

## Paravertebral



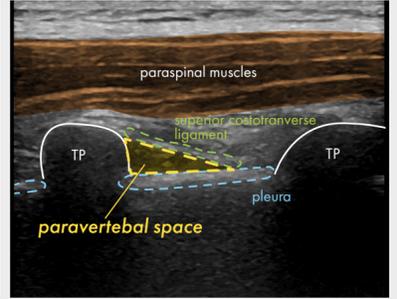
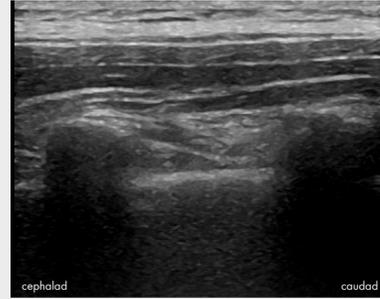
### Thoracic Paravertebral – surgery involving the breast, ribs and chest wall

**Identify:** In a parasagittal plane identify the ribs at the level you wish to block, then trace medially until the bony shadow changes to the more superficial and squarer outline of the transverse processes (described as tombstones). Tilt the probe laterally to demonstrate the pleura and superior costo-transverse ligament in the same image.

**Target:** The small triangular paravertebral space lies between the superior costo-transverse ligament and the pleura.

**Tips:** While maintaining the same probe orientation, angle the caudad end of the probe away from the mid line to improve the needle access past the rib and transverse process below.

**Avoid:** Keep the needle tip in view at all times to avoid pneumothorax, never advance the needle if you cannot see the tip.



## Erector Spinae



### Erector Spinae Plane – thoracic and upper abdominal surgery, posterior rib fractures

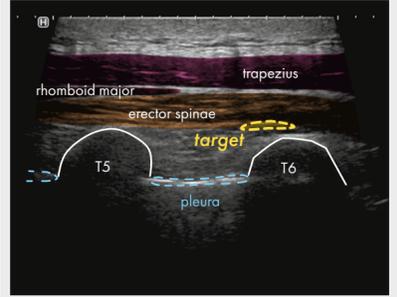
**Identify:** Count the spinous processes to identify the correct spinal level. In the paramedian plane identify the corresponding transverse process, overlying muscle layers and underlying pleura.

**Target:** Using an in-plane approach from the cephalic end of the probe, the target is the fascial plane deep to the erector spinae muscle.

**Tips:** Choose a site where the needle track would hit the transverse process if it was

inserted too far - this acts as a safety net. Look for free spread of local anaesthetic in the fascial plane and use ultrasound to assess the segmental spread up and down the spine. This is a suitable site for catheter techniques for chest wall injuries.

**Avoid:** Lateral injection - be sure to identify transverse processes not ribs. Calculate the maximum local anaesthetic dose and dilute as necessary to achieve a suitable volume, especially with bilateral injections.



## PECS



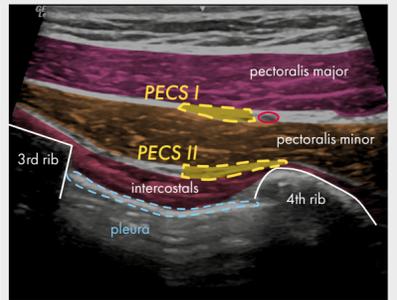
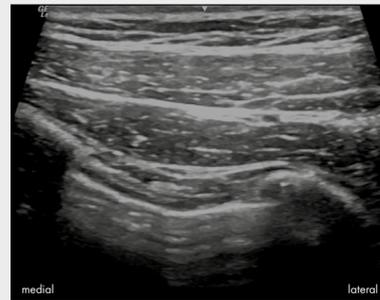
### PECS – breast surgery

**Identify:** Starting in the infraclavicular brachial plexus position in the deltopectoral groove, count the ribs down from the clavicle to identify the 3rd and 4th ribs, then rotate the probe towards the axilla. There are 3 muscle layers: pectoralis major lies superficially, the pectoralis minor is beneath that and the intercostals are deepest, running between the ribs. Serratus anterior arises beneath the lateral border of pec minor.

**Target:** The PECS I injection is between pec major and pec minor; the PECS II includes a second injection between pec minor and the intercostal muscles.

**Tips:** A single needle path in plane from the medial end of the probe allows both targets to be reached through one insertion point. This block relies on adequate volumes of local anaesthetic for spread.

**Avoid:** Keep the 4th rib deep to the needle path to act as a safety measure against pneumothorax, ensure the safe dose of local anaesthetic is not exceeded especially when performing bilateral blocks. Avoid the artery that runs in the PECS I plane (a pectoral branch of the thoracoacromial artery).



