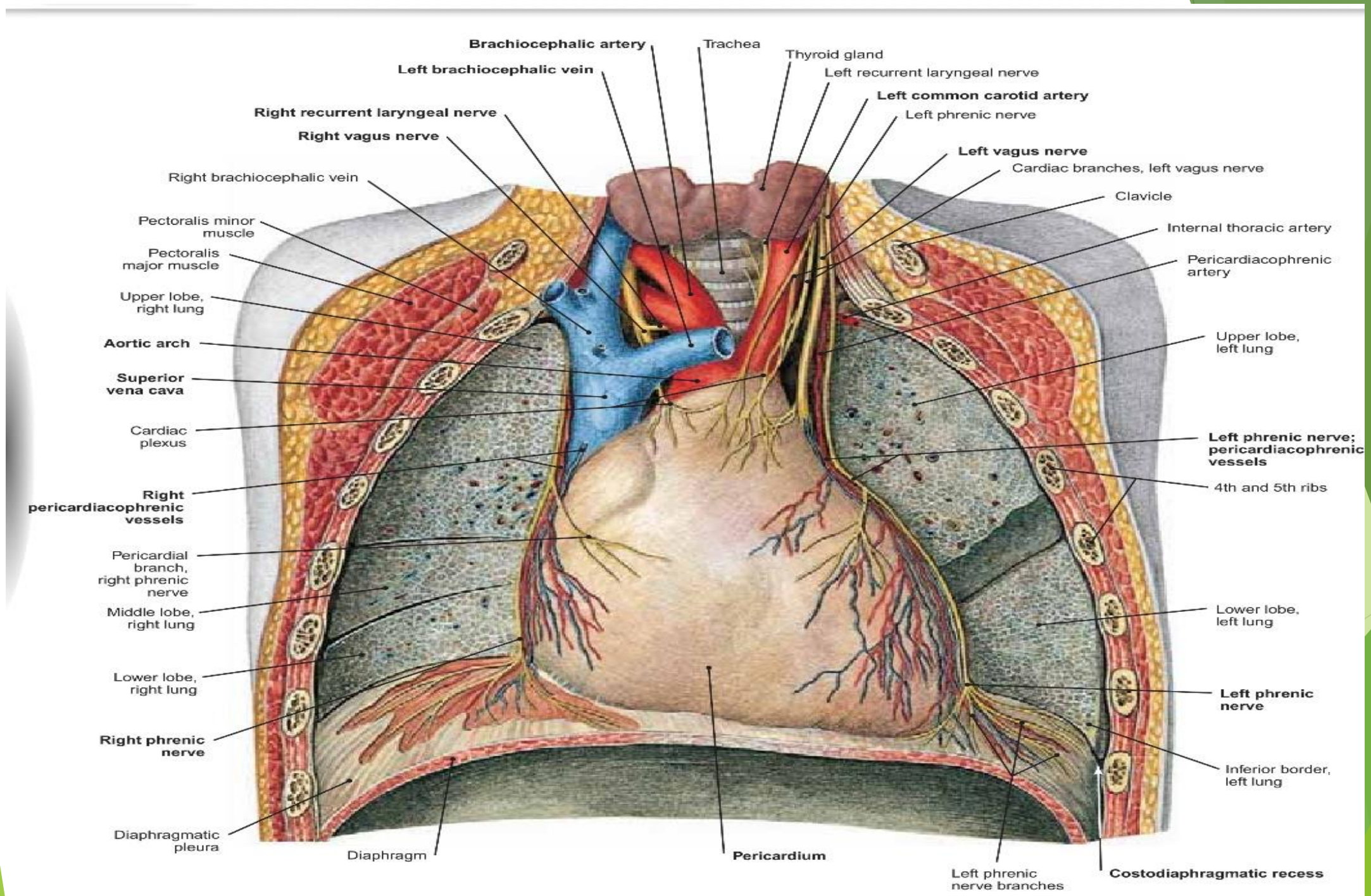
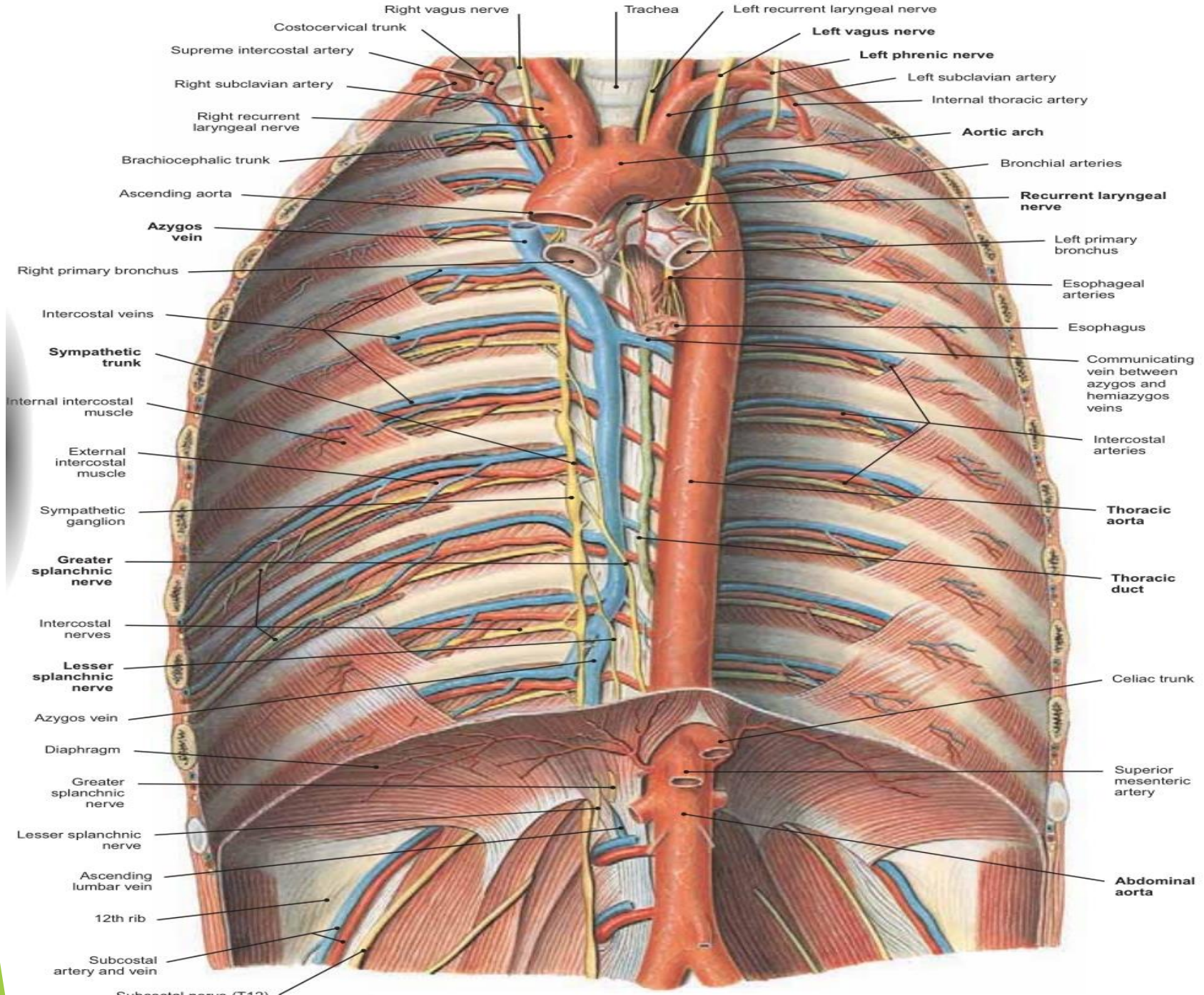
Chest pain management

