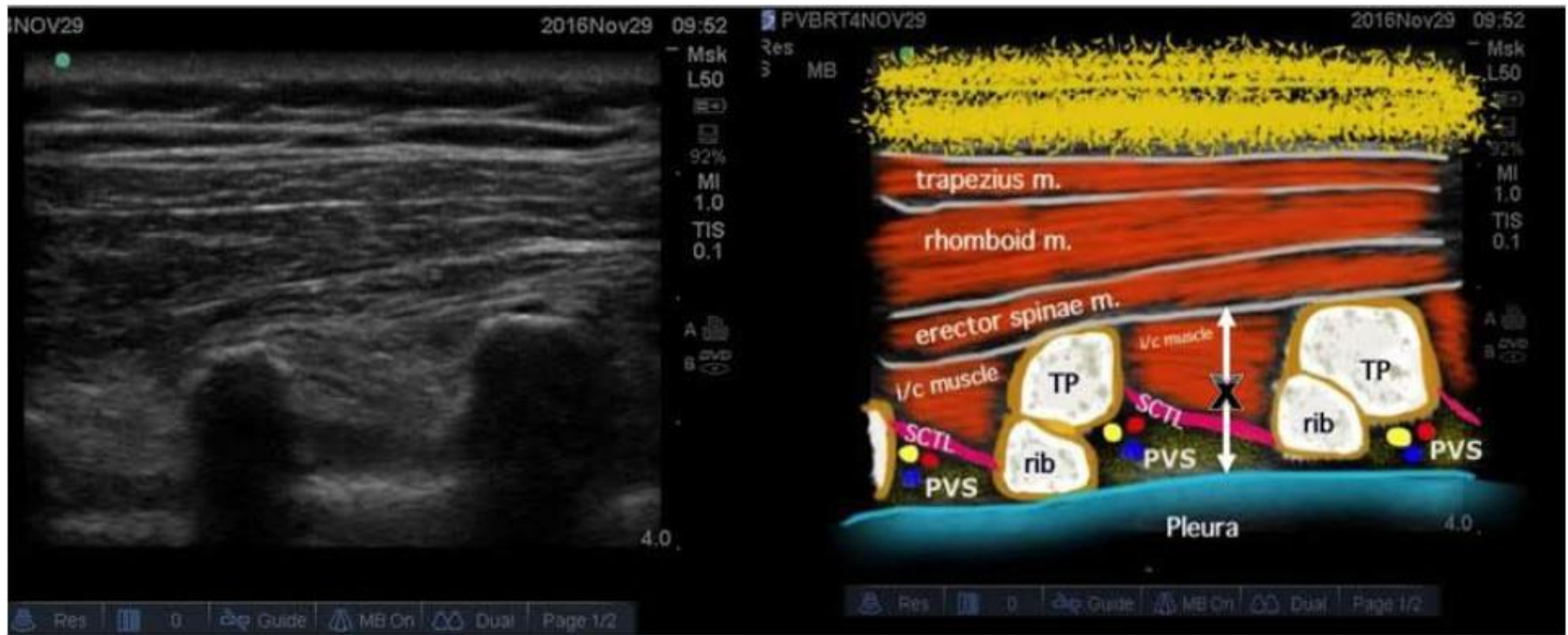
Correspondence 8 Free

Access

## **Does paravertebral block require access to the paravertebral space?**

I. Costache . J. Sinclair, F.A. Farrash, T. B. Nguyen, C.J.I. McCartney, C.J. Ramnanan, S. L. Goodwin

First published: 13 June 2016 | <https://doi.org/10.1111/anae.13527> | Cited by: 6



