Pain intervention in thoracic region

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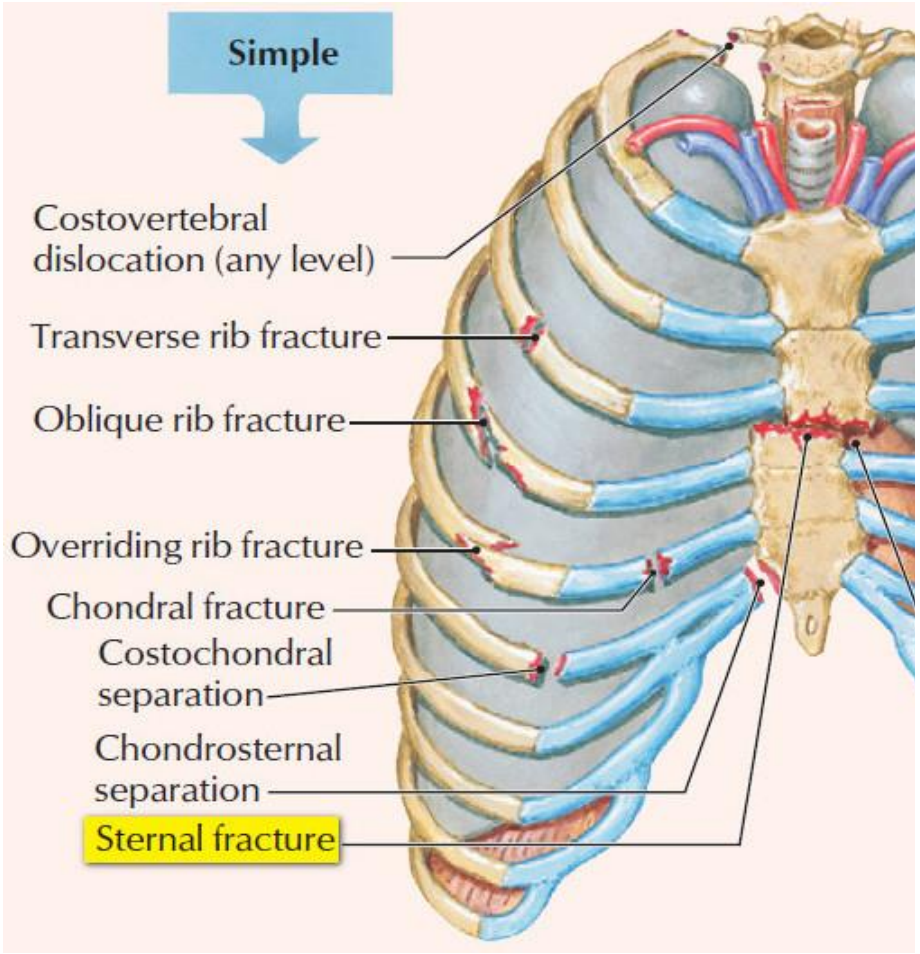
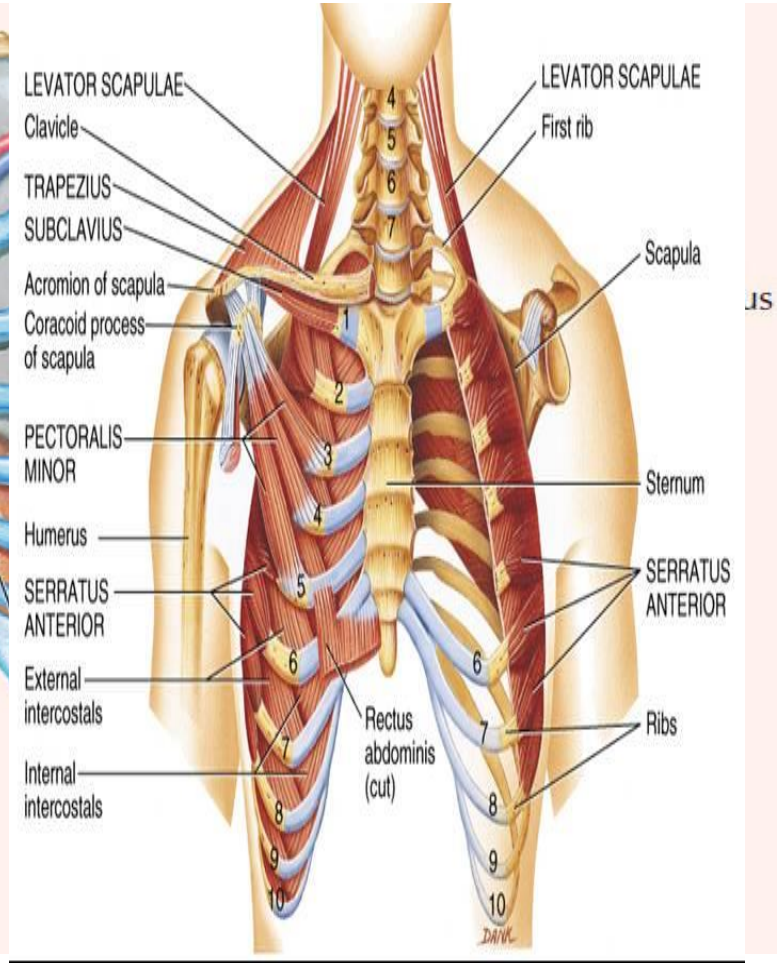
Pain intervention in thoracic region

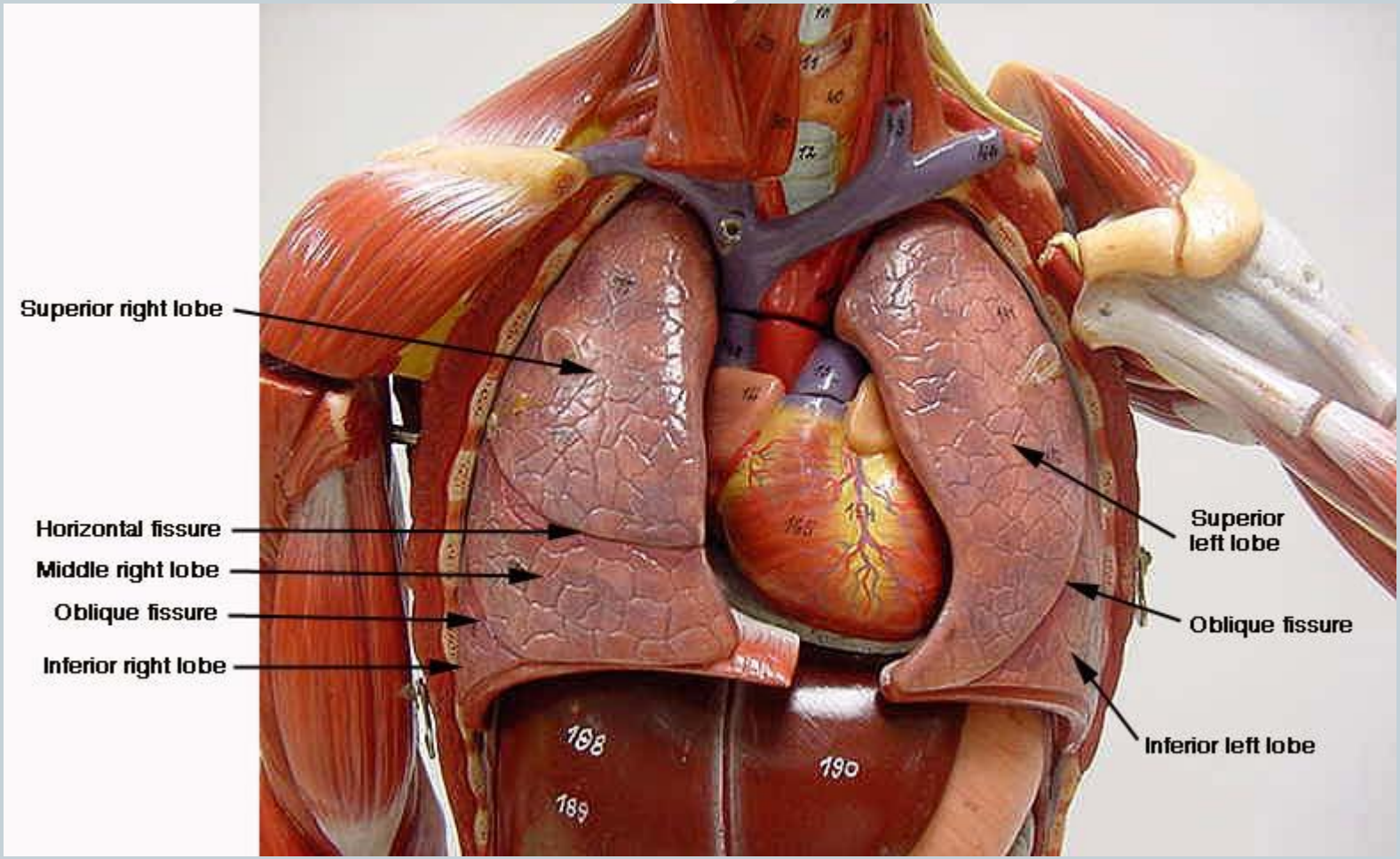
- Pain syndromes originating from the thoracic region are a major health problem that affect patients and family lives.
- The pain is either visceral or somatic in origin.
- Visceral pain is suppressed by sympathetic block, somatic and parietal pleural pain is relieved by intercostal nerve block.
- Paravertebral approach for sympathetic block inhibits both sympathetic and somatic pain .

Thoracic Somatic pain



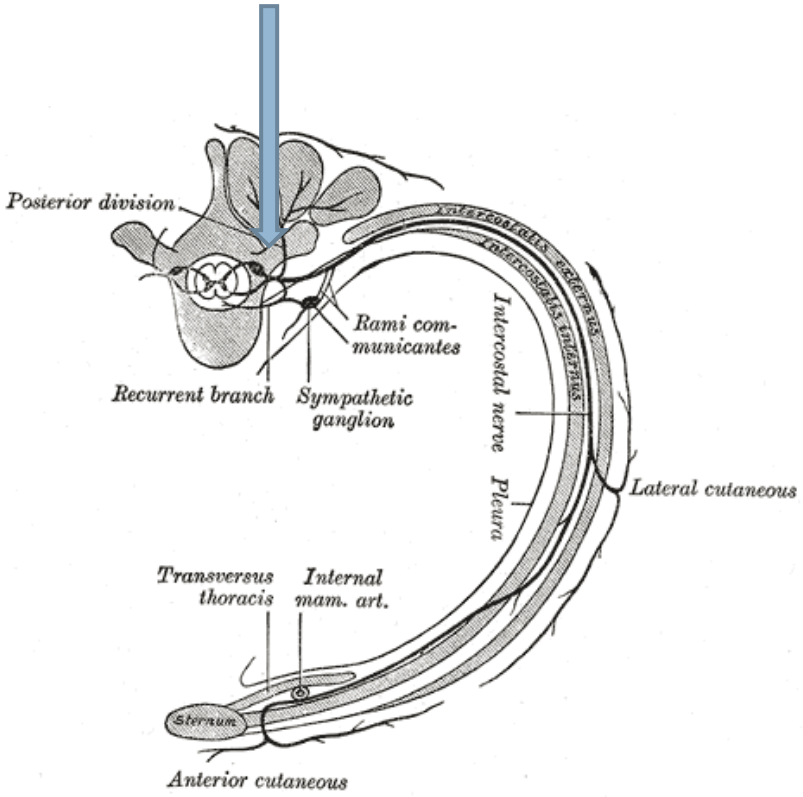


Visceral Thoracic Pain

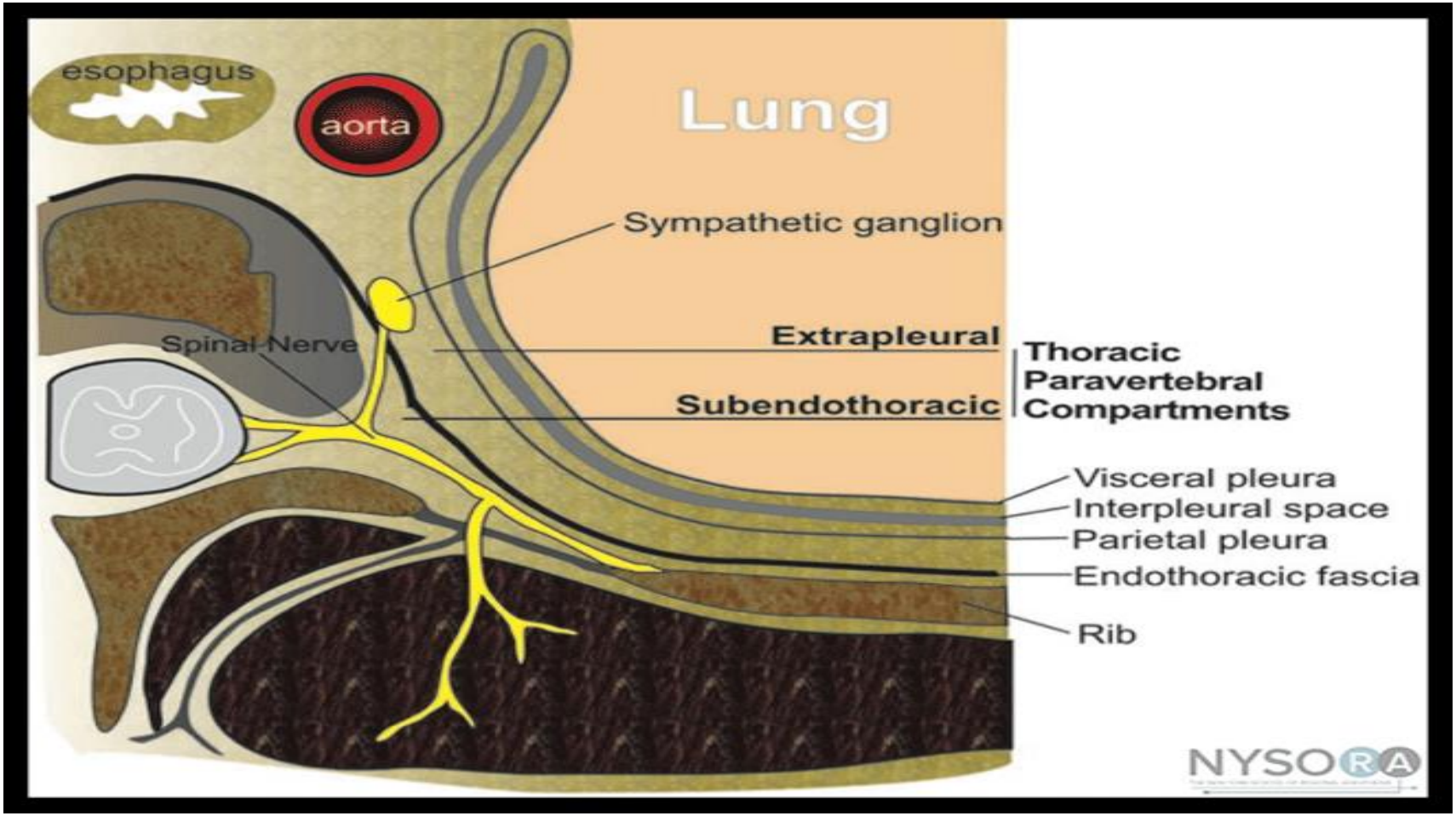


Where is the paravertebral space?