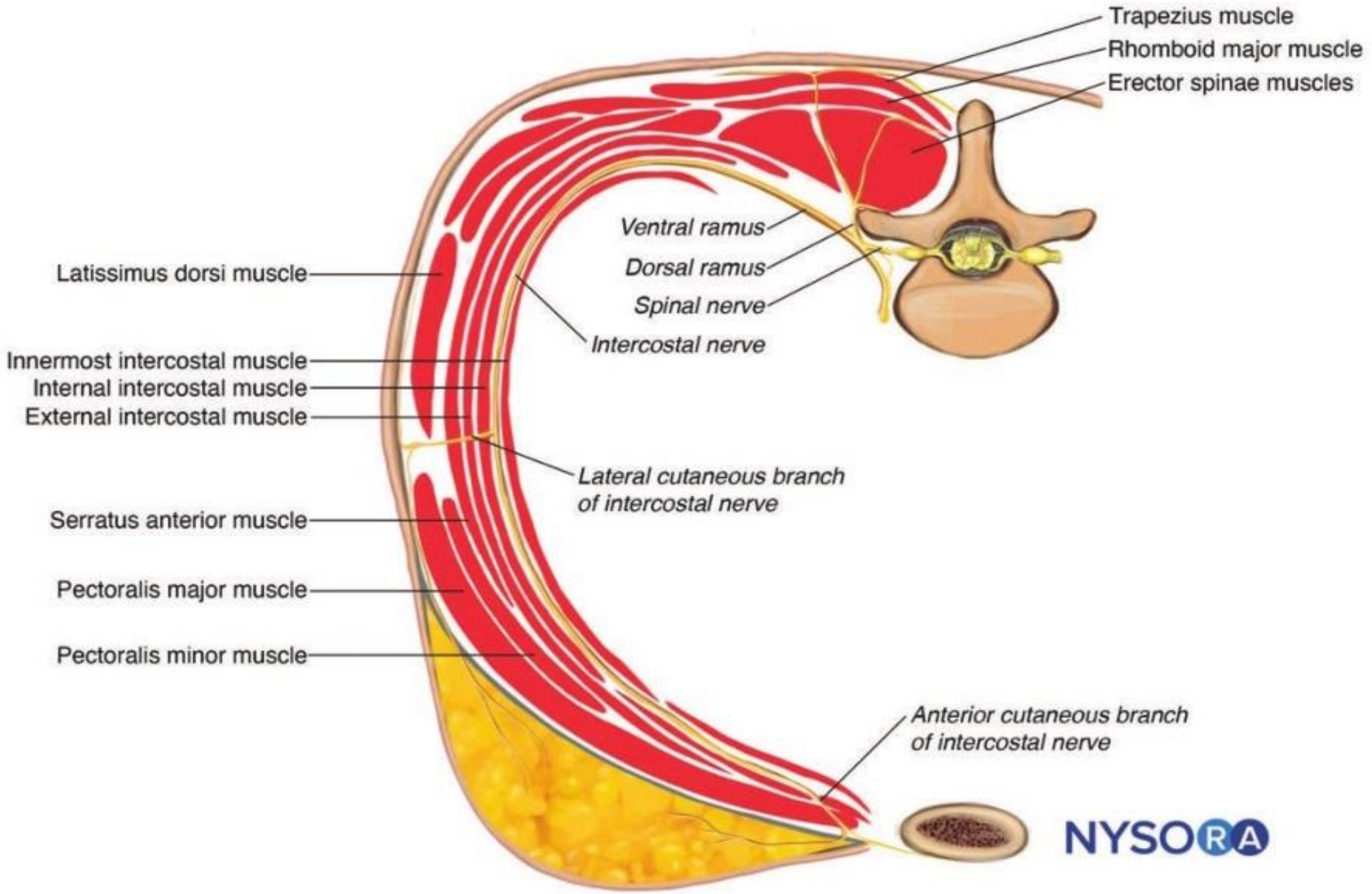
د حسين علي محمود

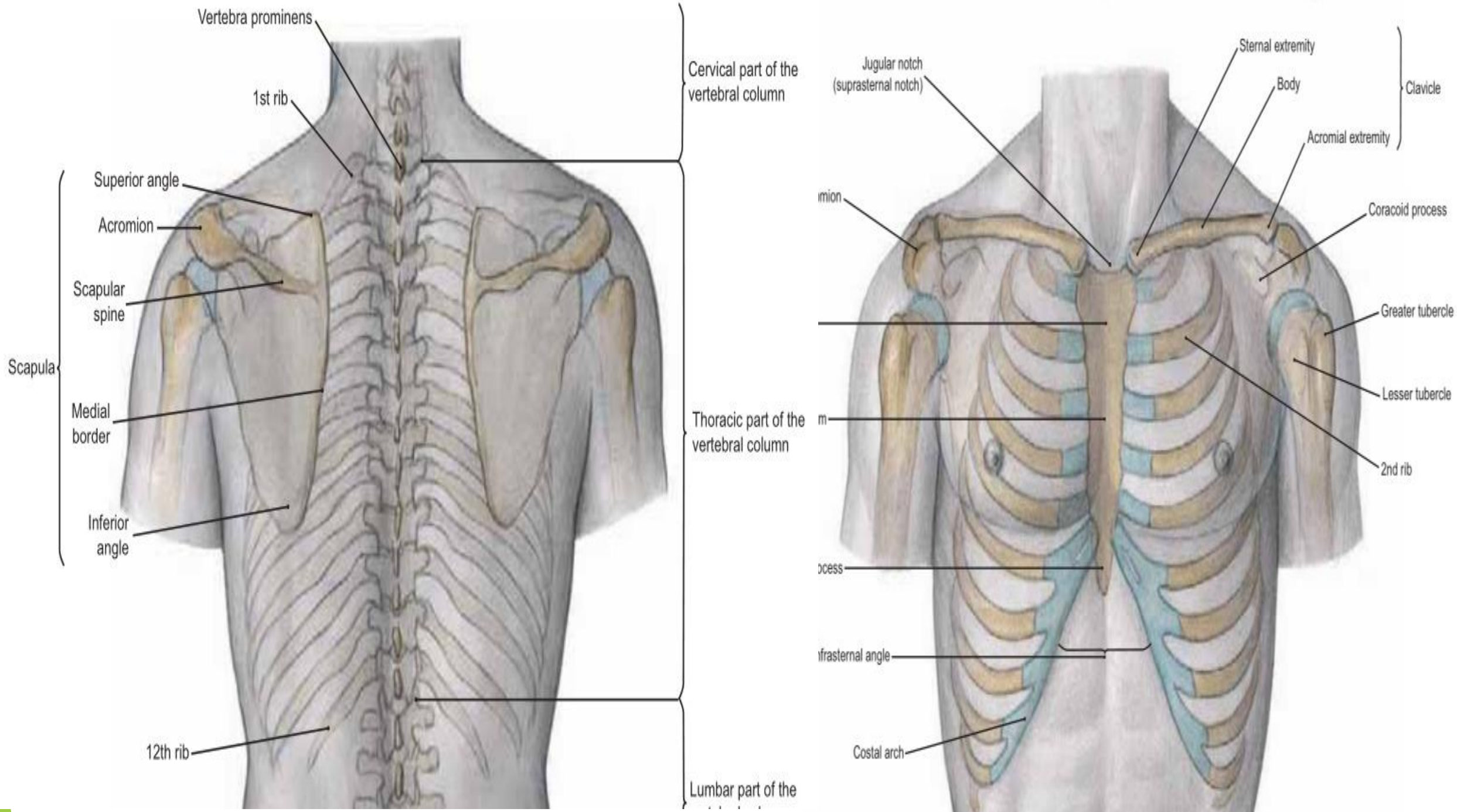
اخصائي تخدير وعناية مشددة وتدبير الم

مشفى الأسد العسكري ـ اللاذقية


Brachiocephalic artery
Trachea
Thyroid gland
Left brachiocephalic vein
Left recurrent laryngeal nerve
Left common carotid artery
Right recurrent laryngeal nerve
Left phrenic nerve
Right vagus nerve
Left vagus nerve
Cardiac branches, left vagus nerve
Right brachiocephalic vein
Clavicle
Pectoralis minor muscle
Internal thoracic artery
Pectoralis major muscle
Pericardiacophrenic artery
Upper lobe, right lung
Upper lobe, left lung
Aortic arch
Superior vena cava
Cardiac plexus
Left phrenic nerve; pericardiacophrenic vessels
4th and 5th ribs
Right pericardiacophrenic vessels
Pericardial branch, right phrenic nerve
Middle lobe, right lung
Lower lobe, left lung
Lower lobe, right lung
Left phrenic nerve
Right phrenic nerve
Inferior border, left lung
Diaphragmatic pleura
Diaphragm
Pericardium
Left phrenic nerve branches
Costodiaphragmatic recess