Anaesthetic 1011, *n*. 1236-1236

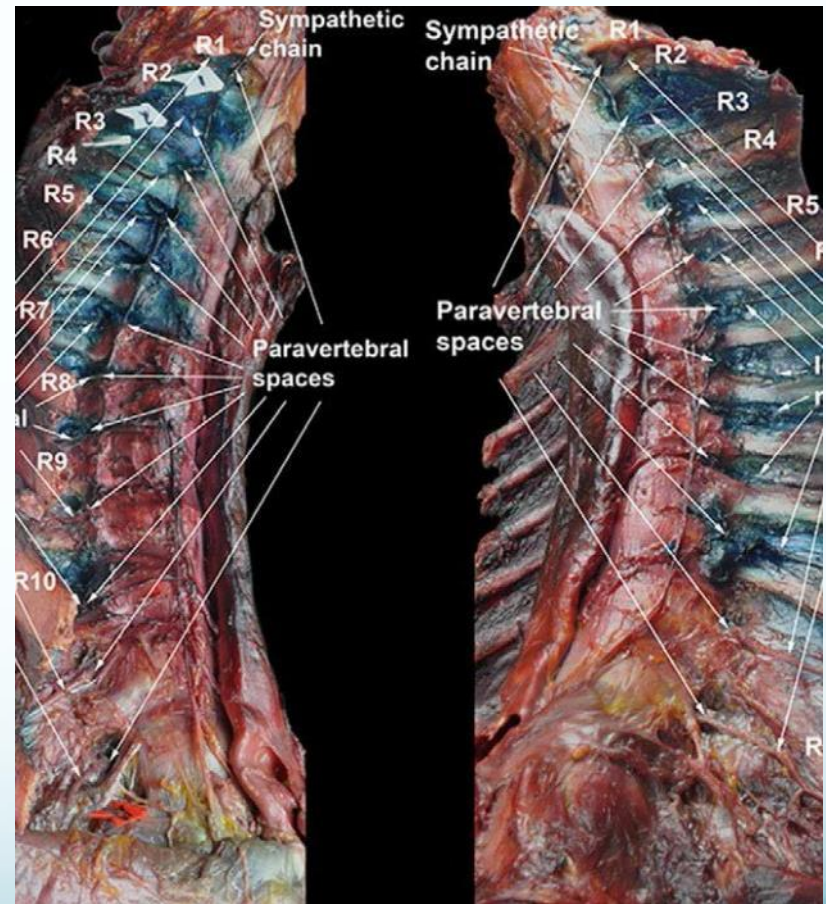
doh10.1111/anae.14004

# Original Article

The mid-point transverse process to pleura (MTP) block: a new end-point for thoracic paravertebral block\*

L. C. M. de Almeida<sup>1</sup>, L. de N. M. de Almeida<sup>2</sup>, C. J. B. de Almeida<sup>3</sup>, S. L. Goodwin<sup>4</sup>, A. P. W. de Almeida<sup>5</sup> and C. J. B. de Almeida<sup>6</sup>

# The mid-point transverse process to pleura (MTP) block: a new end-point for thoracic paravertebral block, *Anaesthesia* 2017



# MTP block

# MTP block

- ◆ No need to visualize superior costotransverse ligament
- ◆ Further distant from pleura than traditionally described PVB
- ◆ Mechanism of action: PVB spread
- ◆ Multiple injection technique BUT may spread to adjacent levels
- ◆ Case reports, anecdotal experience Ottawa & UK