- The thoracic paravertebral space is a triangular area running the length of the thoracic vertebral column bilaterally, from T1 to T12.



Paravertebral approach for somatic and sympathetic ganglion block



Thoracic paravertebral nerve block (TPVNB)

Indications:

- Postoperative chest and upper abdominal pain.
- Chronic pain somatic and visceral pain that including;
  - Post thoracotomy pain, rib fractures, discogenic pain.
  - Refractory angina.
  - Post herpetic neuralgia.
  - Cancer pain, including invasive tumors of the thoracic spine, posterior ribs, the chest and upper abdominal wall.

US guided TPVNB

- US guided paravertebral nerve block for relieving chronic pain is a safe ,easy and reliable technique.

Figure 3: Discogenic back pain due to vertebral compression fracture that respond to PVNB. On the right is an US-guided TPNB technique (PL: Pleura; IIM: Iinnermost intercostal muscle; TP: Transverse process).

J Anesth Crit Care Open Access, 2(2): 00045

Patient preparation

Positions :

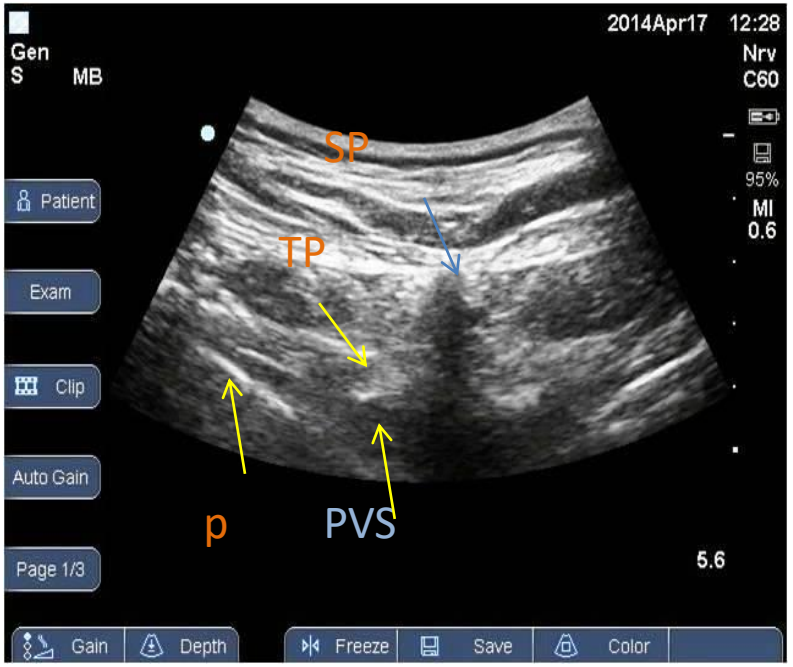
a) prone position. Place a pillow under the chest to flex the thoraco lumbar spine

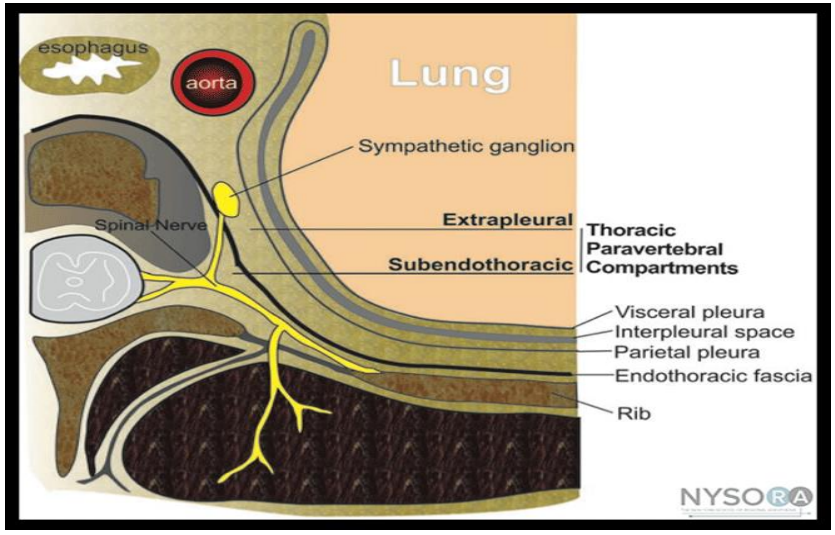
b) Lateral position

c) Sitting position

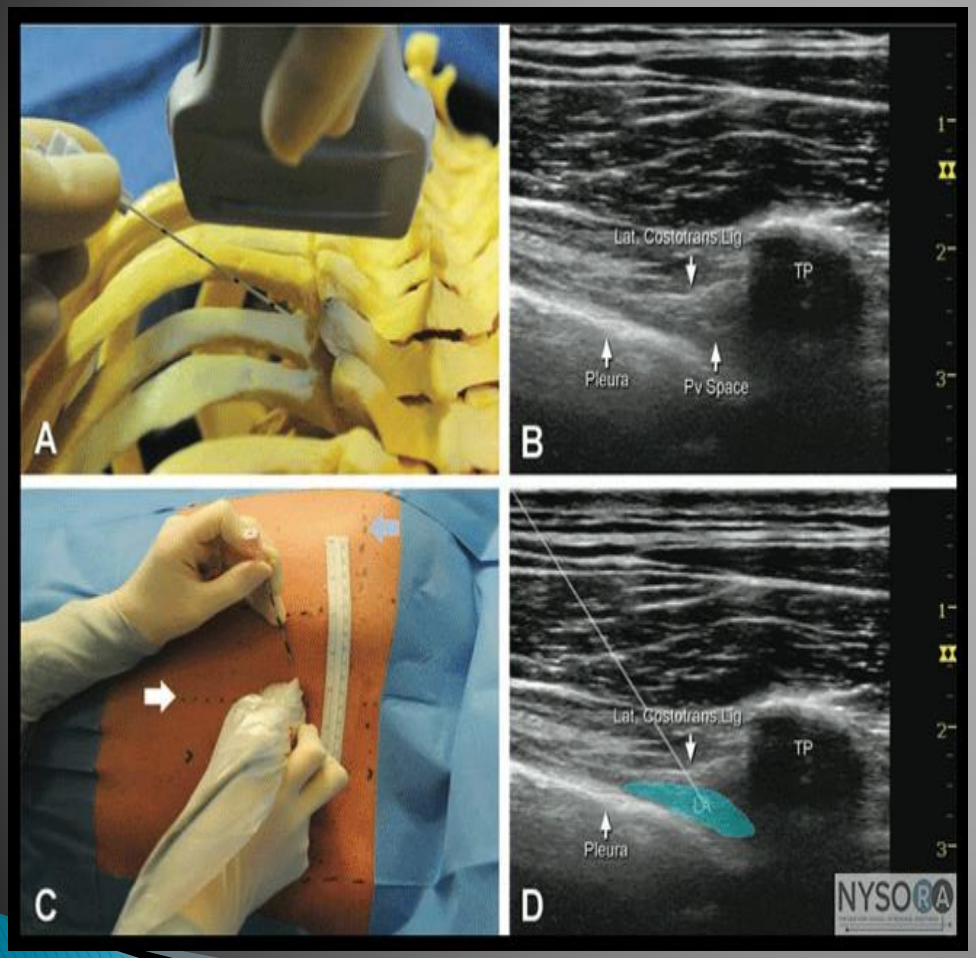
US guided PVNB in thoracic region

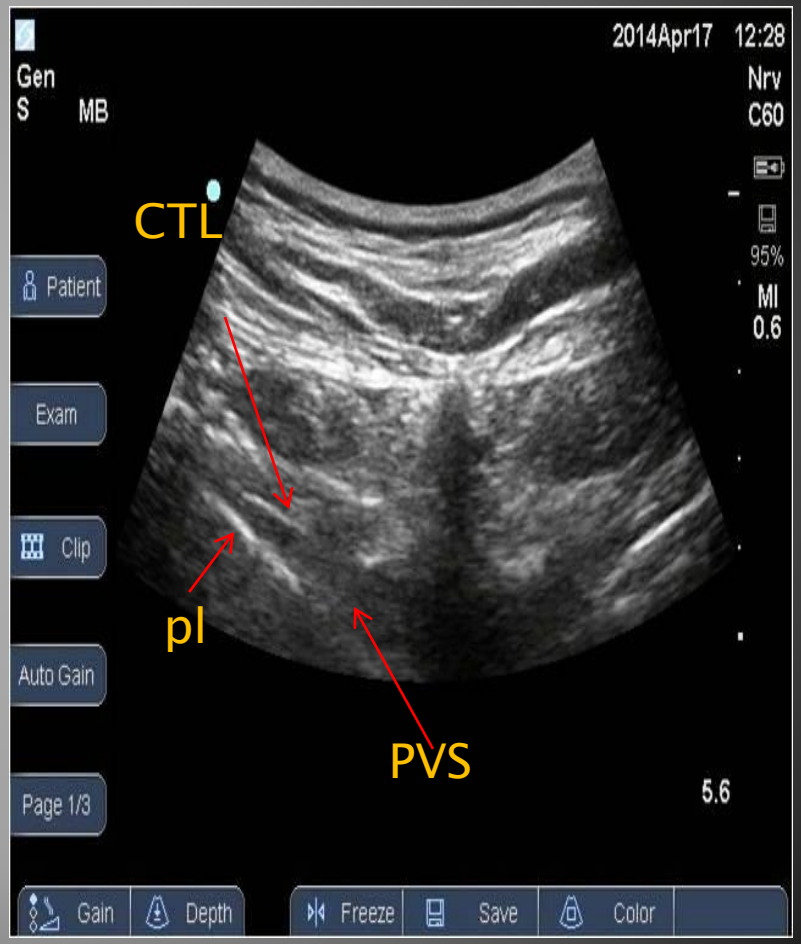
- Under conscious sedation technique ,after skin and probe preparation, a curved transducer is used in longitudinal plane to count vertebral spine from most prominent vertebrae C7 down to T 2-3
- The probe is turned in axial plane to visualize transverse process and costotransverse ligament posteriorly and body of vertebral medially, and pleura anterolaterally.



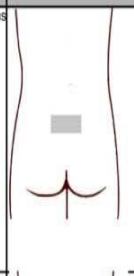
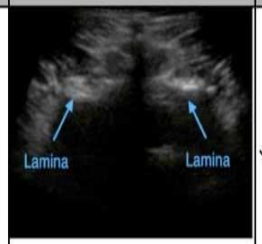
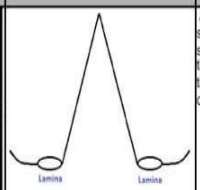
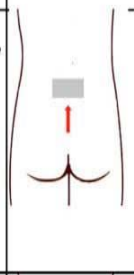
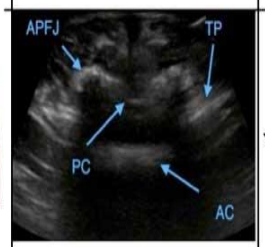
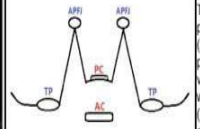
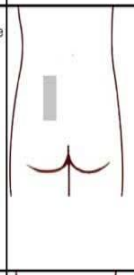
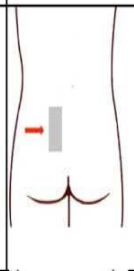
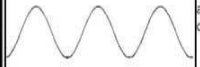