## Serratus Anterior



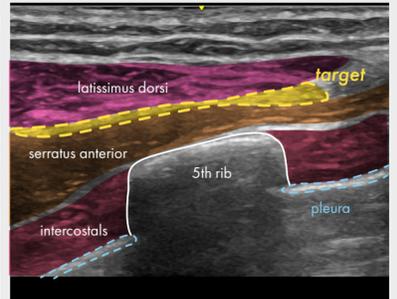
### Serratus Anterior Plane – rib fractures, breast surgery, axillary surgery

**Identify:** Starting with the probe in a transverse plane in the mid-axillary line, scan posteriorly until the latissimus dorsi muscle appears. There is usually an artery in the serratus anterior plane (a branch of the thoracodorsal artery).

**Target:** The aim is to inject in the fascial plane between latissimus dorsi and serratus anterior.

**Tips:** This approach is also very suitable for insertion of a nerve catheter. This block relies on adequate volume for spread eg 30ml of local anaesthetic.

**Avoid:** Vascular puncture, intravascular injection, pneumothorax.



## Quadratus Lumborum



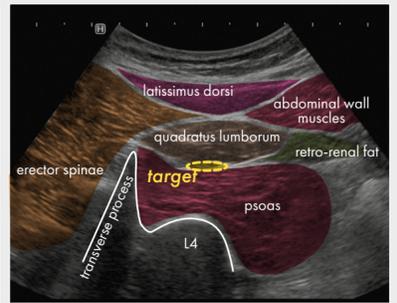
### Quadratus Lumborum (transmuscular) – abdominal surgery

**Identify:** With the patient in the lateral position, use a curvilinear probe in the posterior axillary line between the costal margin and the iliac crest. Identify the L4 vertebral body then tilt the probe caudally to see the transverse process with the three muscle groups forming the "shamrock sign" as illustrated.

**Target:** Using a 100mm echogenic needle and an in-plane approach from the posterior end of the probe, the target is the fascial plane between quadratus lumborum and psoas major.

**Tips:** A curvilinear probe is required and the MSK preset may be best. Use an adequate depth initially to identify the vertebral outline. The QL muscle attaches to the tips of L1-L4 transverse processes.

**Avoid:** Intramuscular injection - look for fascial plane spread and adjust the needle position if necessary. Avoid the lateral peritoneal recess and retro-renal fat. Adequate spread depends on volume of injectate, typically 30ml each side. Avoid exceeding the maximum dose for the individual patient.



## TAP



### Transversus Abdominis Plane – abdominal surgery

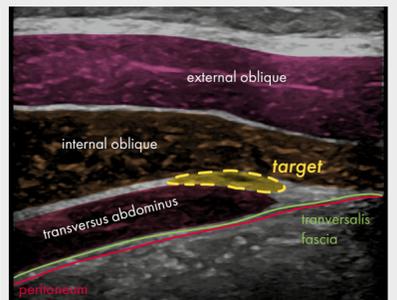
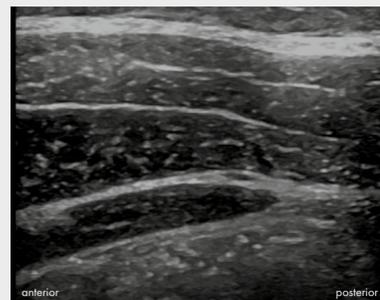
**Identify:** The 3 muscle layers of the abdominal wall (external oblique, internal oblique; transversus abdominus) and trace them back posteriorly to the termination of transversus abdominus.

**Target:** Beneath the fascial layer between the internal oblique and transversus abdominus muscles near the posterior limit of the transversus muscle.

**Tips:** The posterior target site is generally the most effective and because of the tangential approach through the abdominal wall a

100mm needle is appropriate. The block can be performed unilaterally or bilaterally, depending on surgical site, and adequate volume is required for spread eg 20-30ml each side. Visceral pain will not be blocked by a TAP block. For surgery above the umbilicus use the quadratus lumborum block.

**Avoid:** Intravascular injection - check for small vessels with doppler prior to injection; avoid intraperitoneal injection; be aware of total local anaesthetic dose.



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- Cervical plexus – Supraclavicular nerves
- T2 – 12 segmental nerves – Lateral cutaneous branches (lat cut branch of T2 = intercostobrachial) Anterior cutaneous branches
- Lumbar plexus – Iliohypogastric Ilioinguinal Genitofemoral Lateral cutaneous nerve of thigh