Right vagus nerve
Trachea
Left recurrent laryngeal nerve
Costocervical trunk
Left vagus nerve
Supreme intercostal artery
Left phrenic nerve
Right subclavian artery
Left subclavian artery
Internal thoracic artery
Right recurrent laryngeal nerve
Aortic arch
Brachiocephalic trunk
Bronchial arteries
Ascending aorta
Recurrent laryngeal nerve
Azygos vein
Left primary bronchus
Right primary bronchus
Esophageal arteries
Intercostal veins
Esophagus
Sympathetic trunk
Communicating vein between azygos and hemiazygos veins
Internal intercostal muscle
Intercostal arteries
External intercostal muscle
Thoracic aorta
Sympathetic ganglion
Greater splanchnic nerve
Thoracic duct
Intercostal nerves
Lesser splanchnic nerve
Celiac trunk
Azygos vein
Diaphragm
Superior mesenteric artery
Greater splanchnic nerve
Lesser splanchnic nerve
Abdominal aorta
Ascending lumbar vein
12th rib
Subcostal artery and vein


Trapezius muscle
Rhomboid major muscle
Erector spinae muscles
Ventral ramus
Dorsal ramus
Spinal nerve
Intercostal nerve
Latissimus dorsi muscle
Innermost intercostal muscle
Internal intercostal muscle
External intercostal muscle
Lateral cutaneous branch of intercostal nerve
Serratus anterior muscle
Pectoralis major muscle
Pectoralis minor muscle
Anterior cutaneous branch of intercostal nerve
NYSORA


Vertebra prominens
1st rib
Superior angle
Acromion
Scapular spine
Scapula
Medial border
Inferior angle
12th rib
Cervical part of the vertebral column
Thoracic part of the vertebral column
Lumbar part of the
Jugular notch (suprasternal notch)
Sternal extremity
Body
Acromial extremity
Clavicle
Coracoid process
Greater tubercle
Lesser tubercle
2nd rib
Costal arch