Thoracic paravertebral nerve block



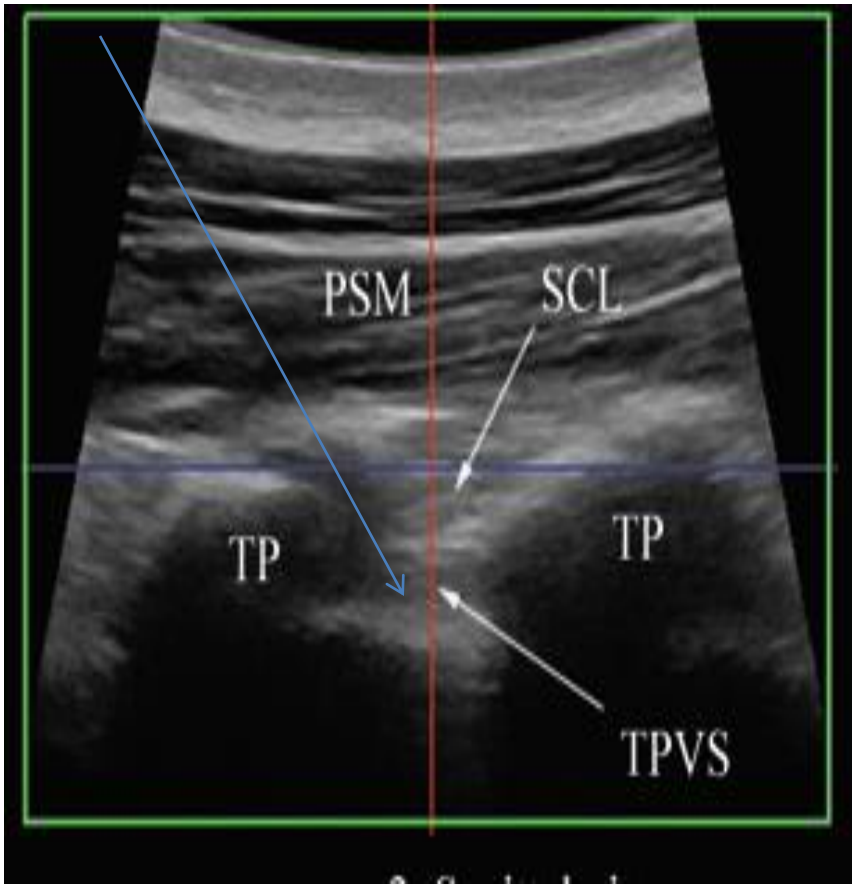


Thoracic paravertebral block paramedian sagittal approach

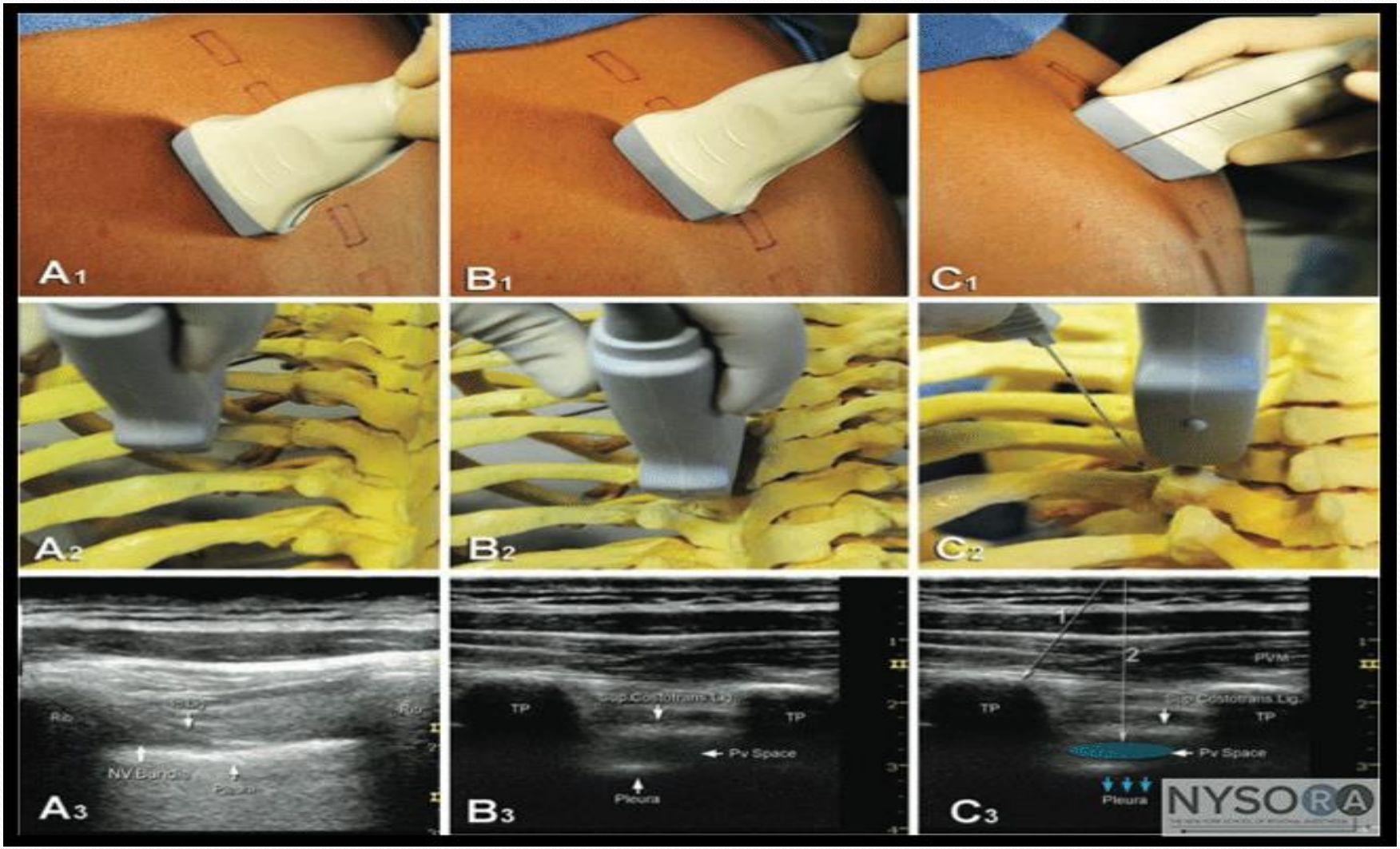
View	Probe Footprint	Ultrasound View	Pattern recognition image	Notes
Transverse Spinous Process view				A distinct midline shadow is cast by the spinous process. Note the lamina are visible, but the anterior and posterior complexes are obscured.
Transverse Interlaminar (Interspinous) view				"Flying Bat" The articular processes/facet joints (APFJ) and transverse processes (TP) are visible. Tilting the probe will highlight the posterior (PC) and anterior (AC) complexes.
Paramedian Sagittal Transverse Process view				The "Trident" sign represents finger-like shadowing behind the transverse processes.
Paramedian Sagittal Articular Process view				"Camel humps" represent continuous hyperechoic bone, due to vertebrae being 'connected' by articular processes. The anterior and posterior complexes are not seen.

Thoracic paravertebral nerve block paramedian sagittal scan

In plane approach

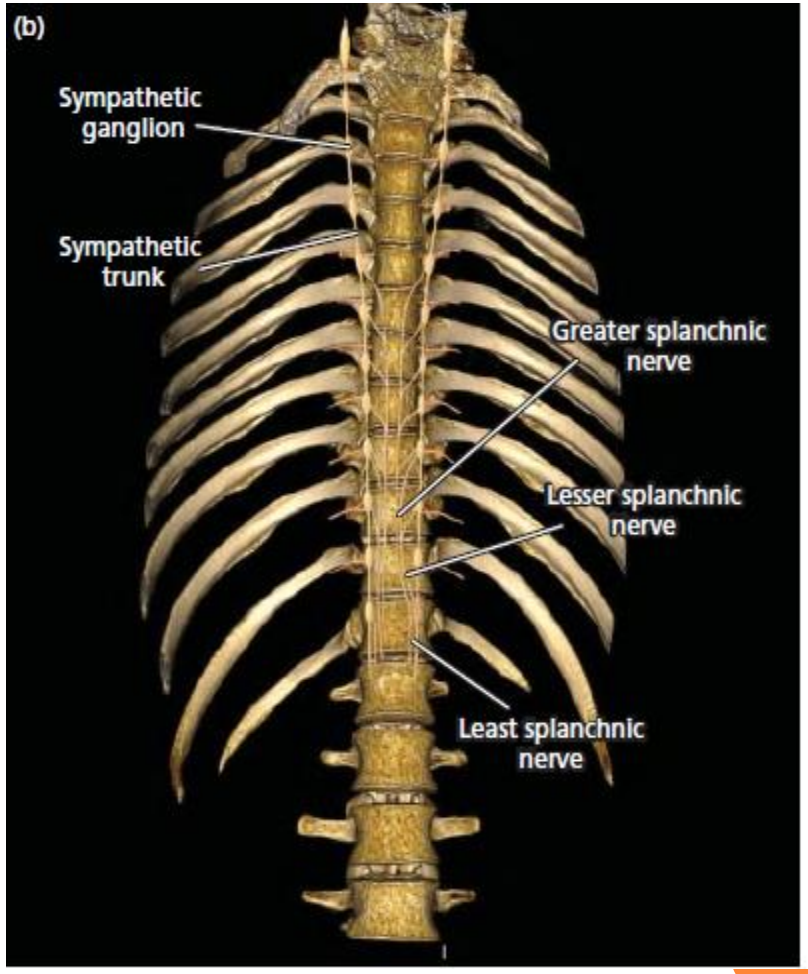


Out of plane approach



THORACIC SYMPATHETIC CHAIN

- Anatomy:
- A12 pair sympathetic thoracic chains.
- The first thoracic ganglion is fused with the lower cervical ganglion to help make up the stellate ganglion
- The upper thoracic chains (2-4 ganglia) lying just beneath the rib and the lower thoracic ganglia moving farther anterior, to rest along the anteriolateral surface of the vertebral body.
- The pleural space lies lateral and anterior to the thoracic sympathetic chain.



US guided Thoracic Sympathetic chain block

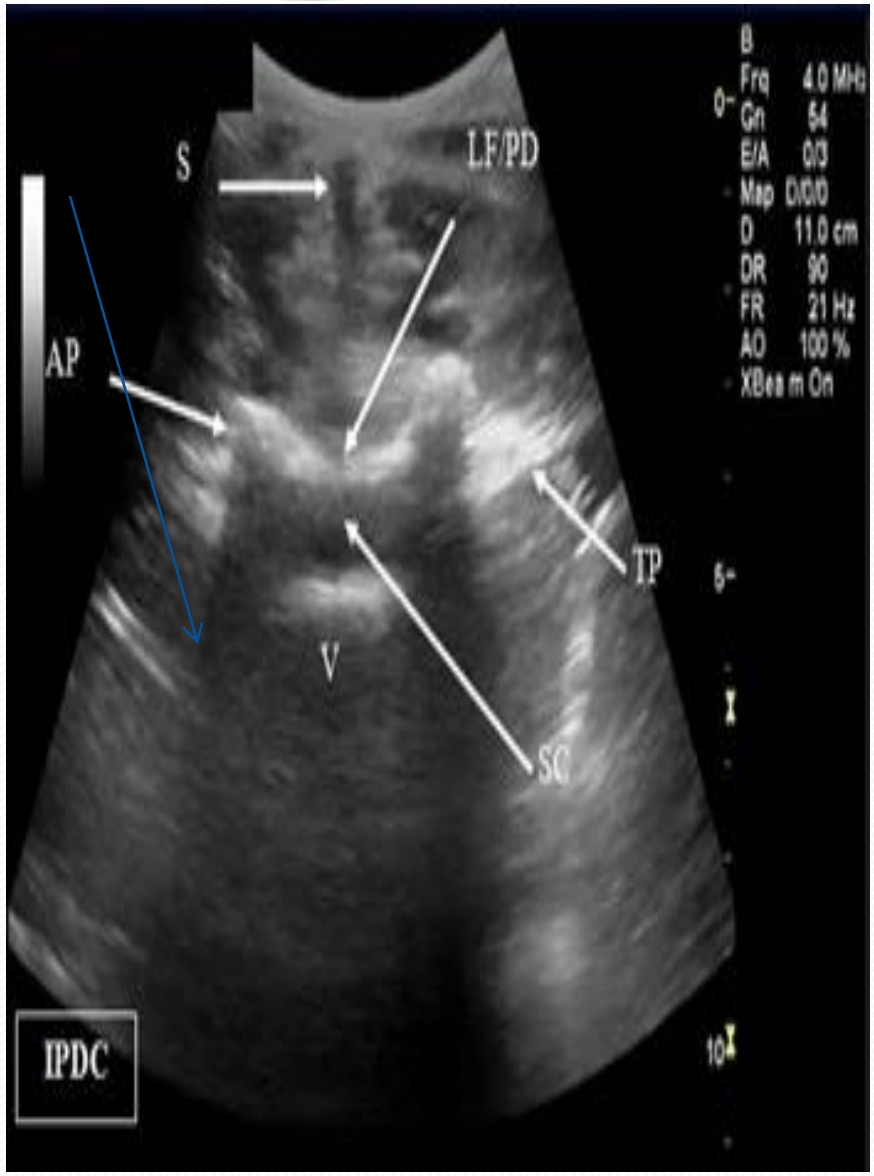
Advance the spinal needle under guidance of US into TPVS. And be in close contact to vertebral body.

Go further to be medial to median fold of pleura.

