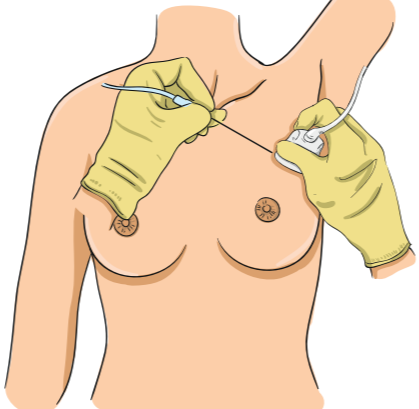
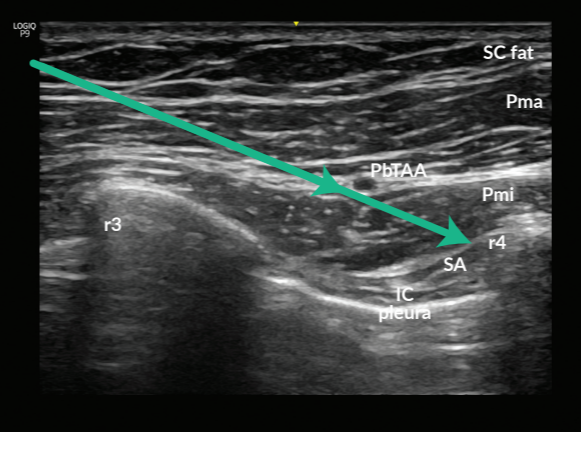
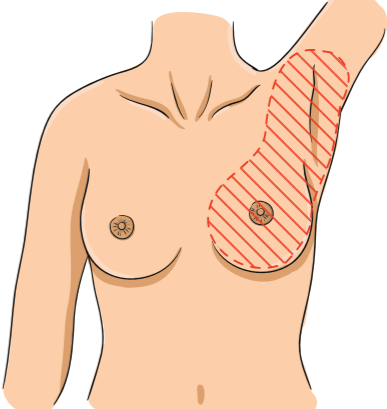
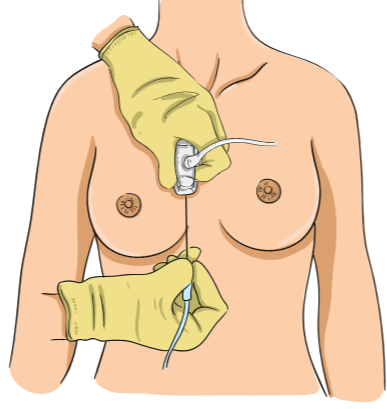
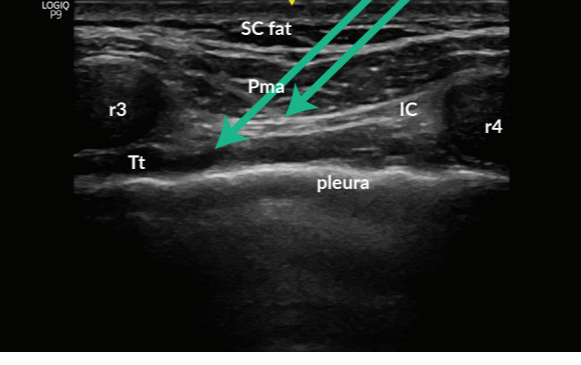
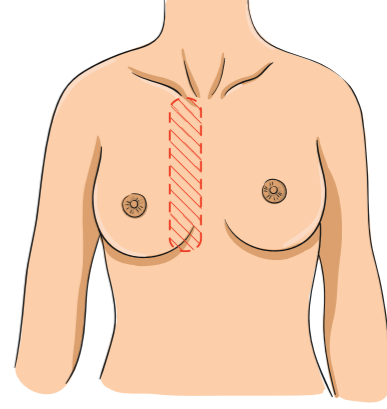
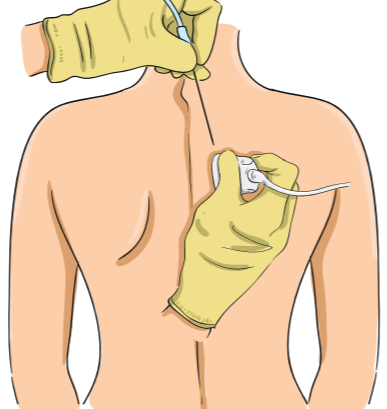
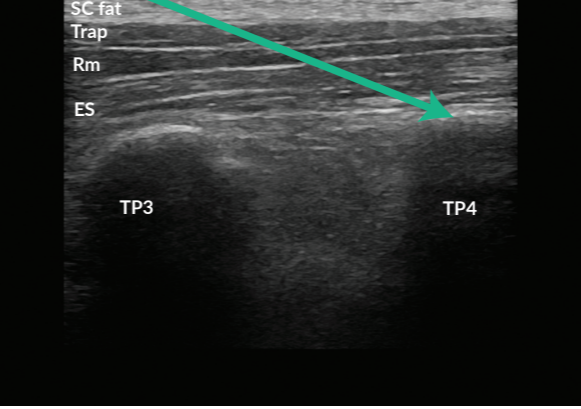
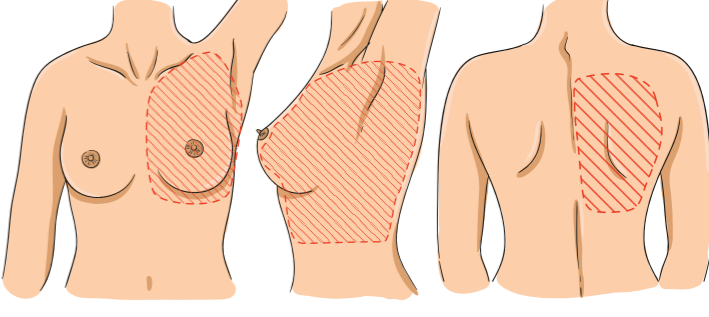
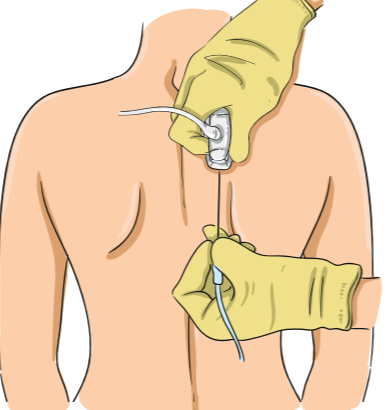
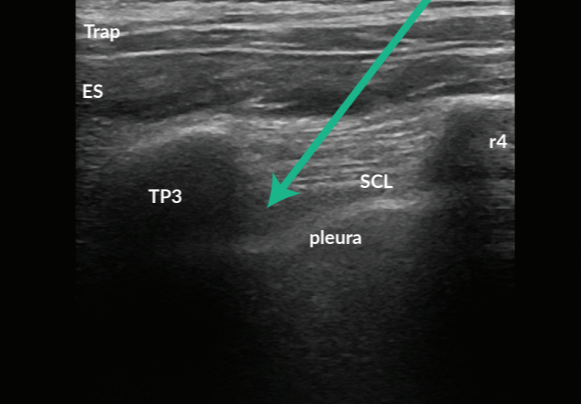
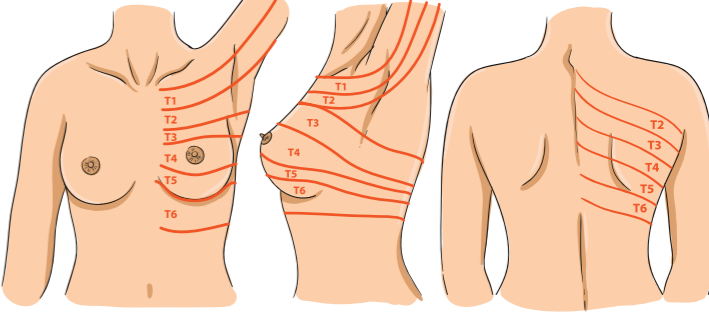


THORACIC WALL BLOCKS FOR BREAST CANCER SURGERY

Barbara Versyck, Kris Vermeulen, Renee van den Broek, Sari Casaer, Geert-Jan van Geffen

	PROBE AND NEEDLE	ULTRASOUND IMAGE	INDICATIONS														
<h2>INTERPECTORAL-PECTOSERRATUS PLANE</h2> <p>Patient position: supine, arm abducted Transducer: linear Needle: 22 G, 5 cm short bevel Local anesthetic: 20 + 20 ml</p> <p>ABBREVIATIONS</p> <table border="0"> <tr><td>Pma</td><td>Pectoralis major</td></tr> <tr><td>Pmi</td><td>Pectoralis minor</td></tr> <tr><td>SA</td><td>Serratus anterior</td></tr> <tr><td>IC</td><td>Intercostal</td></tr> <tr><td>r</td><td>Rib</td></tr> <tr><td>SC fat</td><td>Subcutaneous fat tissue</td></tr> <tr><td>PbTaa</td><td>Pectoral branch of thoracoacromial artery</td></tr> </table>	Pma	Pectoralis major	Pmi	Pectoralis minor	SA	Serratus anterior	IC	Intercostal	r	Rib	SC fat	Subcutaneous fat tissue	PbTaa	Pectoral branch of thoracoacromial artery	 <p>Transducer position: place transducer under lateral third of clavicle, at level of r3-r4. Then, turn probe 45° clockwise. Needle approach: in plane from medial to lateral.</p>	 <p>Required view: r3 and r4 in combination with Pma and Pmi. If possible, with PbTaa and SA. Technique: needle insertion towards r4 aiming medial of PbTaa. First, lower (pectoserratus plane) injection under Pmi. Then, retract needle for upper (interpectoral plane) injection between Pma and Pmi. Spread of LA: linear fluid spread underneath Pmi and between Pma and Pmi. Avoid globular spread which indicates intramuscular injection.