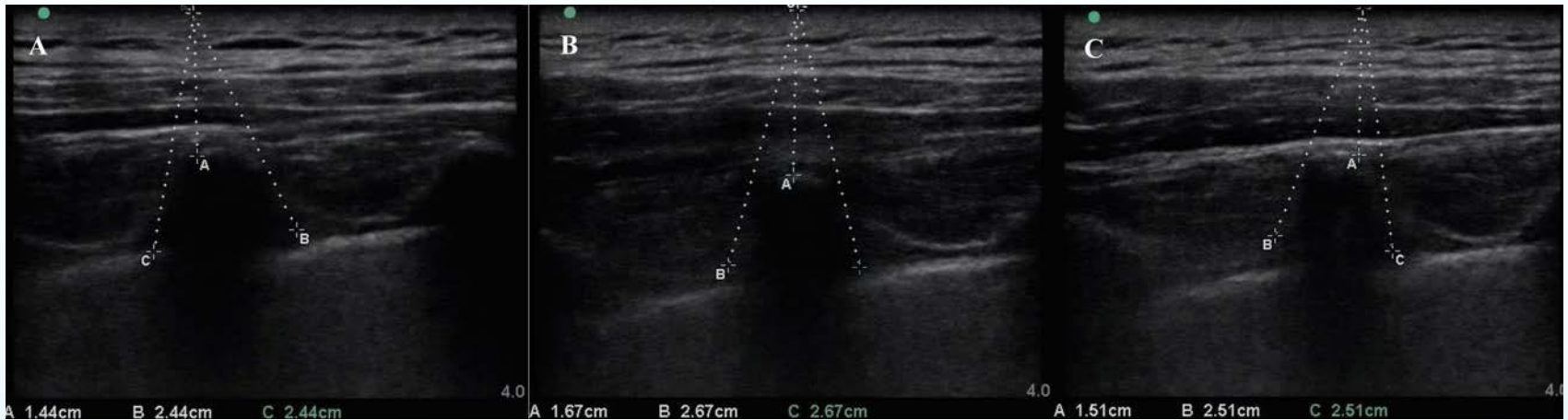
# Comparisons?

- ◆ No literature comparing paraspinal blocks:
  - ◆ Retrolaminar
  - ◆ Intercostal/ Paraspinal
  - ◆ ESP
  - ◆ MTP
- ◆ Possibly doing combinations of these with landmark for many years