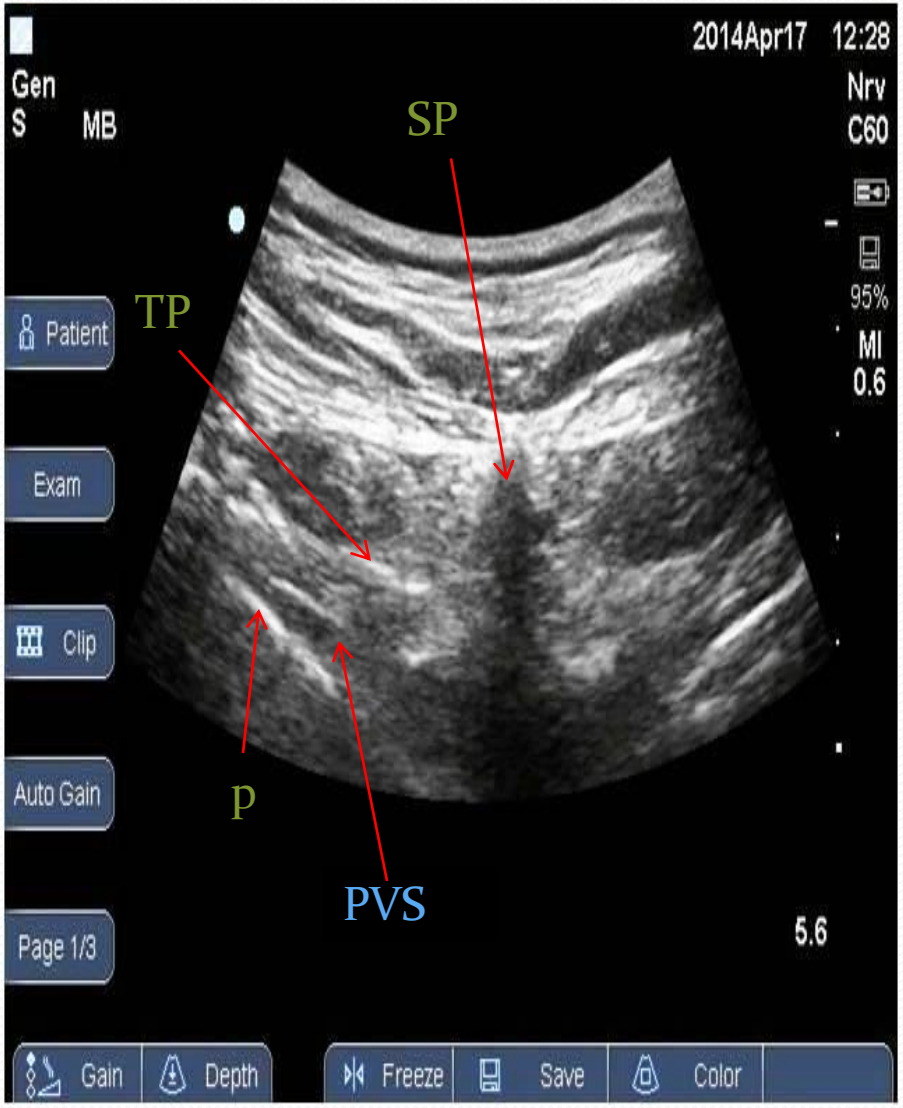
The use of nerve stimulation in combination to US is very helpful in this technique.

Apply sensory stimulation at 50 Hz and 2 V and at 2 Hz motor stimulation to confirm that there is no stimulation of the intercostal nerves.

If paresthesia or contraction occurs in the intercostal nerves, the electrode should be redirected.



US guided Sympathetic chain block in thoracic region



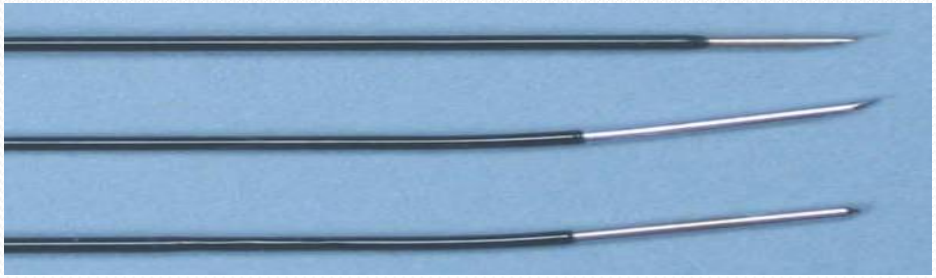
Thoracic ganglion block and lesioning

- After negative aspiration for blood, Inject 5 ml of a mixture of 40 mg/ml triamcinolone and 0.5% bupivacaine for diagnostic purpose.
- In cancer patients, 5 ml of 6% phenol in glycerin for neurolysis can be injected.

RADIOFREQUENCY ABLATION

Radiofrequency ablation is appropriate technique for sympathetic ganglion in thoracic region.

After confirming the appropriate position of the tip of the electrode, no intercostal nerve stimulation, lesioning is performed at 80 °C for 60 –90 seconds.

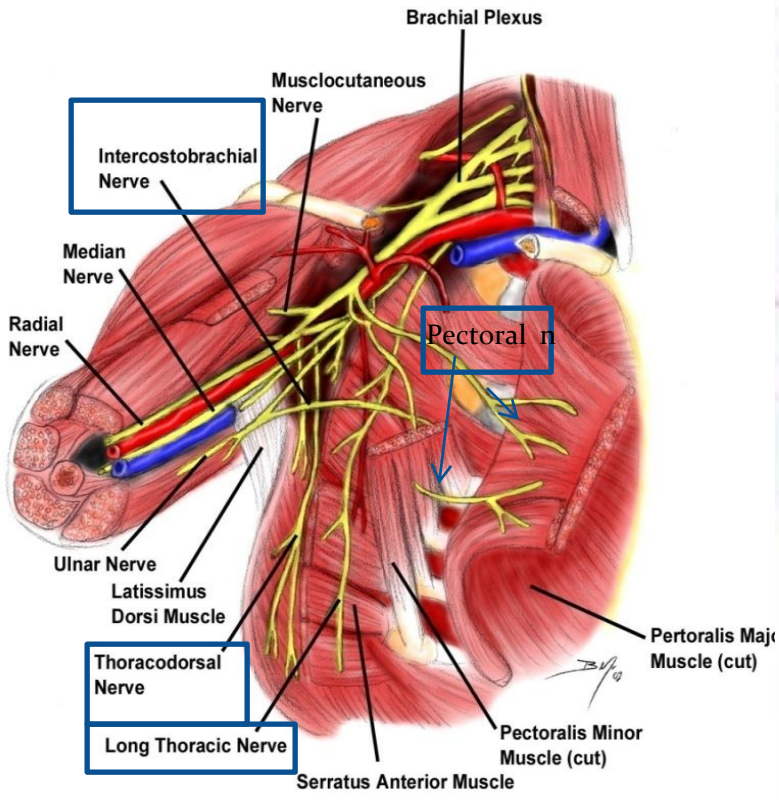


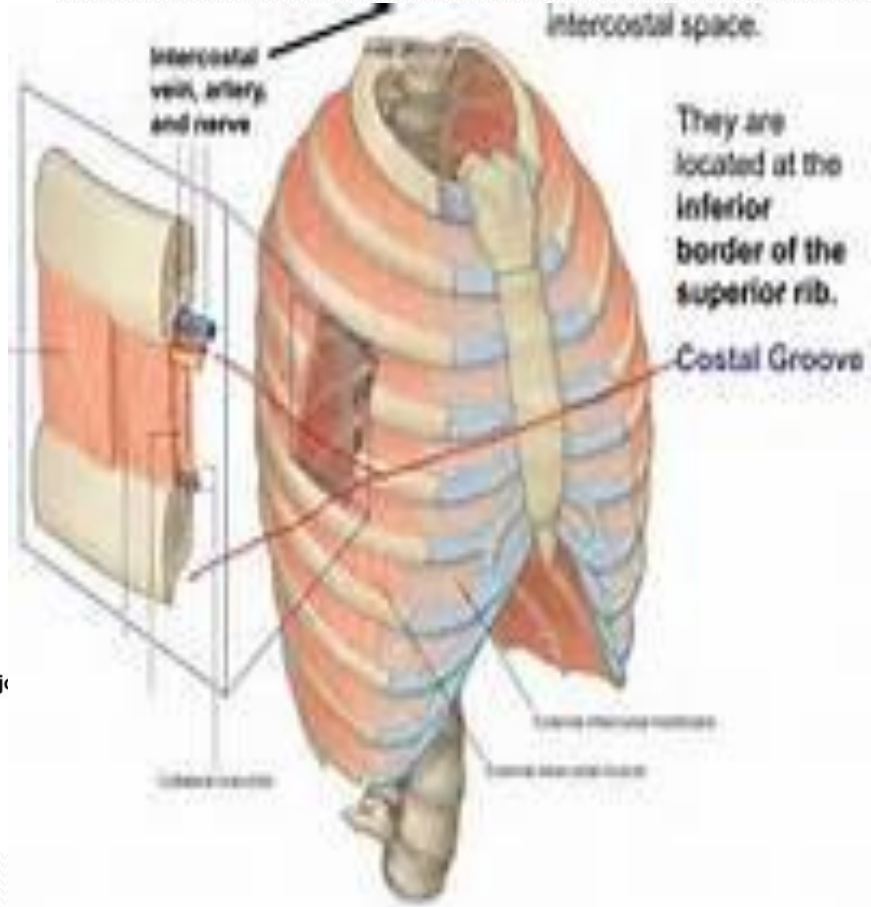
US guided somatic nerve block in thoracic region

Transthoracic plane block:

a) **Intercostal nerve block**
b) **Trans pectoral muscle block**
c) **Serratus muscle block,**
d) **Intercostal/paraspinal nerve block**

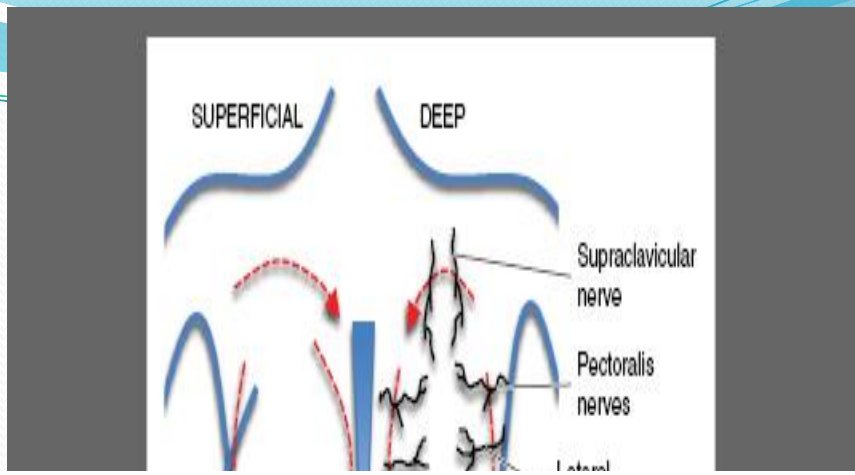
Somatic Nerve Supply to Chest

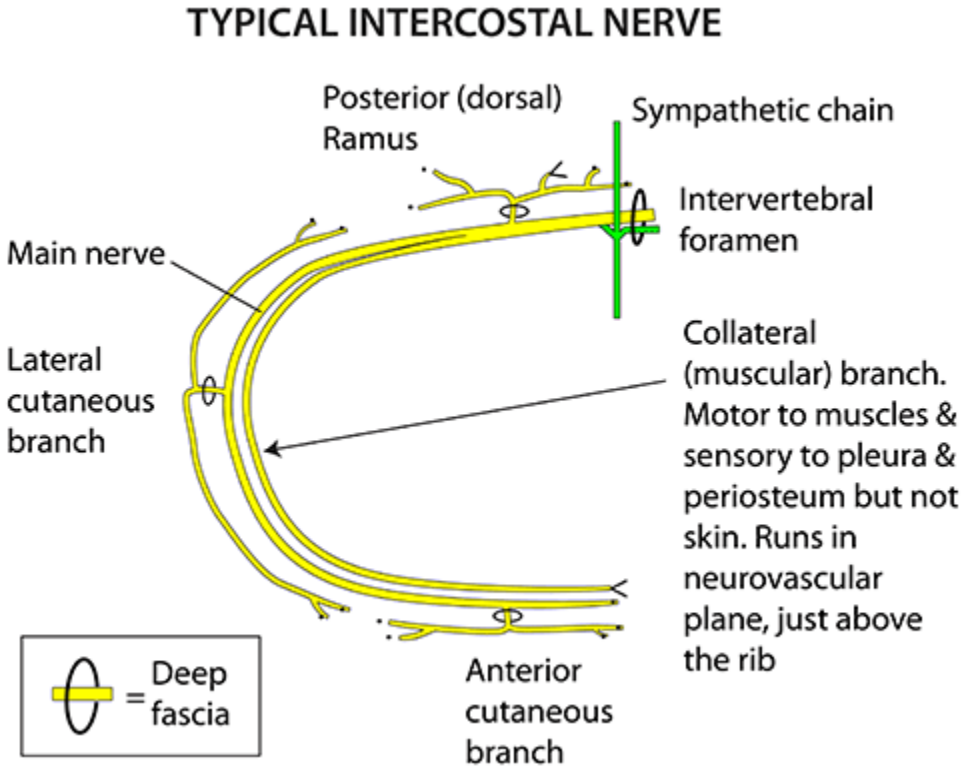




Nerve supply to chest wall

- The sensory nerves of the chest wall and parietal pleura derive from T2-6 intercostal nerves.
- They run in a plane between the intercostal muscles and give off
  - anterior cutaneous nerves
  - the anterior branches of lateral cutaneous nerves





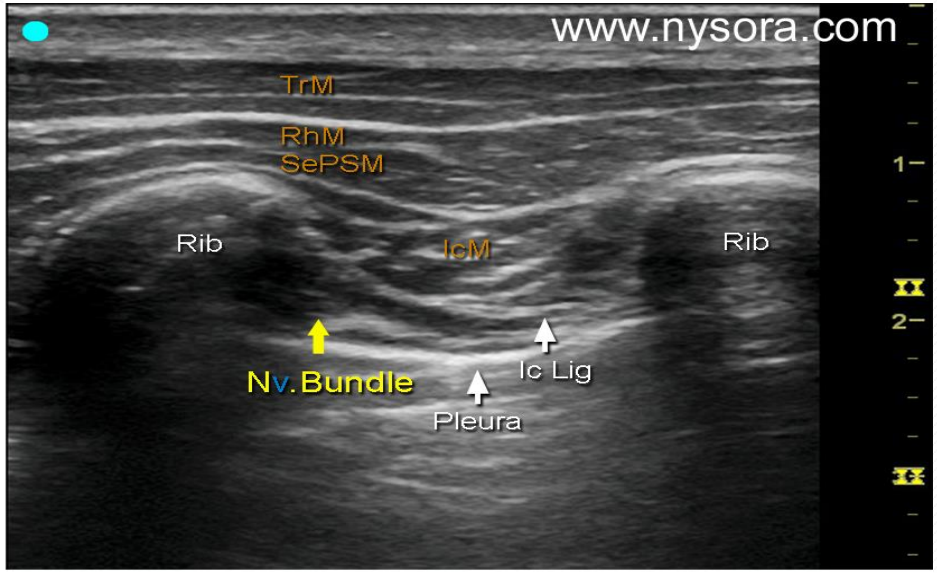
Intercostal Nerve Blocks

Indications:

- Post-thoracotomy pain.
- Post breast therapy syndrome.
- Post herpetic neuralgia.
- Rib fractures
- Palliation of cancer pain, together with pain due to invasive tumors of the ribs and the chest and upper abdominal walls
- Chronic painful pleural effusion

US guided intercostal nerve block

- Position: Prone, lateral decubitus position or supine.
- Probe: high linear probe.
- Technique: At 3- 6 cm lateral to midline, or at mid axillary line the us probe put longitudinally to visualize the intercostal space.
- The needle is directed towards inferior edge of the rib and targeting the plane between inner most internal and internal intercostal muscles.
- A 3-5 ml LA is injected.