Intercostal Nerve Block

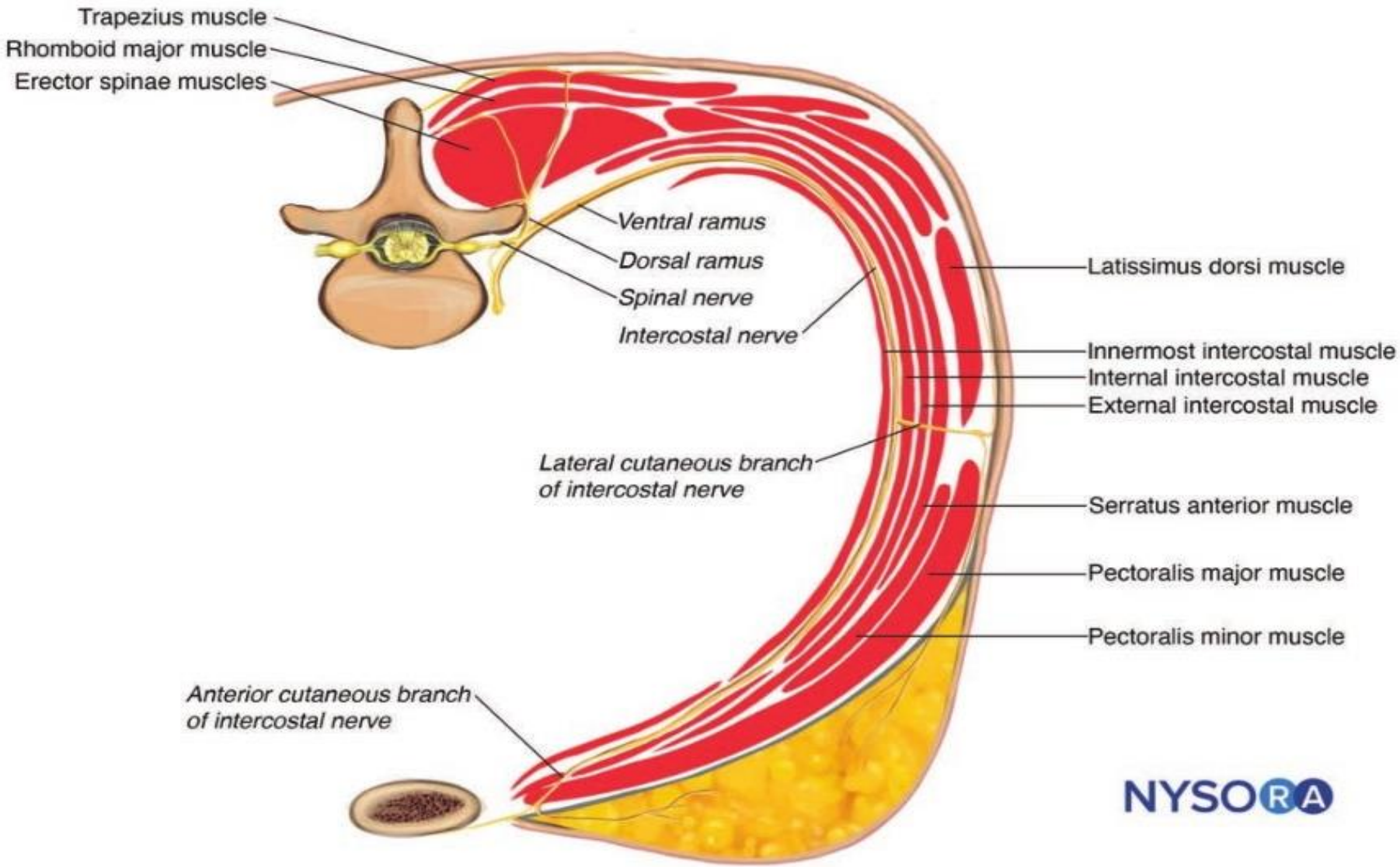
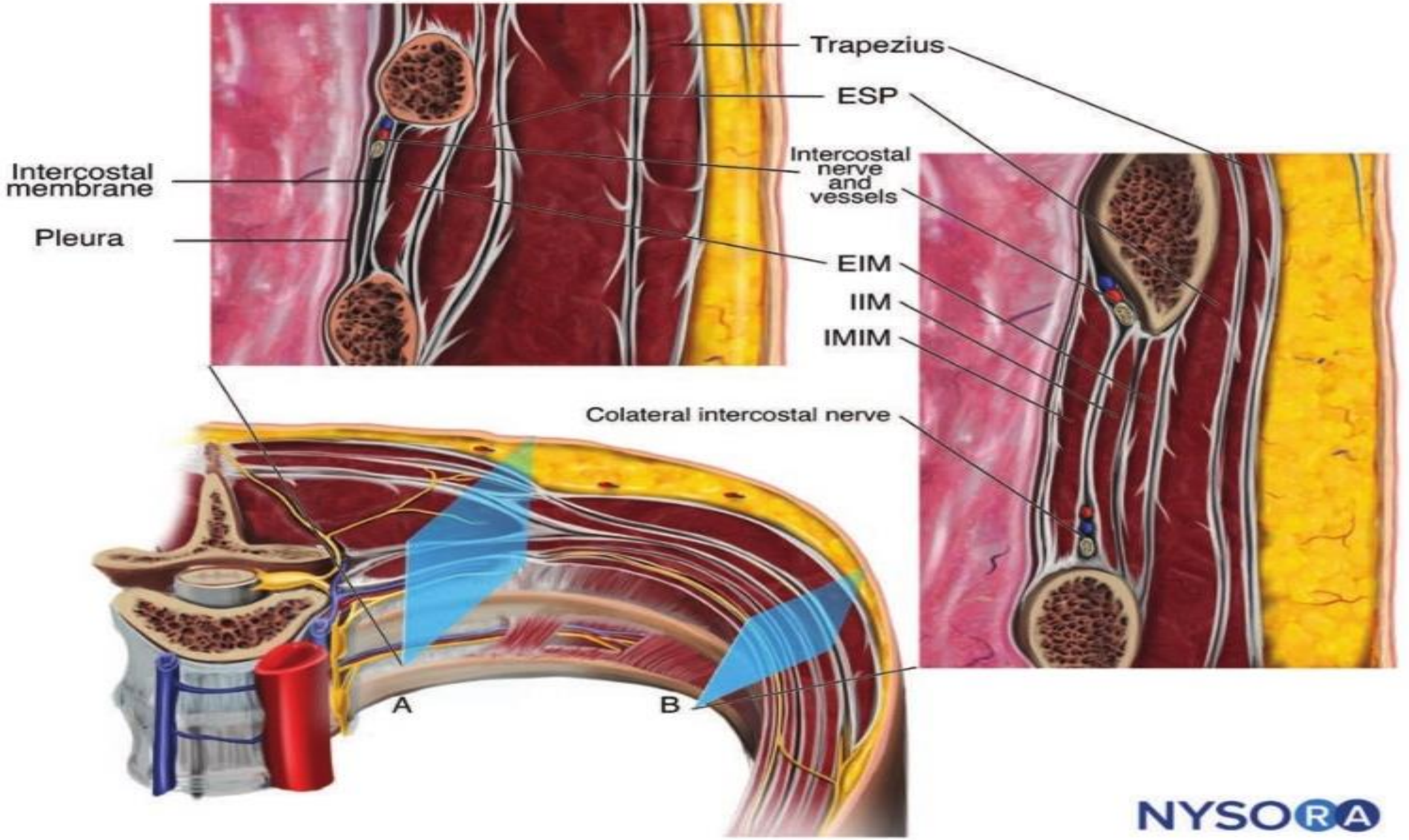
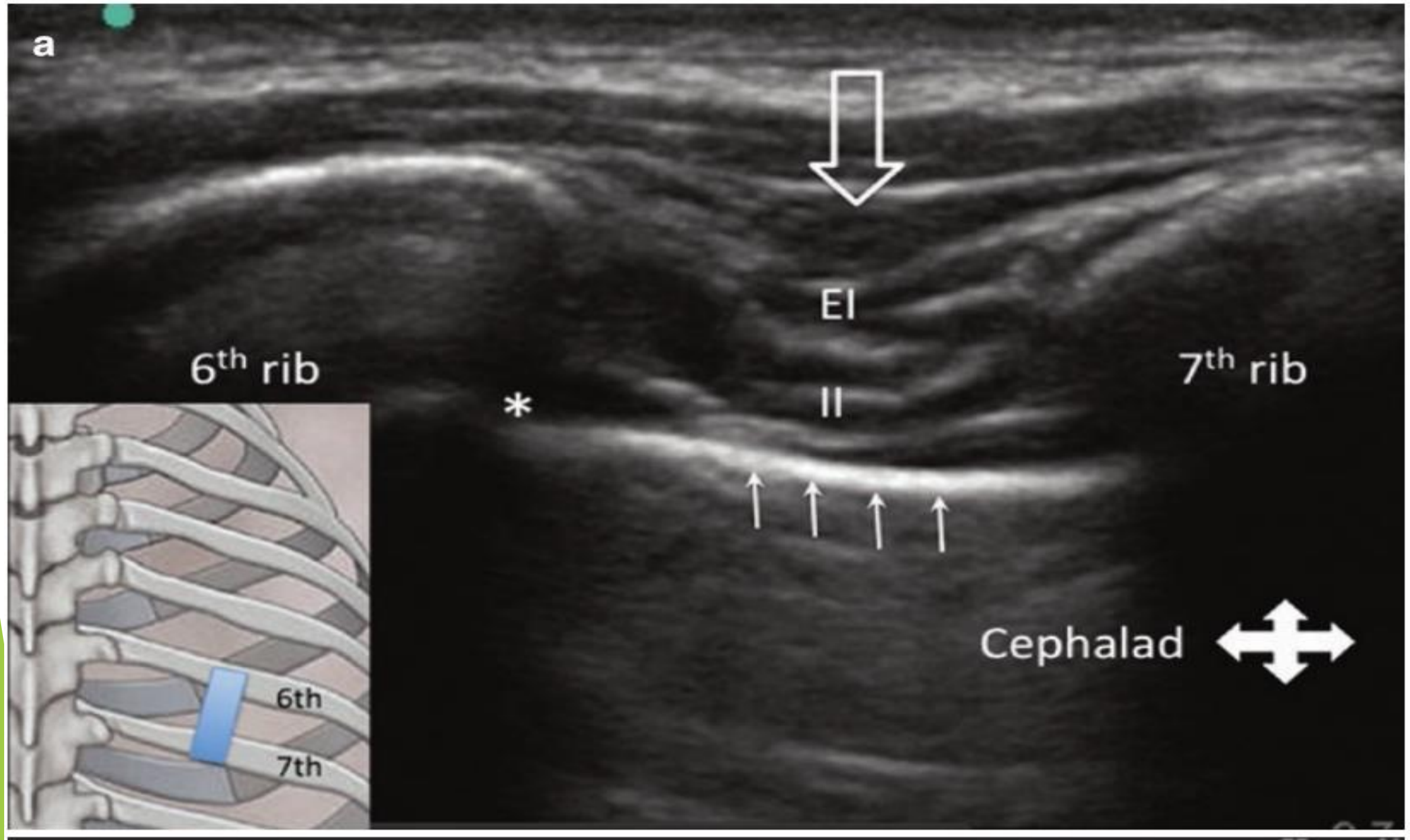


Table 5.1 Indications for intercostal nerve blocks

Indications	Intercostal nerve block mechanism
Diagnostic nerve block	Initial single-injection block to determine efficacy of temporary pain relief. A subsequent neurolytic block, cryoablation, radiofrequency ablation, or chemical neurolysis is then performed to relieve pain for an extended period.
Chest wall surgery	Relieves pain after upper abdominal or flank surgery
Chest wall trauma	Controls pain resulting from fractured ribs and other chest wall trauma
Shingles or postherpetic neuralgia	Acute herpes zoster infection results in inflammation of the intercostal nerves and dorsal root ganglion.
Chronic conditions	Manages pain associated with chest wall tumors, nerve entrapment syndromes, thoracic spine pain, and intercostal neuralgia


Trapezius
ESP
Intercostal membrane
Intercostal nerve and vessels
Pleura
EIM
IIM
IMIM
Colateral intercostal nerve
A
B
NYSORA