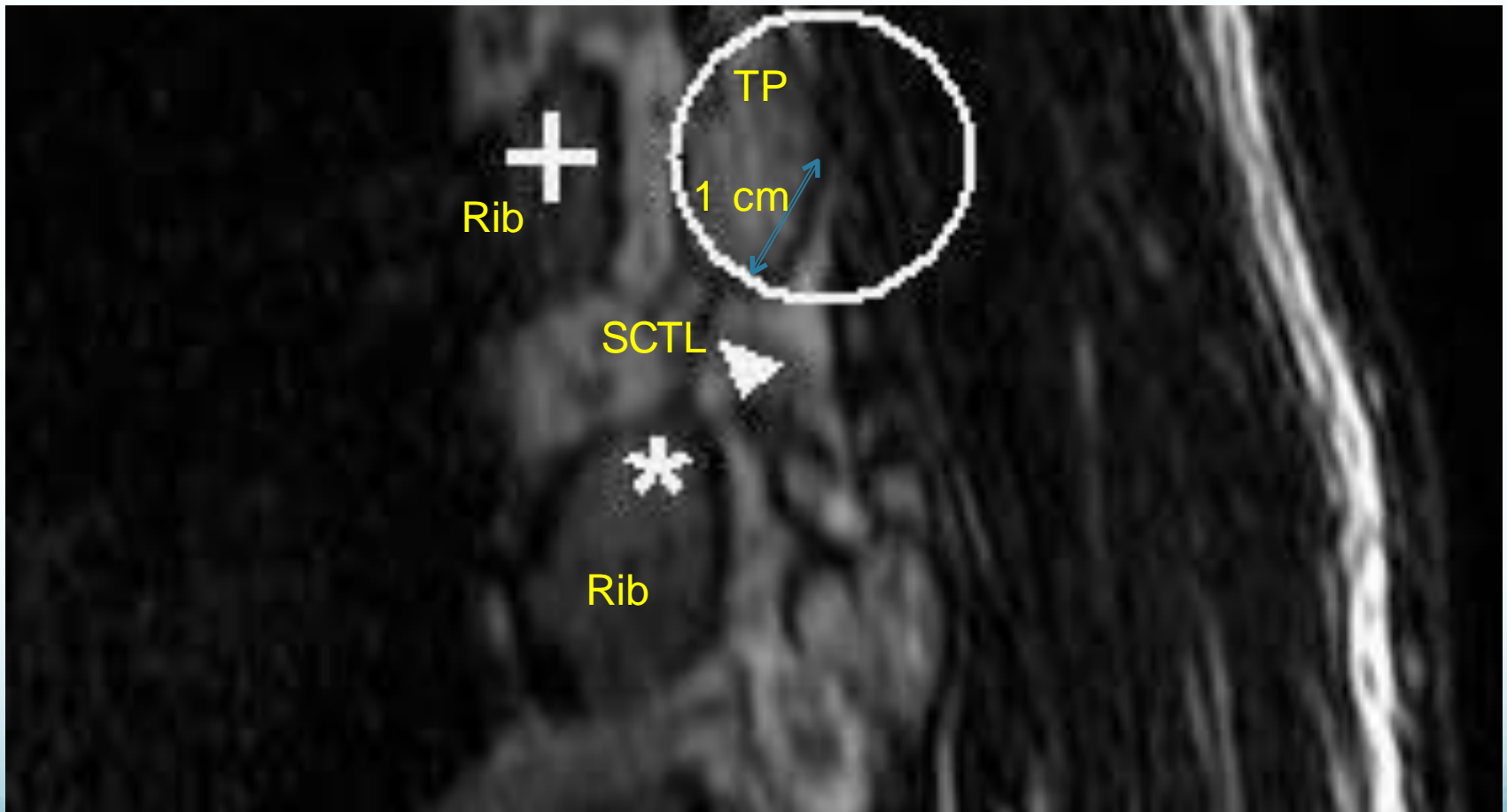


# PVB with different initial contact points on transverse process

Costache, Pawa, Abdallah, PVB by Proxy,  
*Anaesthesia*, In press

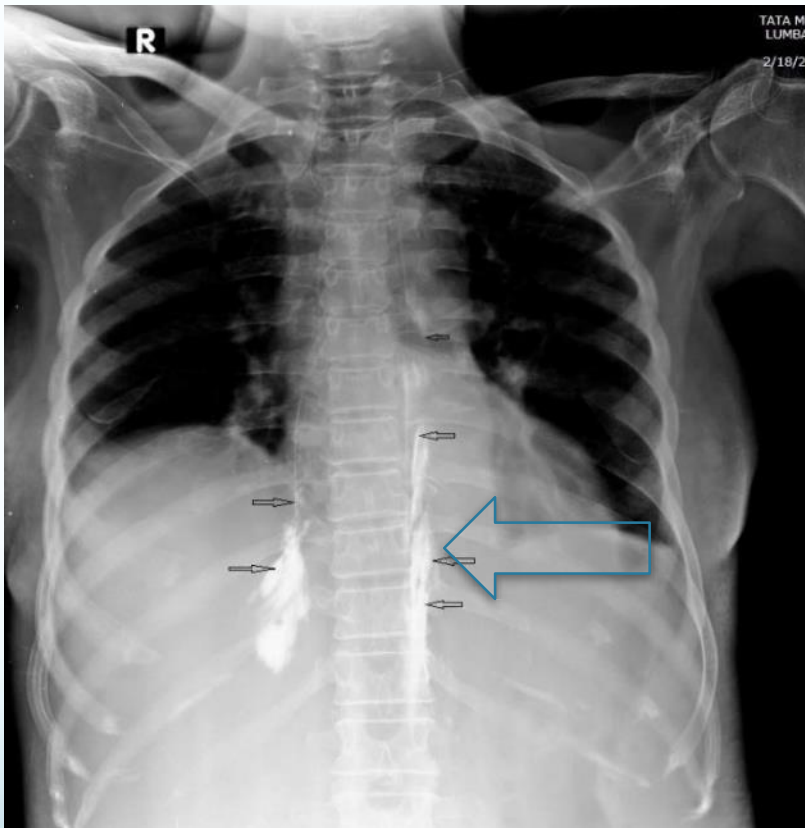