Intercostal Space - between 2nd and 3rd Rib


INTERCOSTAL
2010Sep03 10:29
Gen MB
Nrv
L50
98%
MI
0.9
TIS
0.1
Patient
Auto Gain
Gen
Clip
Page 1/3
CO
EX
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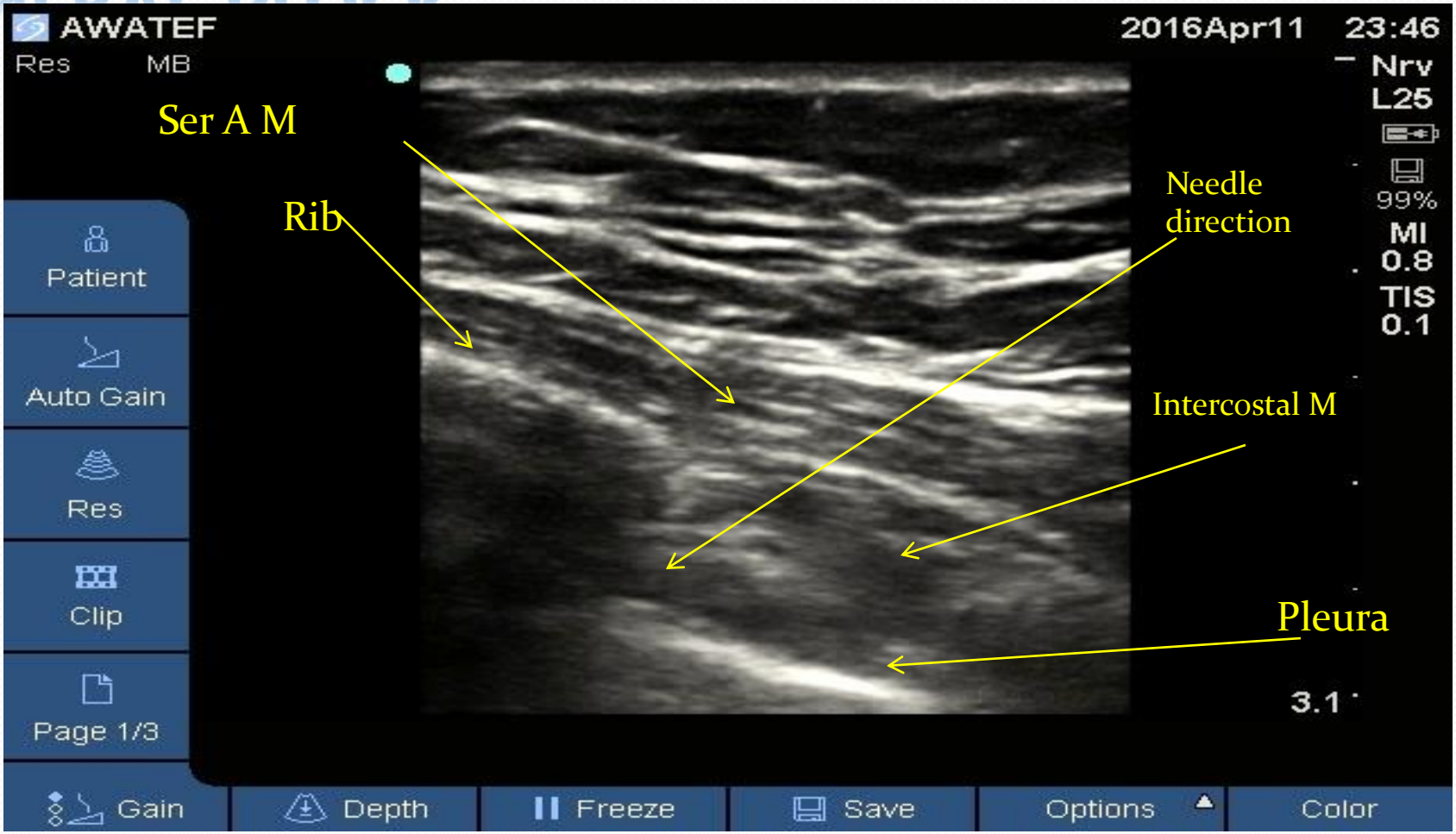
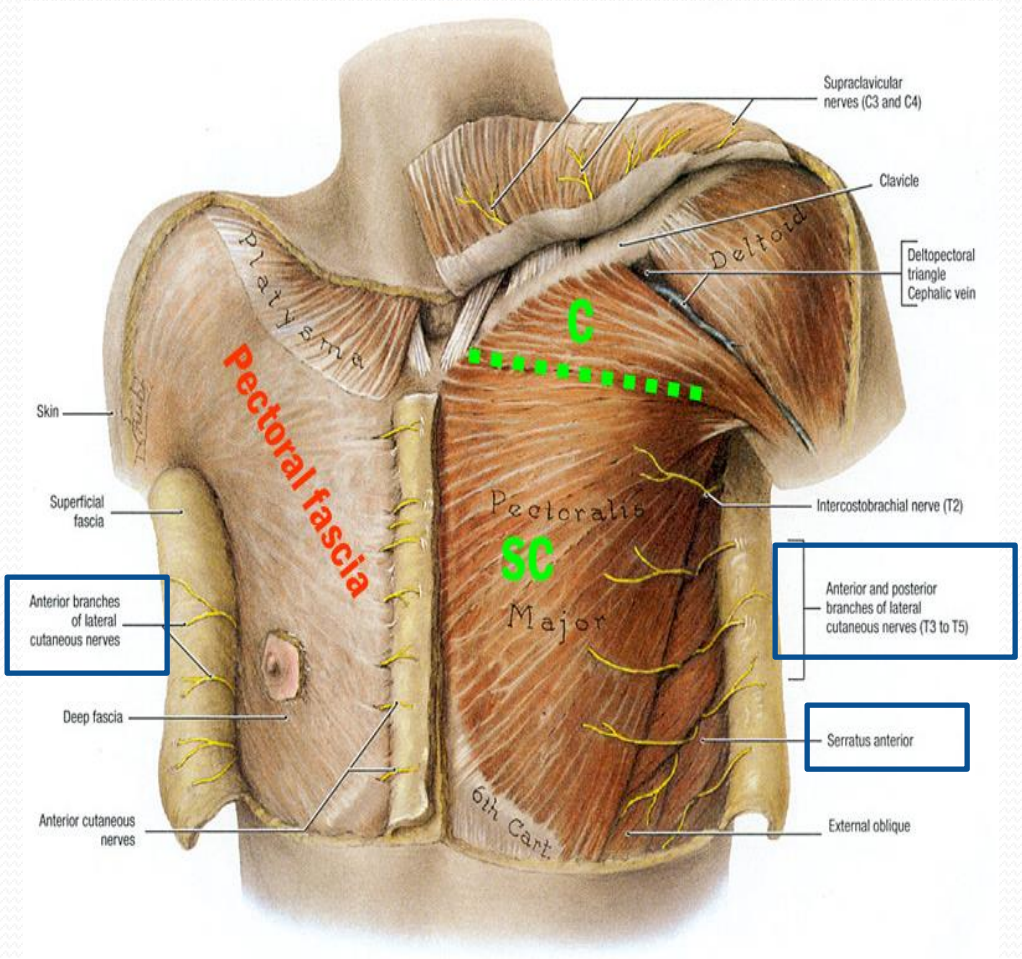
MID AXILLARY APPROACH TO INTERCOSTAL NERVE BLOCK



Intercostobrachial nerve (T2)

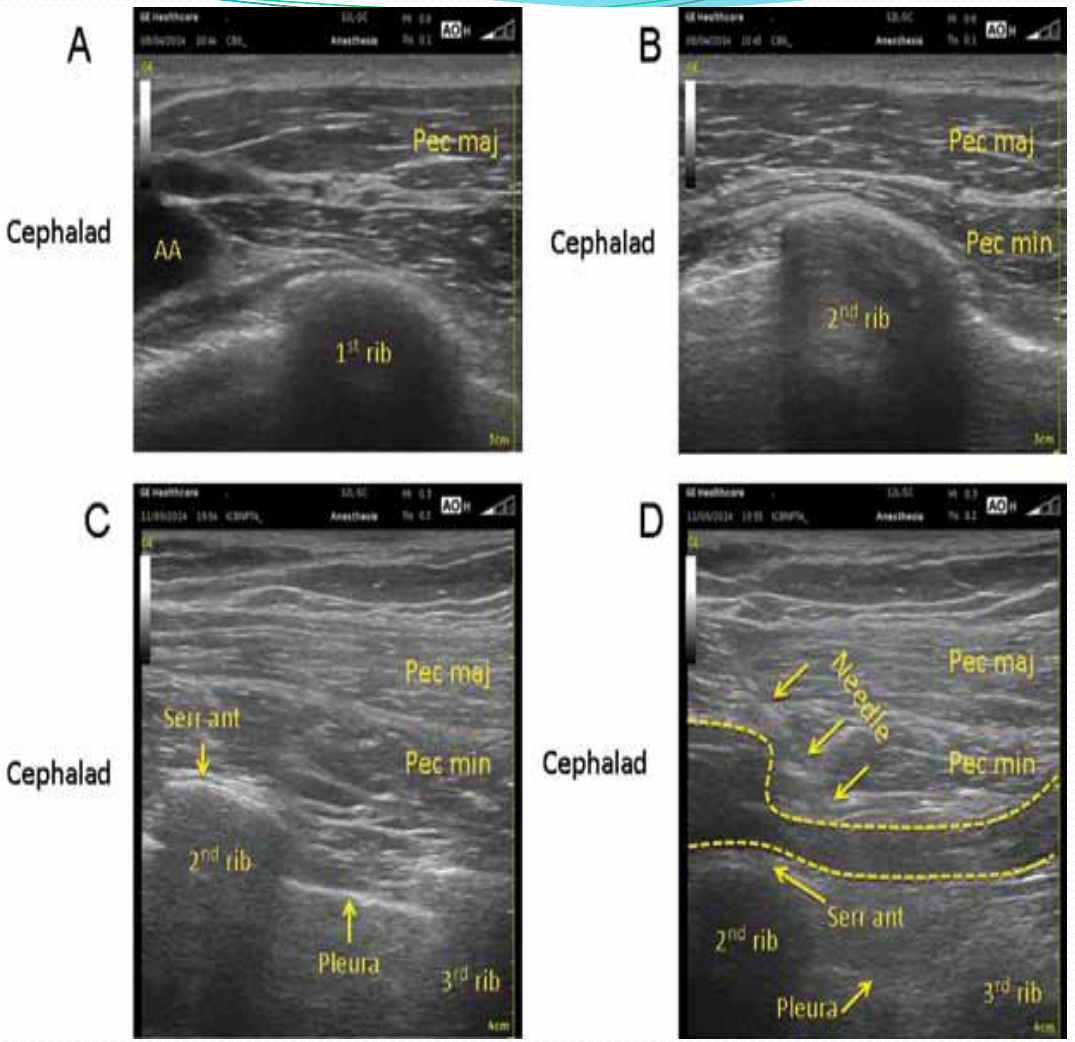
The lateral cutaneous branch of the second intercostal nerve does not divide. It becomes intercostobrachial nerve, pierces the Serratus anterior, crosses the axilla to the medial side of the arm.