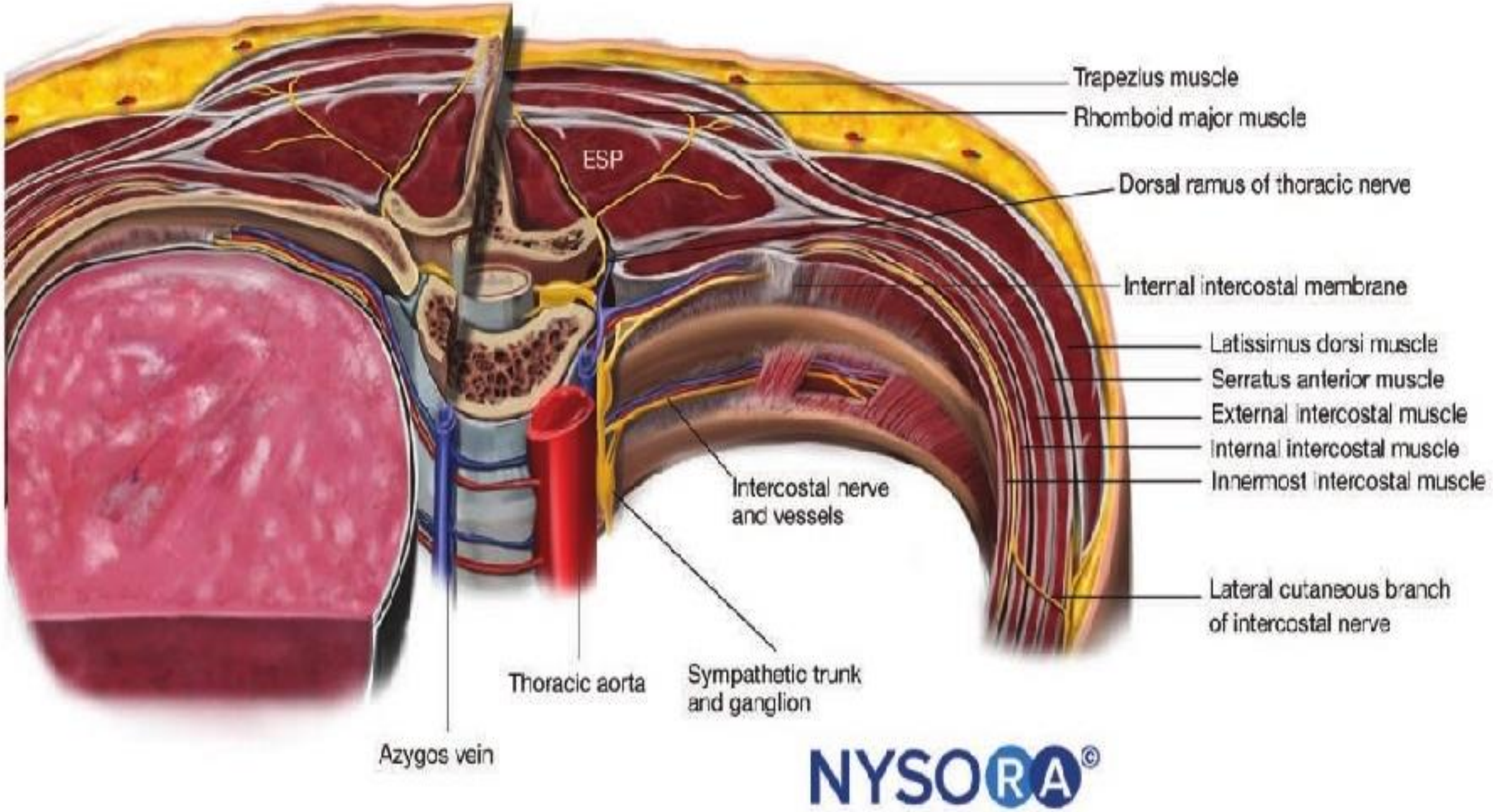

a
EI
6th rib
7th rib
*
II
Cephalad
6th
7th

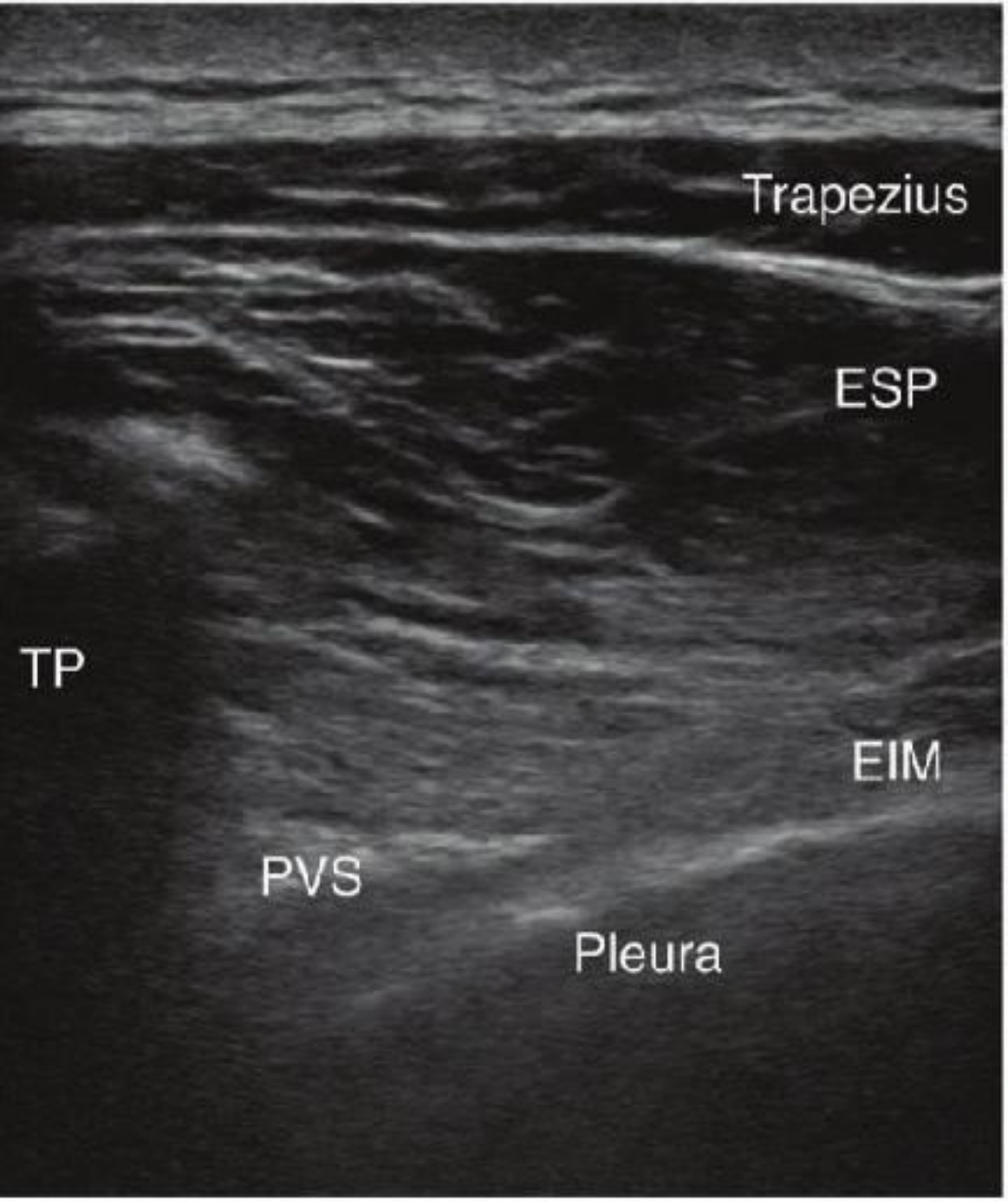
Paravertebral Block

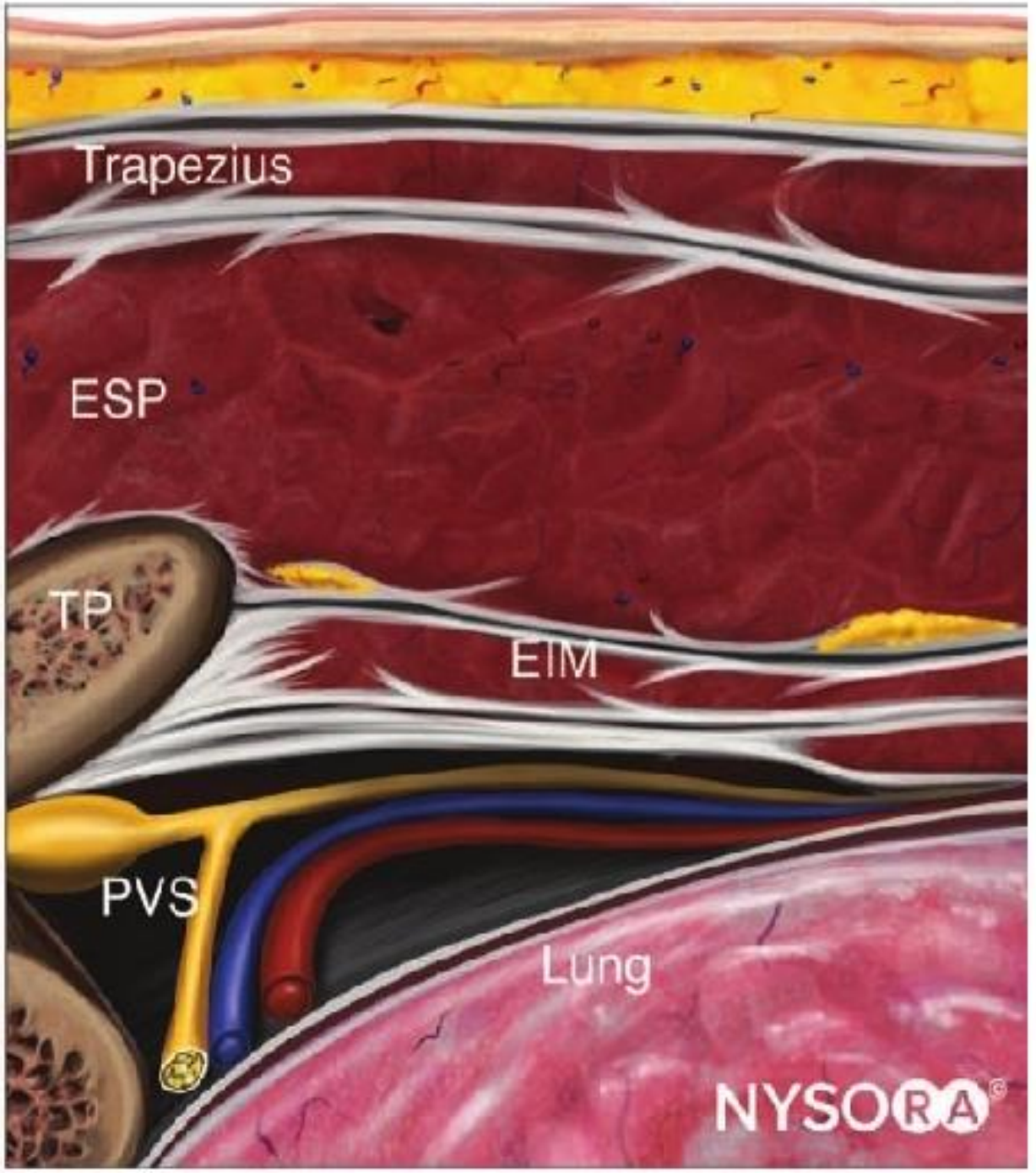
I • Indications: Analgesia after thoracic and breast surgery, rib fractures, and procedures involving the thoracic and upper abdominal wall

• Goal: Spread of local anesthetic into the paravertebral space around the spinal nerves as they arise from the intervertebral foramen

• Local anesthetic volume: 4 to 5 mL per space to be blocked


Trapezius muscle
Rhomboid major muscle
ESP
Dorsal ramus of thoracic nerve
Internal intercostal membrane
Latissimus dorsi muscle
Serratus anterior muscle
External intercostal muscle
Internal intercostal muscle
Innermost intercostal muscle
Intercostal nerve and vessels
Lateral cutaneous branch of intercostal nerve
Thoracic aorta
Sympathetic trunk and ganglion
Azygos vein
NYSORA©