# Landmark PVB: MRI correlation



# ESP catheters

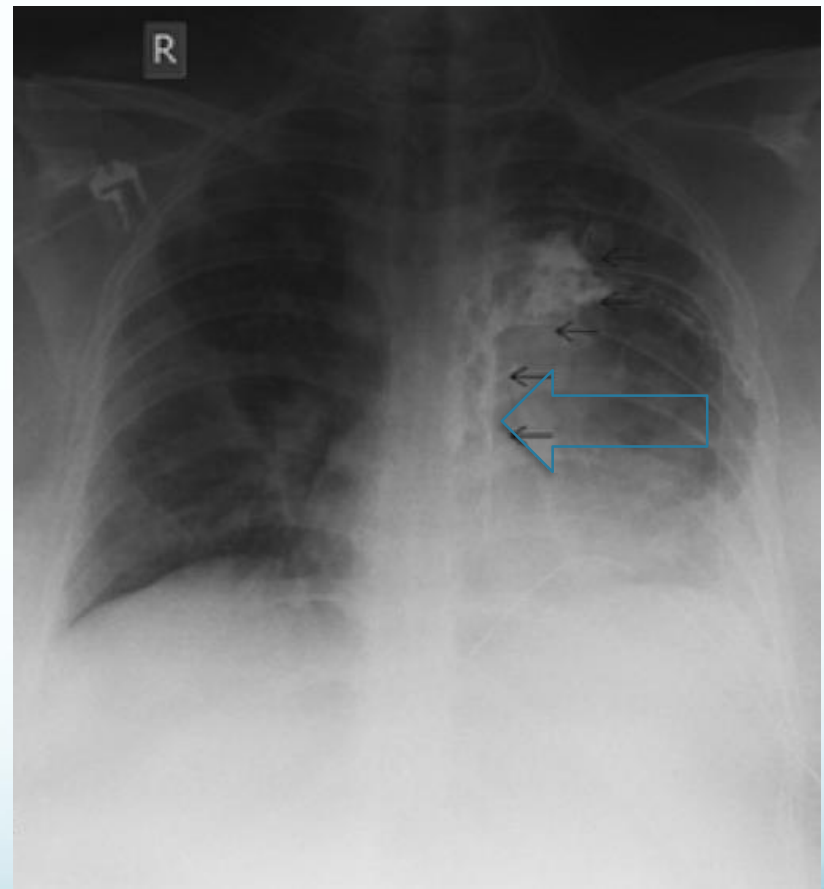
Jadon, *Anaesthesia* 2017



:-5: X-ray after contrast injection through catheters, arrows show contrast spread with paravertebral encroachment