It supplies the skin of the upper half of the medial and posterior part of the arm,



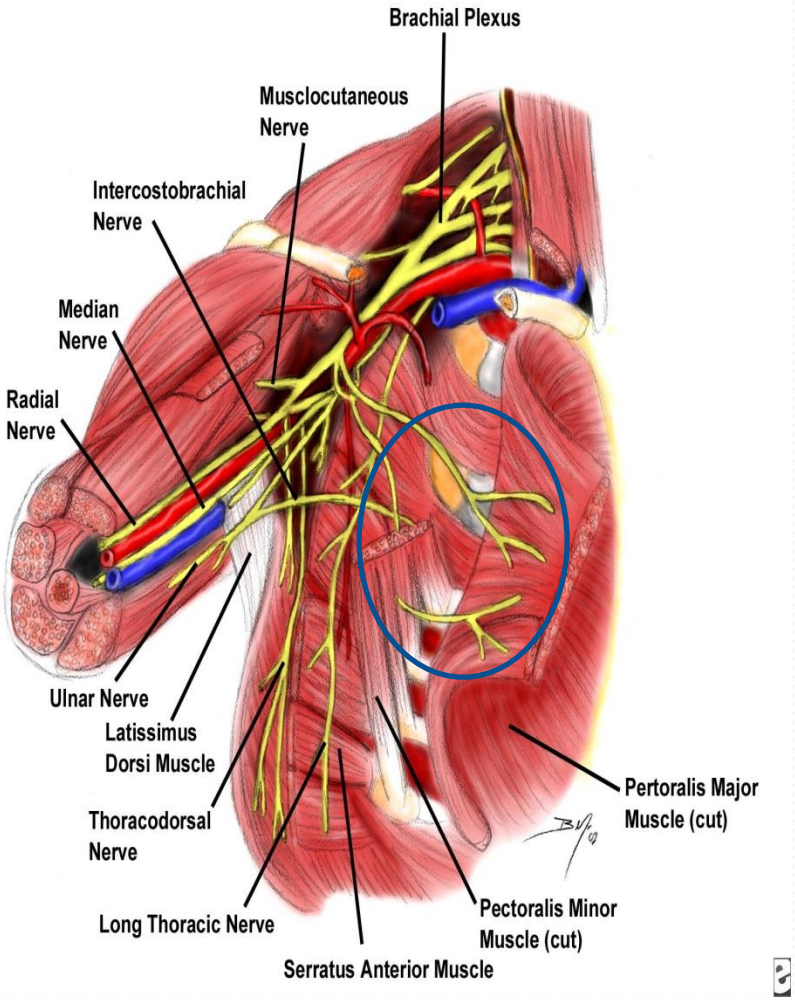
US guided intercostobrachial nerve block

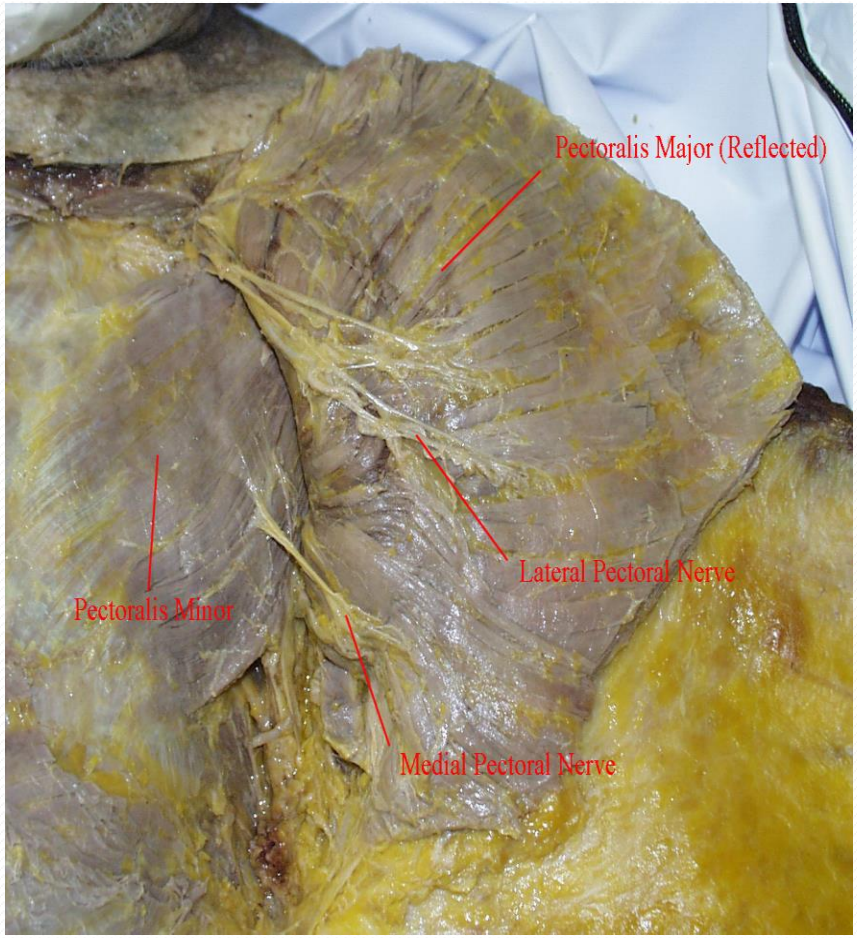
- Probe: Linear probe
- Technique: parasagittal plane just under the lateral part of clavicle. Visualize axillary artery and vein, first rib.
- Move the probe laterally to see second rib .
- Rotate the probe obliquely to visualize serratus anterior muscle.
- Then inferiorly to see third rib.
- Inject 20 ml LA between perctoralis minor and serratus anterior



Pain Physician: February 2016: 19:E309-E317

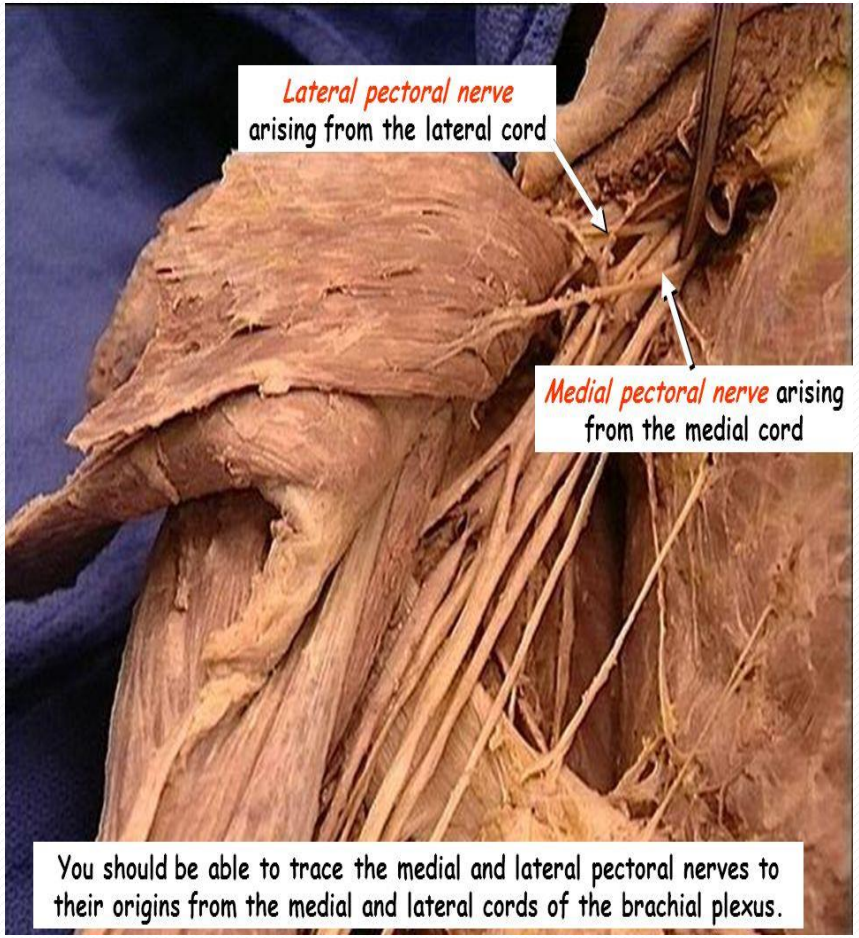
Pectoral nerve blocks





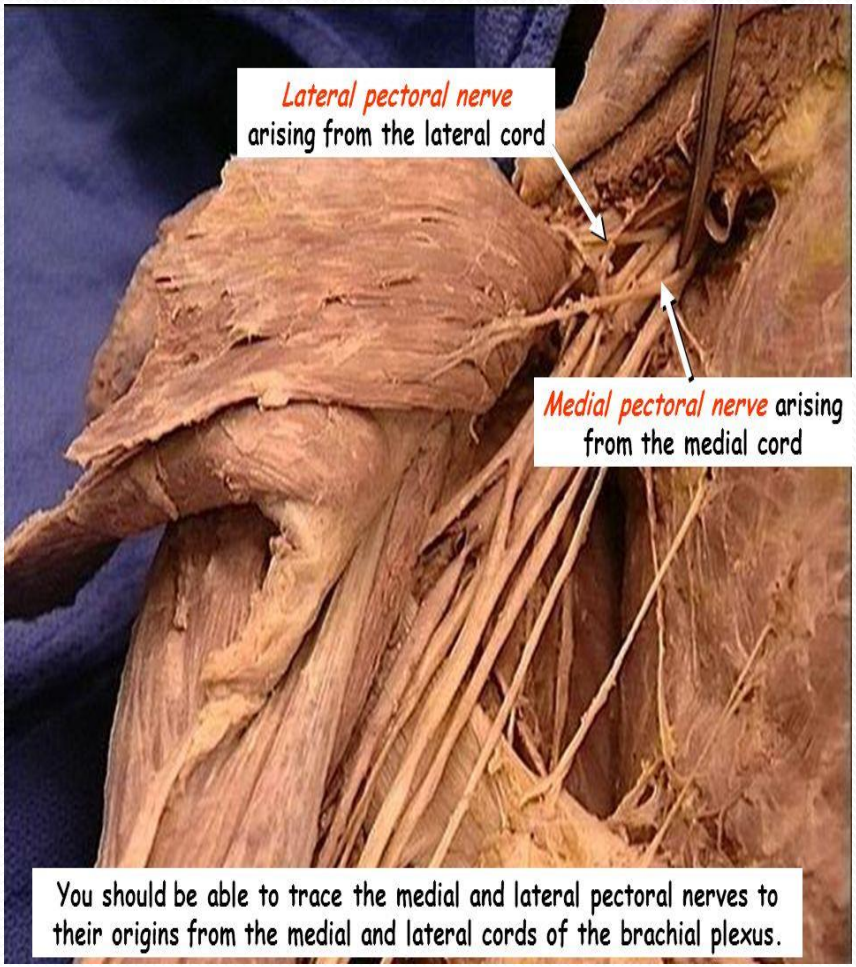
Pectoral nerve blocks

- Lateral pectoral nerve - from C5-7, runs across the axillary artery and vein, pierces the coracoclavicular fascia, and is distributed to the deep surface of the pectoralis major to supply pectoralis major.
- Medial pectoral nerve - from C8-T1, runs deep to pectoralis minor to supply pectoralis major and minor.



Pectoral nerve block

- is indicated for prevention and reducing pain after breast augmentation and mastectomy.
- Injection of LA in pectoral plane relieves pain of muscle contraction



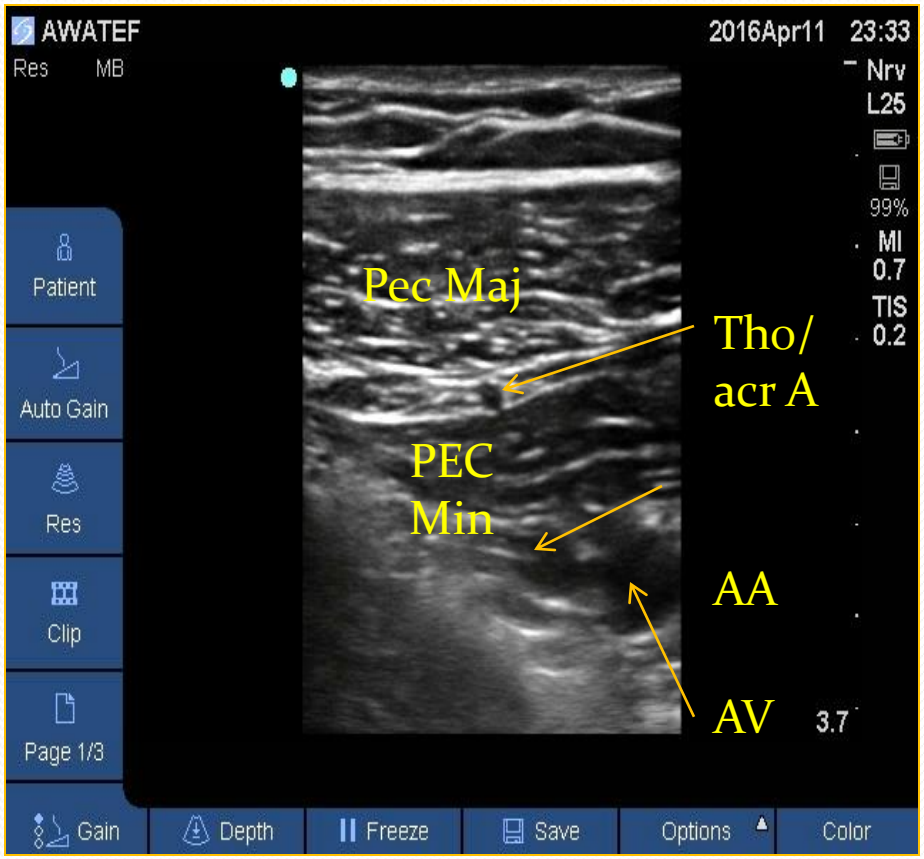
Pectoral nerve block

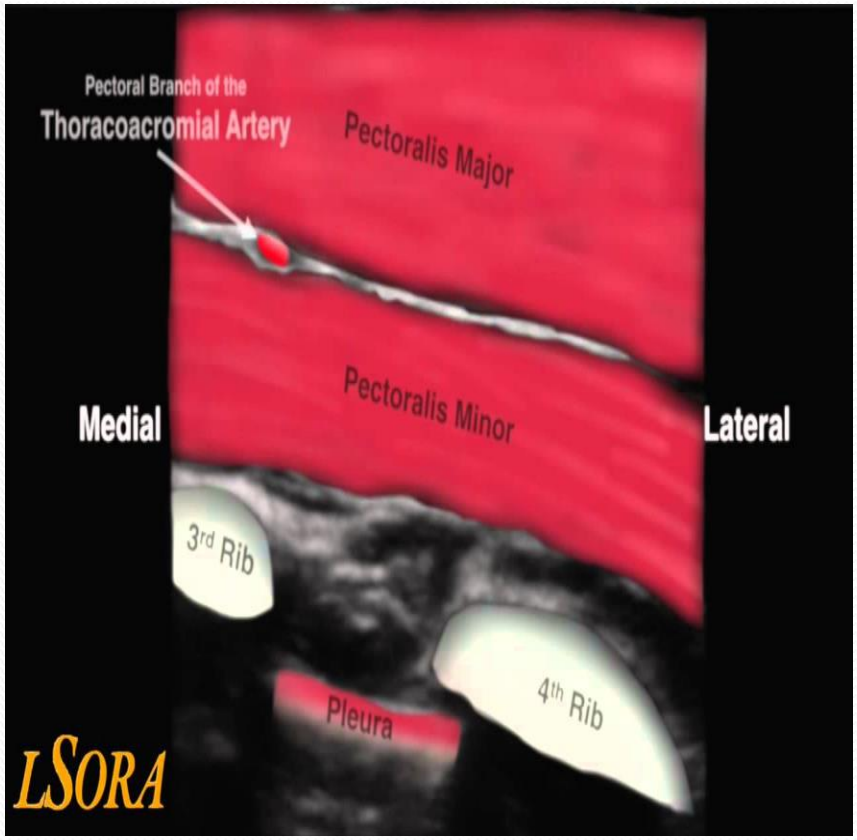
Position: Supine

Probe: Linear

Technique: parallel to the clavicle and medial to the coracoid process, the pectoralis minor muscle, the pectoralis major muscle, axillary artery, and axillary vein were identified.