</p>	 <p>Indications: unilateral breast and axillary analgesia. Tips: Aim needle at underlying rib to avoid pleura puncture. For breast surgery interpectoral + serratus plane block at this level will give similar effect as interpectoral-pectoserratus plane block. Use 20 ml + 20 ml to ensure sufficient spread in the axillary region.</p>
Pma	Pectoralis major																
Pmi	Pectoralis minor																
SA	Serratus anterior																
IC	Intercostal																
r	Rib																
SC fat	Subcutaneous fat tissue																
PbTaa	Pectoral branch of thoracoacromial artery																
<h2>PARASTERNAL INTERFASCIAL PLANE</h2> <p>Patient position: supine Transducer: linear Needle: 22 G, 5 cm short bevel Local anesthetic: 20 ml</p> <p>ABBREVIATIONS</p> <table border="0"> <tr><td>Pma</td><td>Pectoralis major</td></tr> <tr><td>IC</td><td>Intercostal</td></tr> <tr><td>r</td><td>Rib</td></tr> <tr><td>SC fat</td><td>Subcutaneous fat tissue</td></tr> <tr><td>Tt</td><td>Transversus thoracis</td></tr> </table>	Pma	Pectoralis major	IC	Intercostal	r	Rib	SC fat	Subcutaneous fat tissue	Tt	Transversus thoracis	 <p>Transducer position: place transducer parasagittal at level of r3-r4, 2 cm lateral to sternum. Needle approach: in plane from caudal to cephalad.</p>	 <p>Required view: r3 and r4 in combination with Pma. Technique: needle insertion aiming towards r3. Superficial: deep to Pma and superficial to IC. Deep: deep to IC and superficial to Tt. Spread of LA: linear fluid spread underneath Pma (superficial) or underneath IC (deep).</p>	 <p>Indications: unilateral parasternal analgesia. Tips: Add to interpectoral-pectoserratus plane block in case of medial breast surgery. Aim needle towards rib to avoid pleura puncture. The caudal to cephalad needle insertion prevents interference between the clavicle and the path of the needle insertion.</p>				