Trapezius
ESP
TP
EIM
PVS
Pleura


Trapezius
ESP
TP
EIM
PVS
Lung
NYSORA

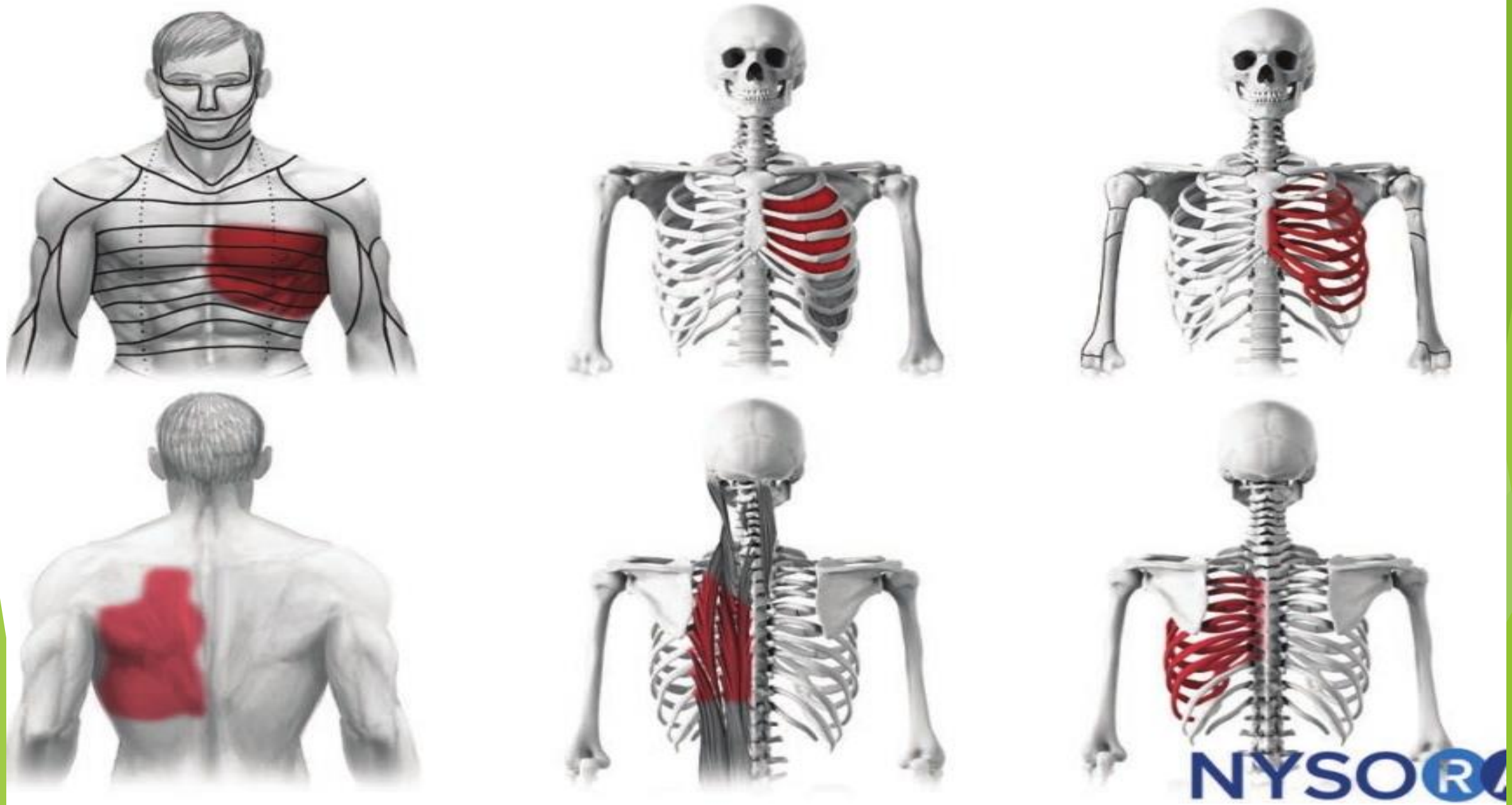
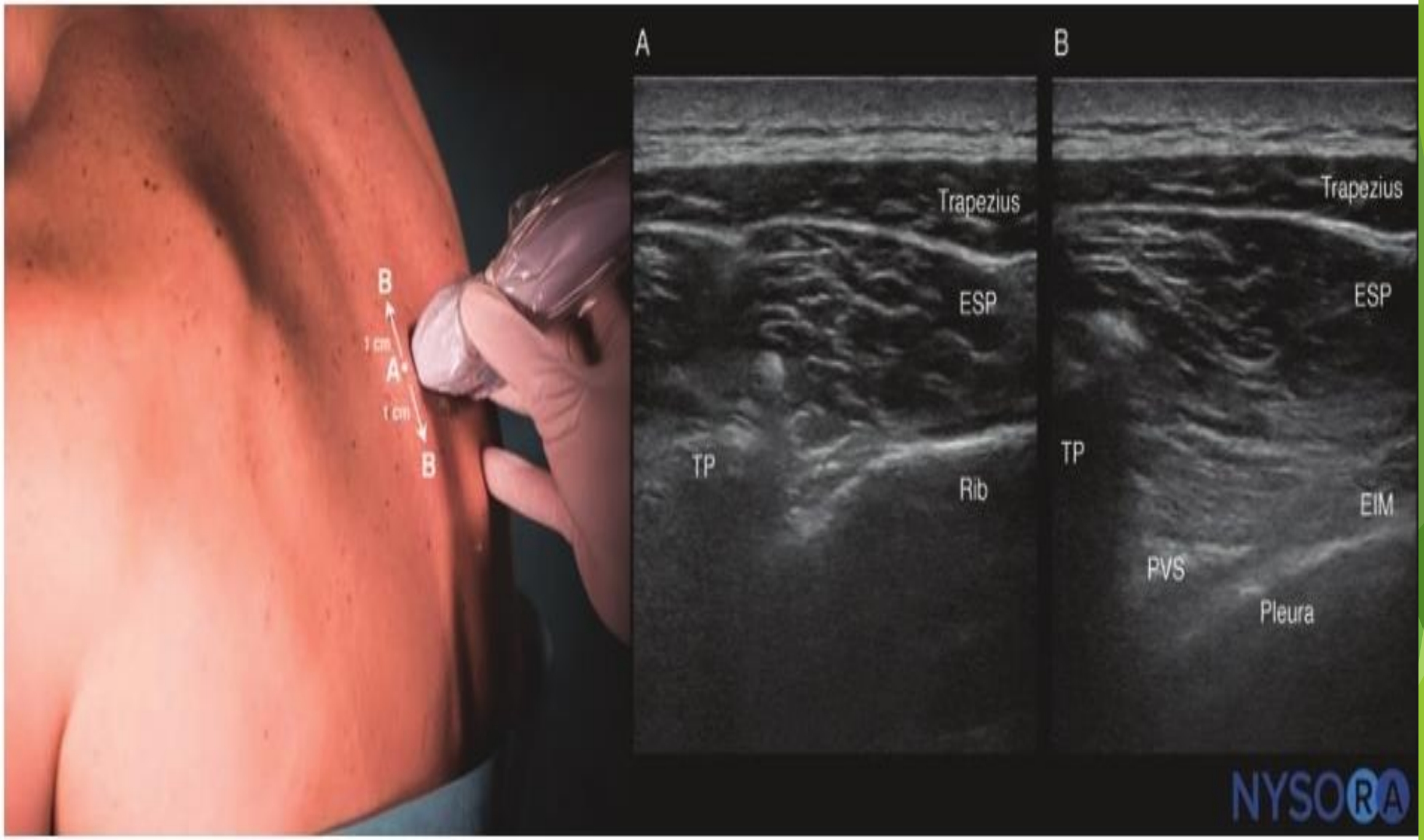
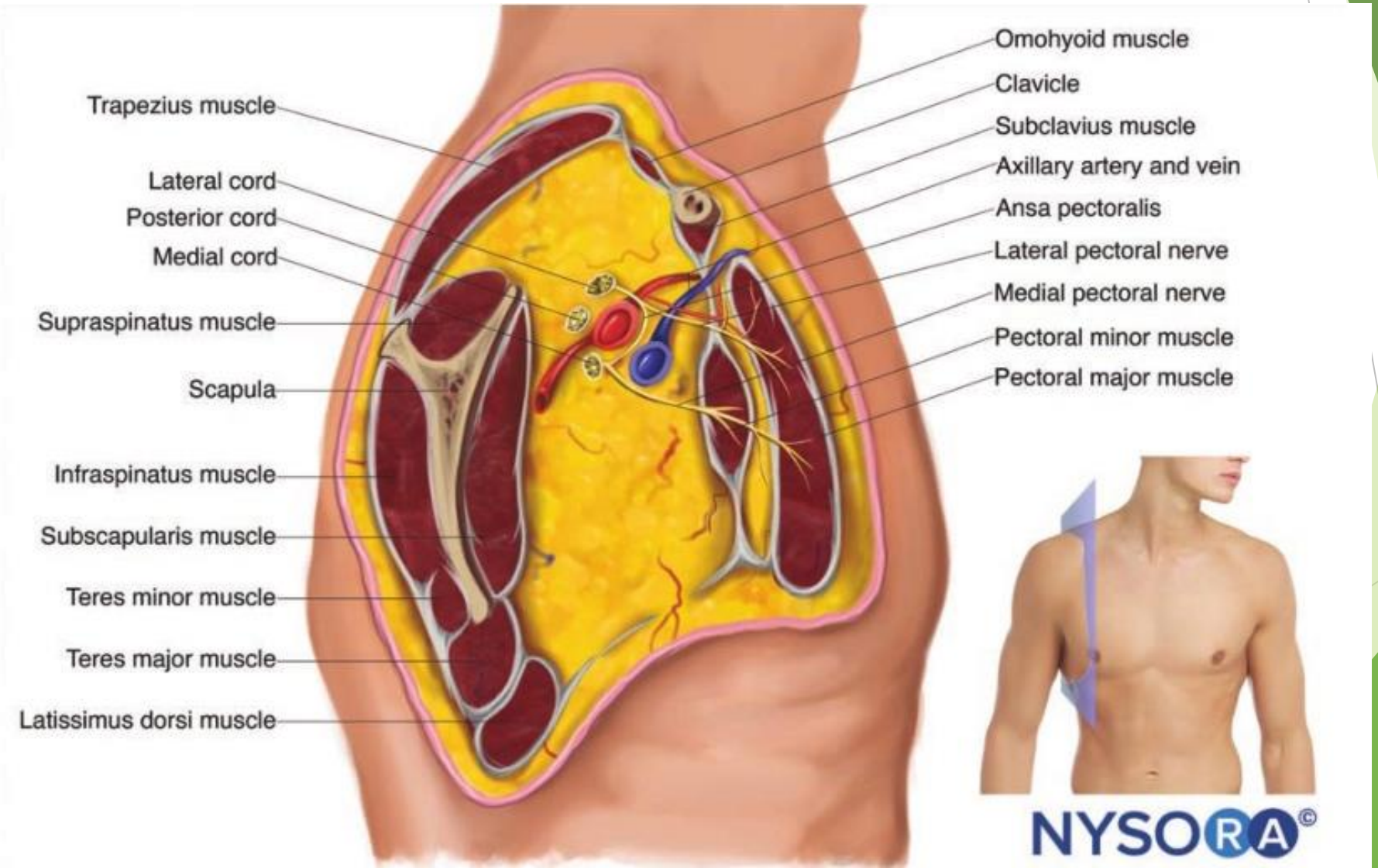


FIGURE 36-3. Distribution of anesthesia after a paravertebral block.