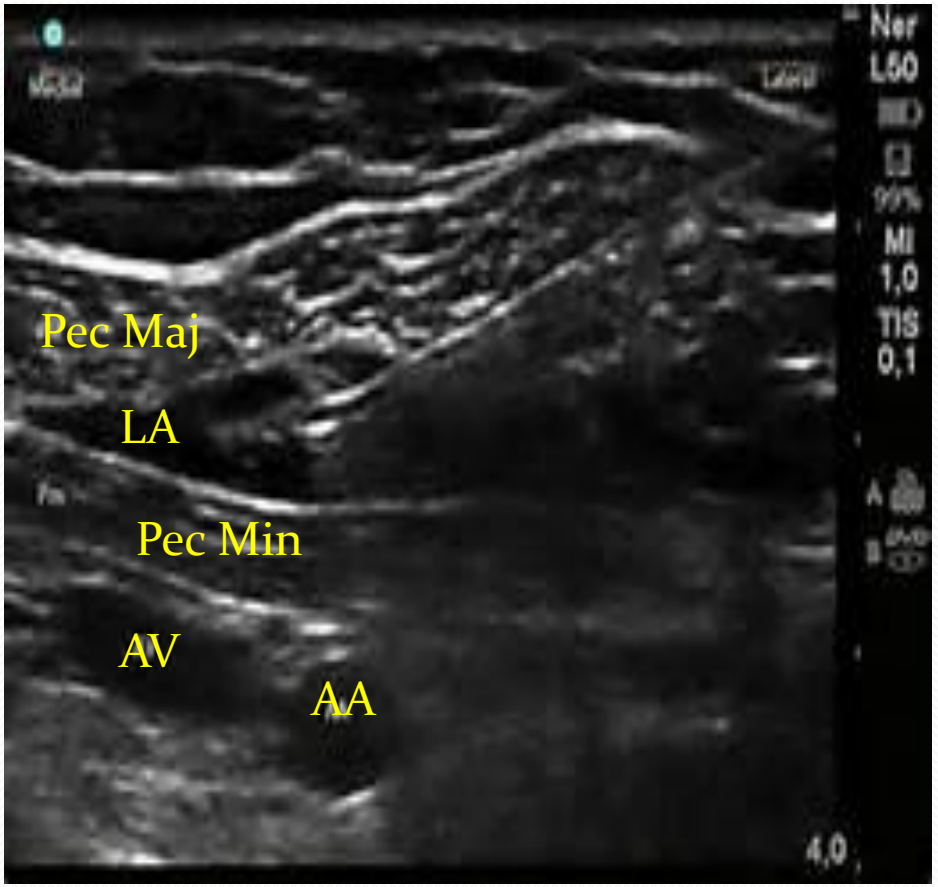
Pectoral nerve block



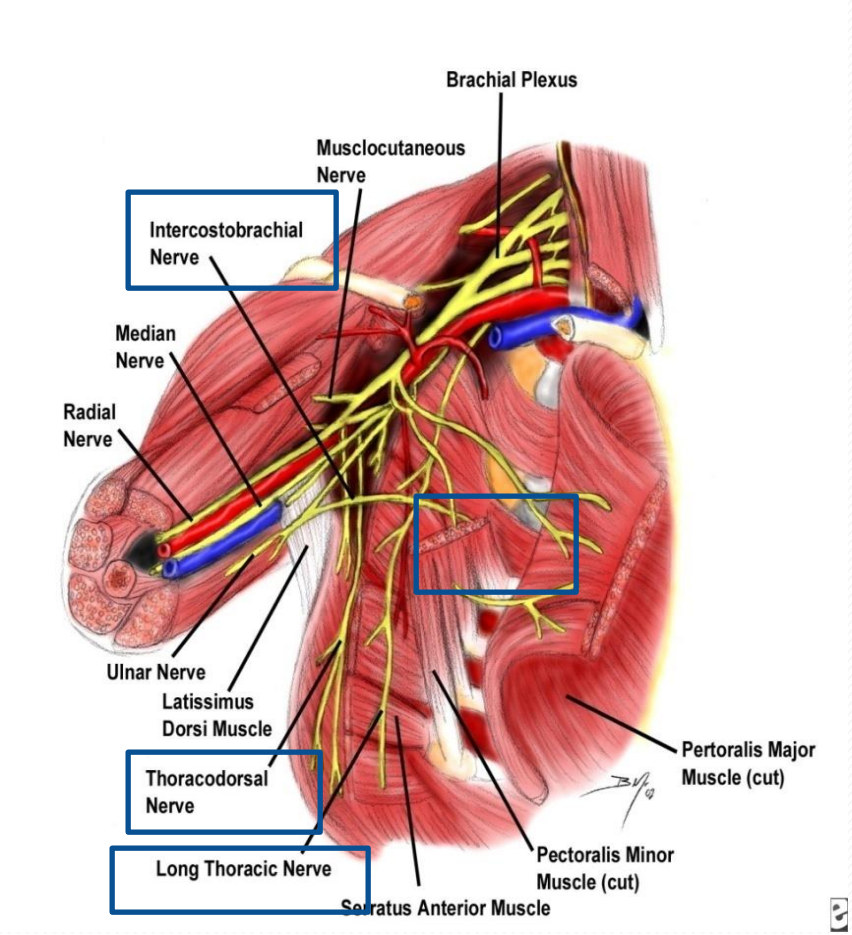


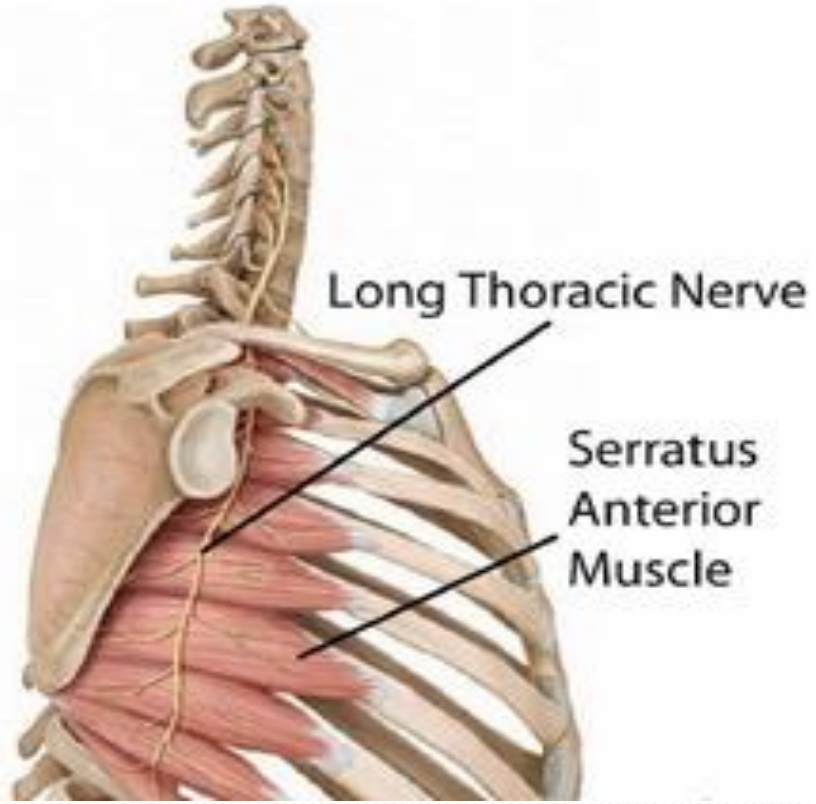
US guided Pectoral plane block

- 10mL LA injection between pectoralis major and minor at the 3rd rib is used to block the lateral and medial pectoral nerves.



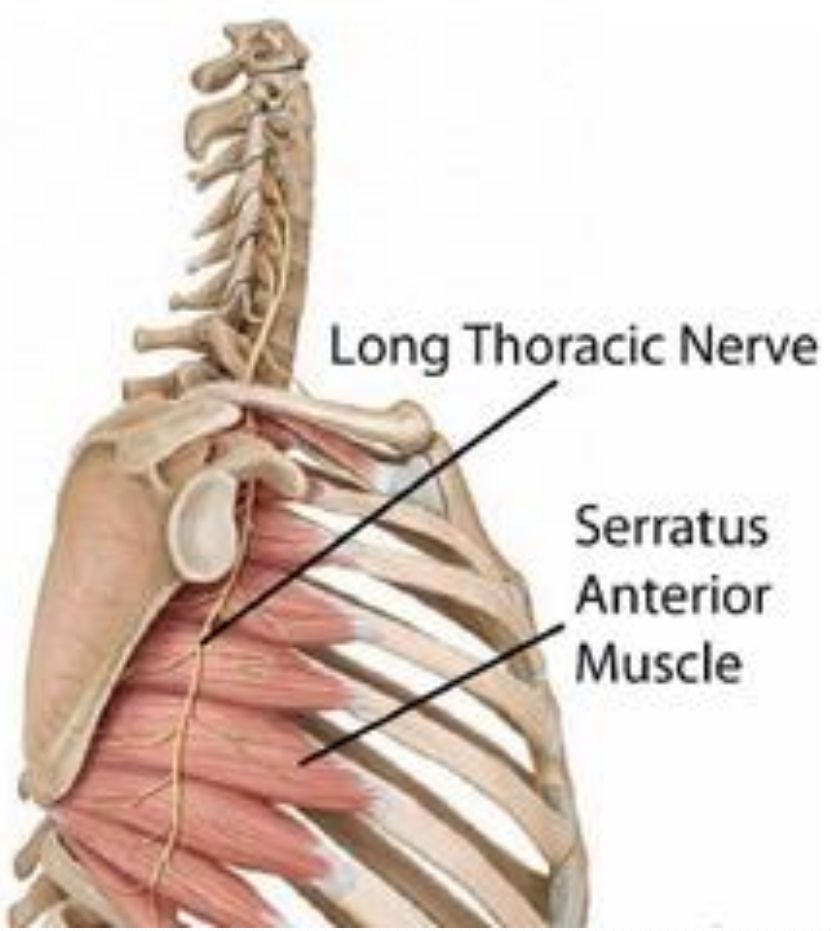
US guided Serratus anterior block





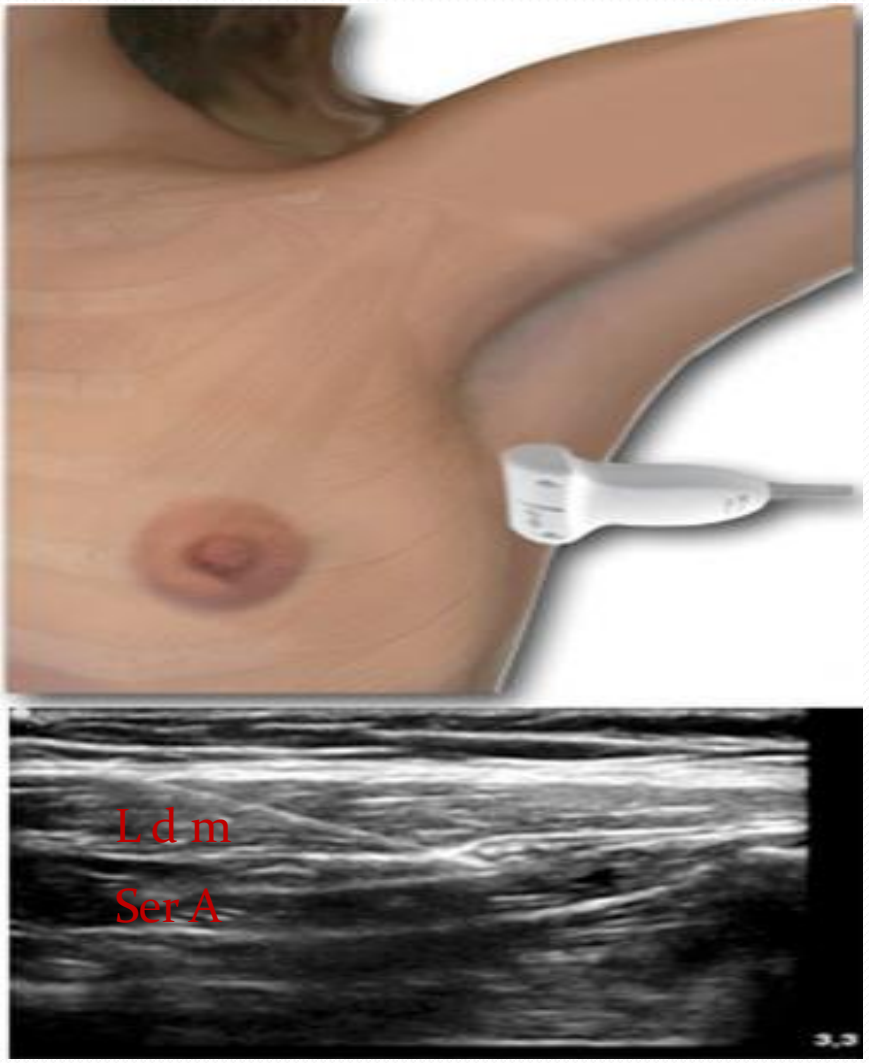
US guided
Serratus anterior block

- Long thoracic nerve – from C5-7, runs on outer surface of serratus anterior to the axilla where it supplies serratus anterior muscle.
- Liable to be injured during thoracotomy.
- Effective in relieving post thoracotomy pain.