Pma	Pectoralis major																
IC	Intercostal																
r	Rib																
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Tt	Transversus thoracis																
<h2>ERECTOR SPINAE PLANE</h2> <p>Patient position: sitting, lateral or prone position Transducer: linear or curved depending on body posture (switch at TP depth ± 4 cm) Needle: 18G Tuohy needle or 8-10 cm short bevel needle Local anesthetic: 20-40 ml</p> <p>ABBREVIATIONS</p> <table border="0"> <tr><td>Trap</td><td>Trapezius</td></tr> <tr><td>Rhom</td><td>Rhomboides</td></tr> <tr><td>ES</td><td>Erector spinae</td></tr> <tr><td>TP</td><td>Transverse process</td></tr> <tr><td>SC fat</td><td>Subcutaneous fat tissue</td></tr> </table>	Trap	Trapezius	Rhom	Rhomboides	ES	Erector spinae	TP	Transverse process	SC fat	Subcutaneous fat tissue	 <p>Transducer position: place transducer parasagittal at level of fourth spinous process, then move ±3 cm lateral, visualising the transverse process. Needle approach: in plane from cephalad to caudal.</p>	 <p>Required view: TP3 and TP4 in combination with Trap, Rm and ES. Technique: needle insertion aiming towards top of TP5. Injection under ES. Spread of LA: linear fluid spread lifting the erector spinae muscle off the tip of the TP. Avoid globular spread which indicates intramuscular injection.</p>	 <p>Indications: analgesia of unilateral thoracic wall T2-T6. Tips: higher volume generates broader spread, dilute LA with NaCl 0.9% if necessary.</p>				
Trap	Trapezius																
Rhom	Rhomboides																
ES	Erector spinae																
TP	Transverse process																
SC fat	Subcutaneous fat tissue																