# PVB catheter

Renes, *Reg Anesth & Pain Med* 2010



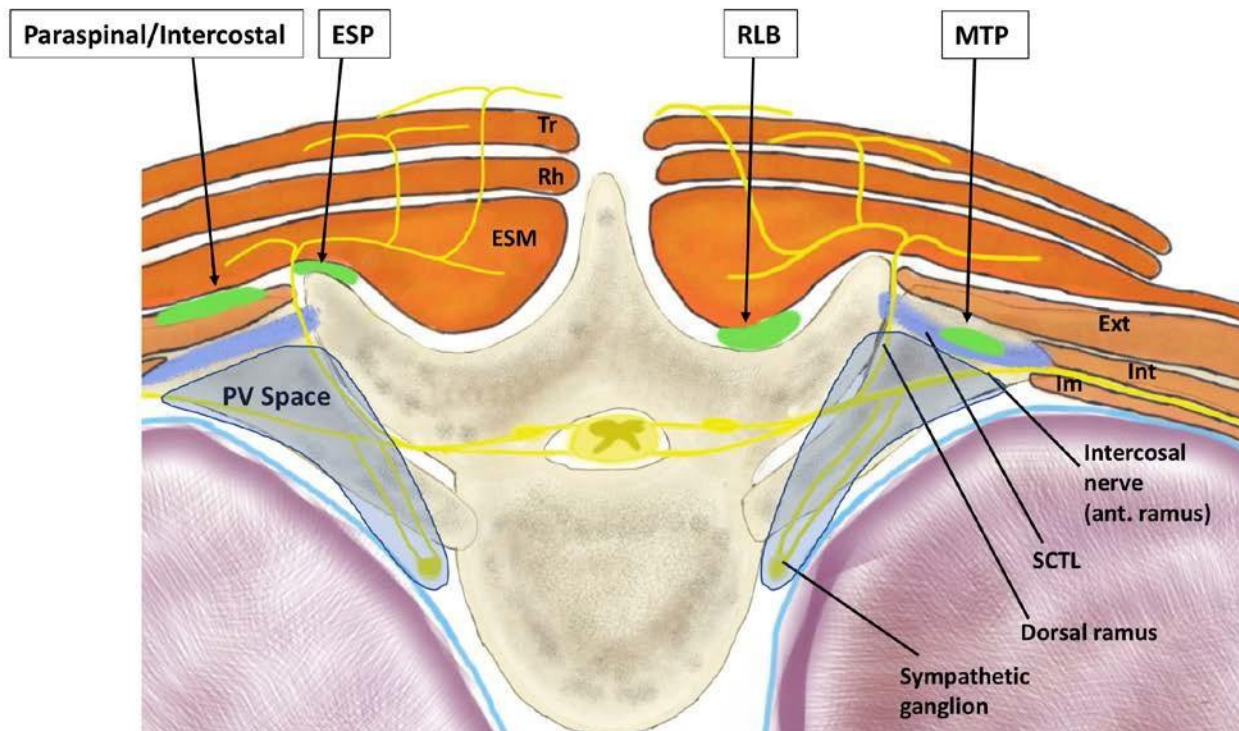
# Other options

- ◆ PECS I
  - ◆ Medial and lateral pectoral nerves
- ◆ PECS II
  - ◆ PECS I plus injection b/ w pec minor & serratus
    - ◆ Covers long thoracic/ thoracodorsal/ multiple intercostal levels
- ◆ Serratus plane block
- ◆ Rhomboid intercostal

# Serratus plane block

- ◆ First described in 2013 by Blanco et al.
- ◆ Case reports: breast surgery, thoracoscopy, rib fracture analgesia, shoulder surgery
- ◆ Injection superficial or deep to serratus anterior muscle
- ◆ Blocks lateral cutaneous branches of intercostal nerves
- ◆ Anatomically not comparable to PVB
- ◆ Same interfascial plane intercostal/ paraspinal, rhomboid intercostal, ESP, RLB

# Paraspinal blocks



Costache, Pawa,  
Abdallah, PVB by proxy,  
*Anaesthesia*, In press

# How do we apply the paraspinal blocks?

- ◆ Desire to do PVB
- ◆ Fear the complications
- ◆ Options when imaging poor
- ◆ Teaching/ learning PVB
  - ◆ Stepwise approach: ESP/M TP, PVB once comfortable with skills



Which block to choose?





# Thoracic Paraspinal Blocks:

- A) are useful for surgery involving the thoracic wall
- B) their ultrasound-guided techniques are technically less challenging than a paravertebral block
- C) potentially carry less risk than thoracic epidural or paravertebral
- D) have a risk of local anesthetic systemic toxicity (LAST)
- E) all of the above

# Conclusion

- ◆ Multiple options for traditionally defined PVB
- ◆ May have been doing the “new” blocks with landmark
- ◆ PVB trusted, old technique, good evidence
  - ◆ If new techniques similar action, we already have evidence for use

# Conclusion

- ◆ Paraspinal blocks should be a core competency for all anesthesiologists
  - ◆ Easy to do
  - ◆ Easy to teach
  - ◆ Less risk than paravertebral or epidural
  - ◆ The evidence is coming!