US guided
Serratus anterior block

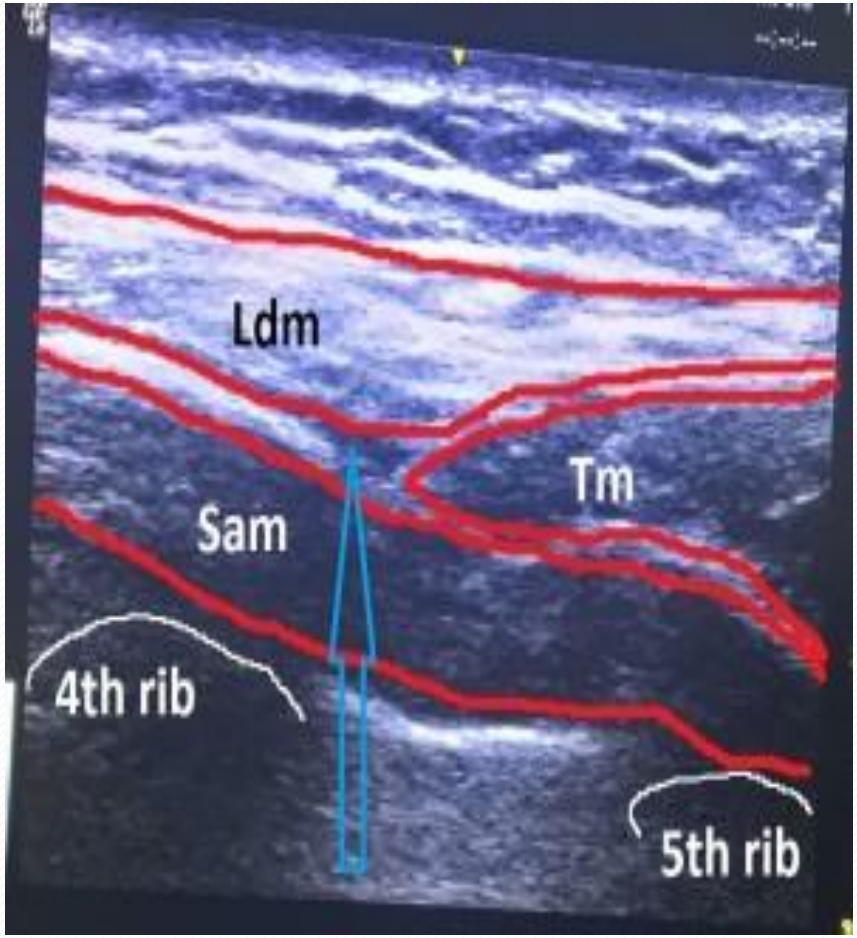
- Position: supine
- Probe: High linear
- Technique: parasagittal at mid axillary line to visualize 4th and 5 th rib, latismus dorsi and serratus anterior muscle.



Blanco et al. | Serratus plane block
Anaesthesia 2013, 68, 1107–1113

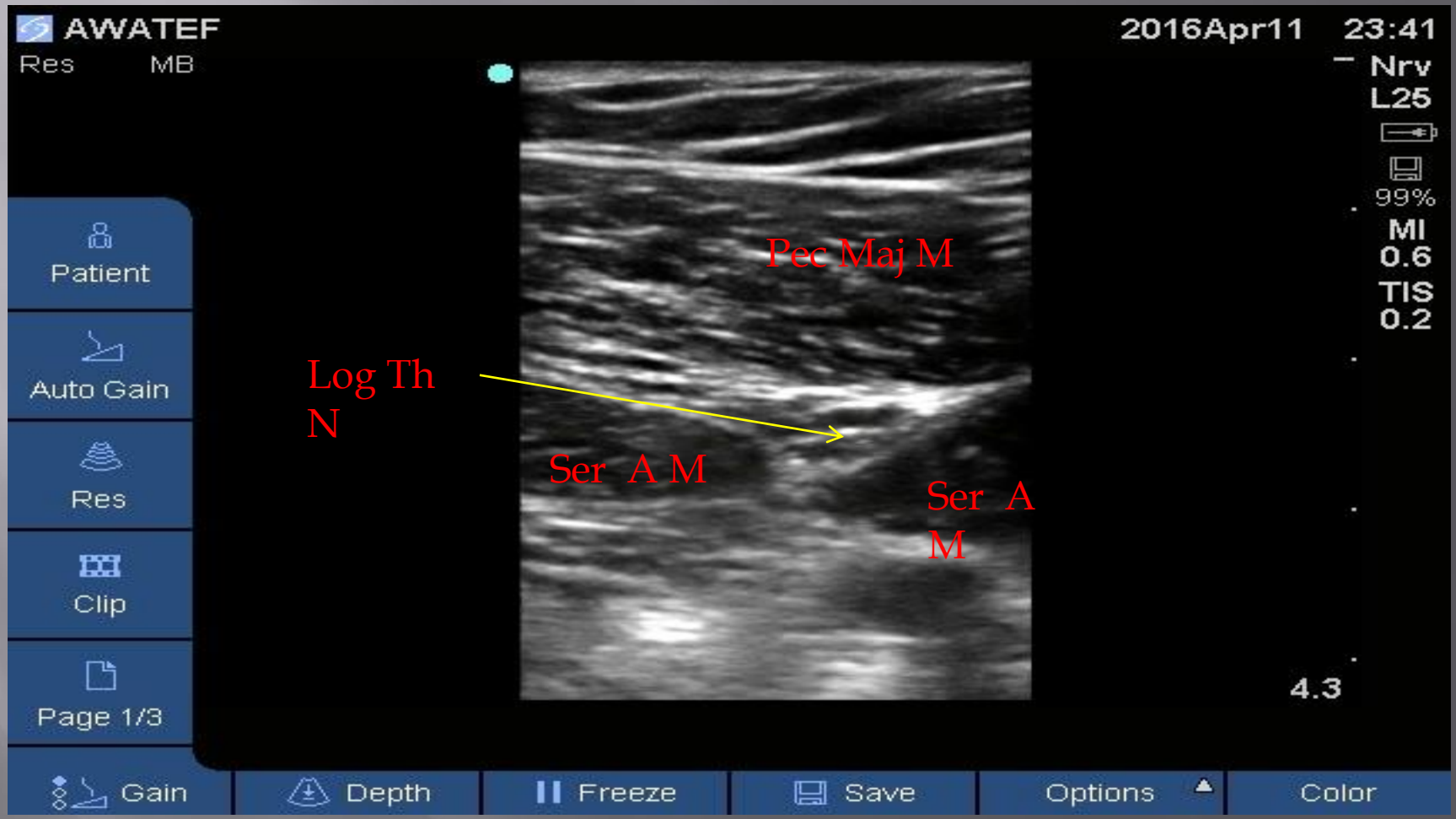
US guided Serratus anterior block

- Needle is guided towards the fascial plane above serratus anterior muscle and between it and latismus dorsi muscle.
- 20 – 40 ml of LA is injected to block long thoracic nerve, intercostal nerves where they pierce serratus anterior muscle and thoracodorsal nerve.



Blanco et al. | Serratus plane block Anaesthesia 2013, 68, 1107–1113

US guided Long thoracic nerve Serratus anterior block at anterior axillary line

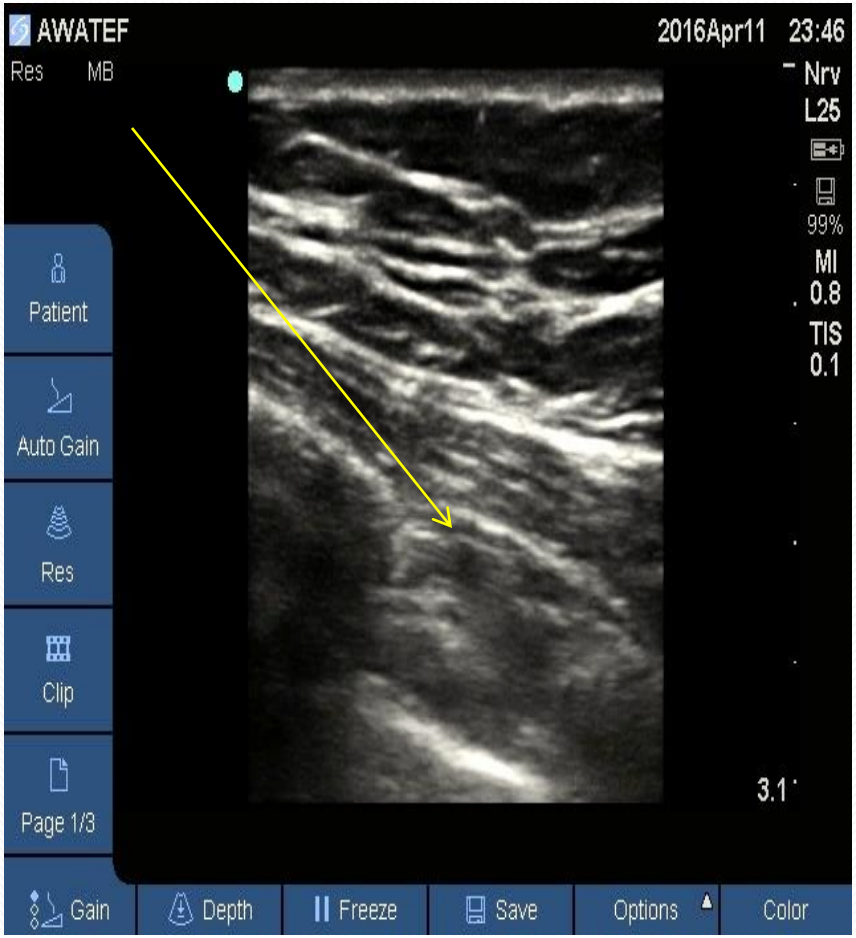


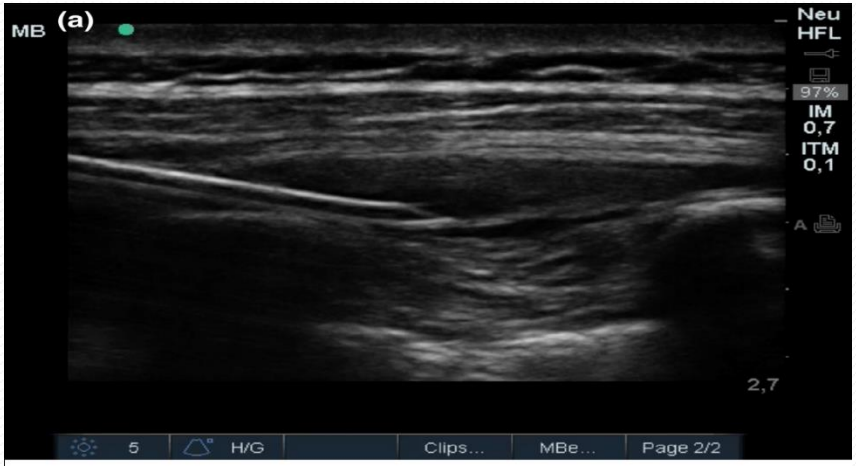
parasagittal at anterior axillary line to visualize 3th and 4 th rib, pectoralise minor and serratus anterior muscle.

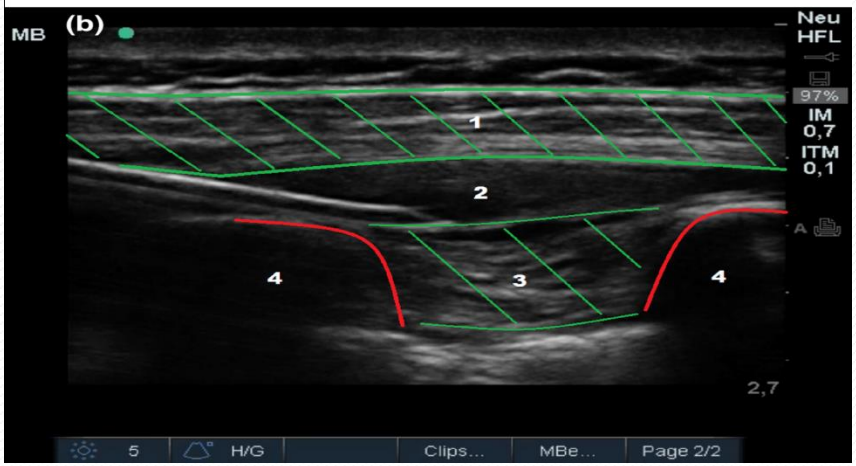
US guided serratus anterior block

- Sensory loss spread to posterior lateral and anterior of the chest wall.

Intercosto/ paraspinal plane blocks subserratus anterior block







Intercosto/ paraspinal plane blocks subserratus anterior block

- Needle is guided towards the fascial plane below serratus anterior muscle and between it and intercostal muscles.
- More sensory loss.

In conclusion

- Transthoracic plane block is an alternative to paravertebral and epidural block
- It is effective in acute and chronic thoracic pain.
- It is easy technique with less side effects.

Thank you for your attention