<h2>PARAVERTEBRAL</h2> <p>Patient position: sitting position with arched back, lateral 'foetal' position or prone Transducer: linear or curved depending on body posture (switch at TP depth ± 4 cm) Needle: 18 G Tuohy needle or 8-10 cm short bevel needle Local anesthetic: 10-20 ml</p> <p>ABBREVIATIONS</p> <table border="0"> <tr><td>Trap</td><td>Trapezius</td></tr> <tr><td>ES</td><td>Erector spinae</td></tr> <tr><td>SCL</td><td>Superior costotransverse ligament</td></tr> <tr><td>TP</td><td>Transverse process</td></tr> <tr><td>SC fat</td><td>Subcutaneous fat tissue</td></tr> </table>	Trap	Trapezius	ES	Erector spinae	SCL	Superior costotransverse ligament	TP	Transverse process	SC fat	Subcutaneous fat tissue	 <p>Transducer position: place transducer medial at level of third spinous process for parasagittal view, then move ±3 cm lateral, visualising the transverse process. Needle approach: in plane from cephalad to caudal.</p>	 <p>Spread of LA: lateral spread underneath superior costotransverse ligament, pushing the pleura down. Technique: needle insertion aiming towards SCL, then breach SCL to reach paravertebral space. Required view: TP superiorly, rib inferiorly, connected through SCL.</p>	 <p>Indications: unilateral analgesia of segmental somatosensory and sympathetic nerves without axilla. Tips: Rotate caudad part of US beam away from midline to optimize your ultrasound image. Due to the steep angulation of the needle, visualisation of needle tip may be challenging, use an echogenic needle. Perform the block at a mid-dermatomal level with reference to the surgical site, T3-4 for simple mastectomy. When greater dermatomal spread is desired, perform multilevel injections.</p>				
Trap	Trapezius																
ES	Erector spinae																
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THE INNERVATION OF THE BREAST AND AXILLARY REGION

ABBREVIATIONS

LTN	Long thoracic nerve
LSN	Lateral supraclavicular nerve
ISN	Intermediate supraclavicular nerve
MSN	Medial supraclavicular nerve
LPN	Lateral pectoral nerve
MPN	Medial pectoral nerve
ICBN	Intercostobrachial nerve
MBCN	Medial brachial cutaneous nerve