B
1 cm
A
1 cm
B
A
Trapezius
ESP
TP
Rib
B
Trapezius
ESP
TP
EIM
PVS
Pleura
NYSORA


Trapezius
ESP
TP
EIM
PVS
Lung
NYSORA

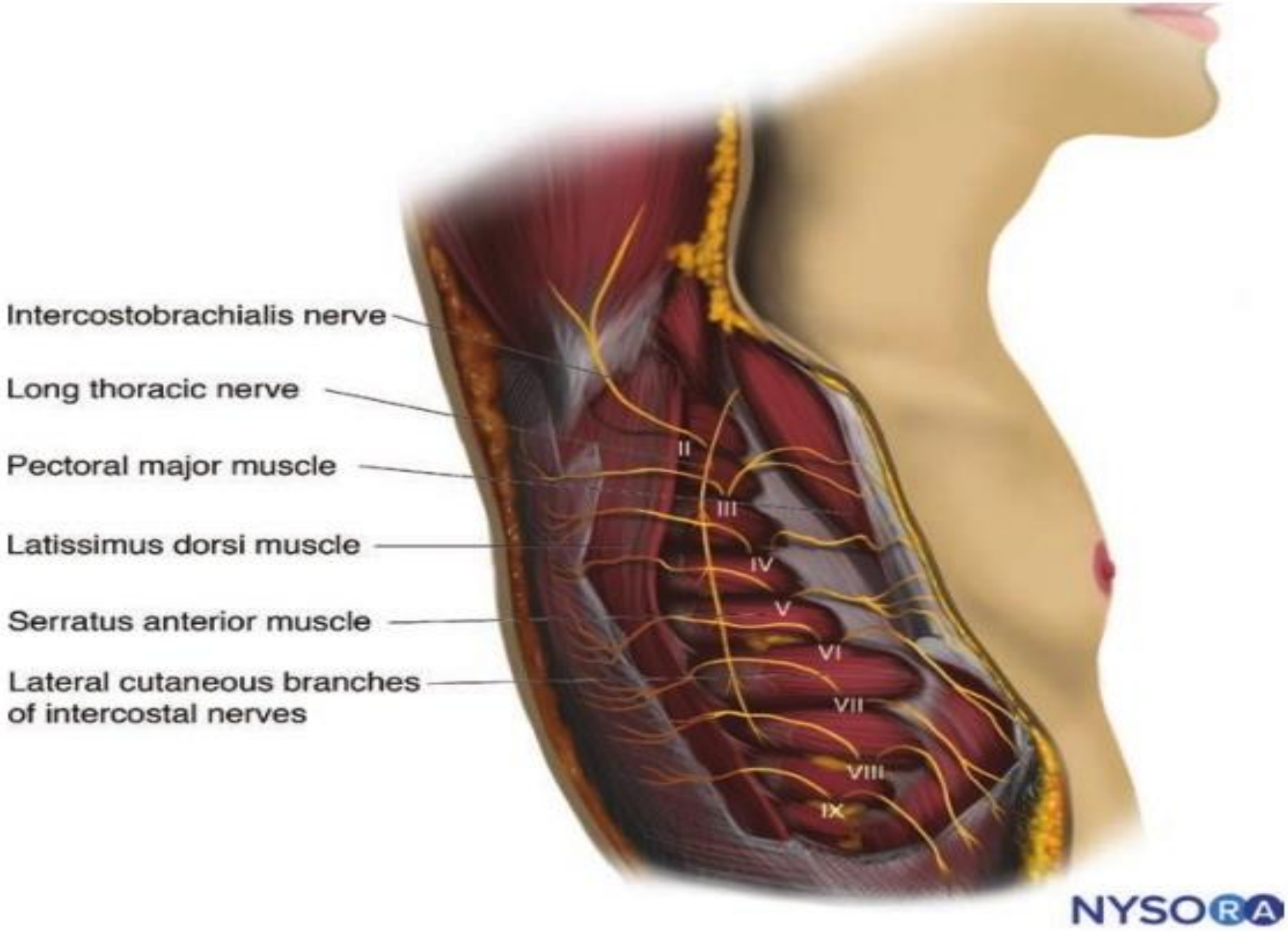
Pectoral Nerves Block



Injection of local anesthetic (LA) into the fascial plane between the pectoral muscles and between the pectoralis minor and serratus anterior muscles.

- **Indications**: Analgesia after breast surgery, thoracotomy, rib and clavicle fractures, and herpes zoster neuralgia
- **Goal**: LA spread along the interfascial planes to block the pectoral nerves and lateral branches of the intercostal nerves T3-T6 •

Local anesthetic volume: 15 to 30 mL


Intercostobrachialis nerve
Long thoracic nerve
Pectoral major muscle
Latissimus dorsi muscle
Serratus anterior muscle
Lateral cutaneous branches of intercostal nerves
II
III
IV
V
VI
VII
VIII
IX
NYSORA

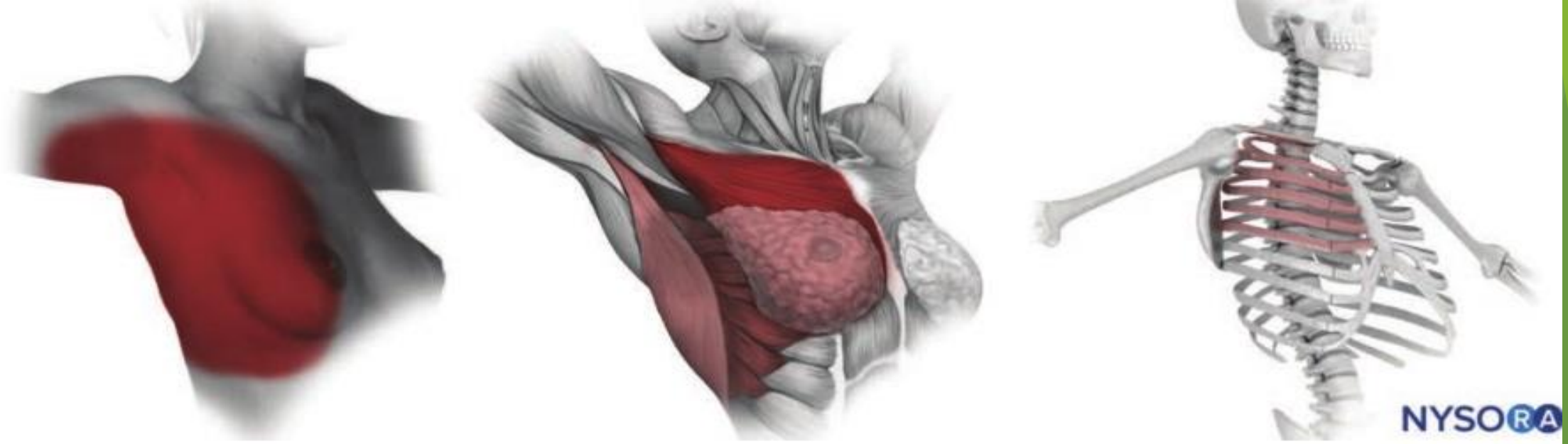


FIGURE 34-4. From left to right: dermatomes, myotomes, and osteotomes covered by a pectoralis block.

FIGURE 34-5. Patient position to perform a Pecs block.

FIGURE 34-6. Transducer position and sonoanatomy to perform a Pecs block.

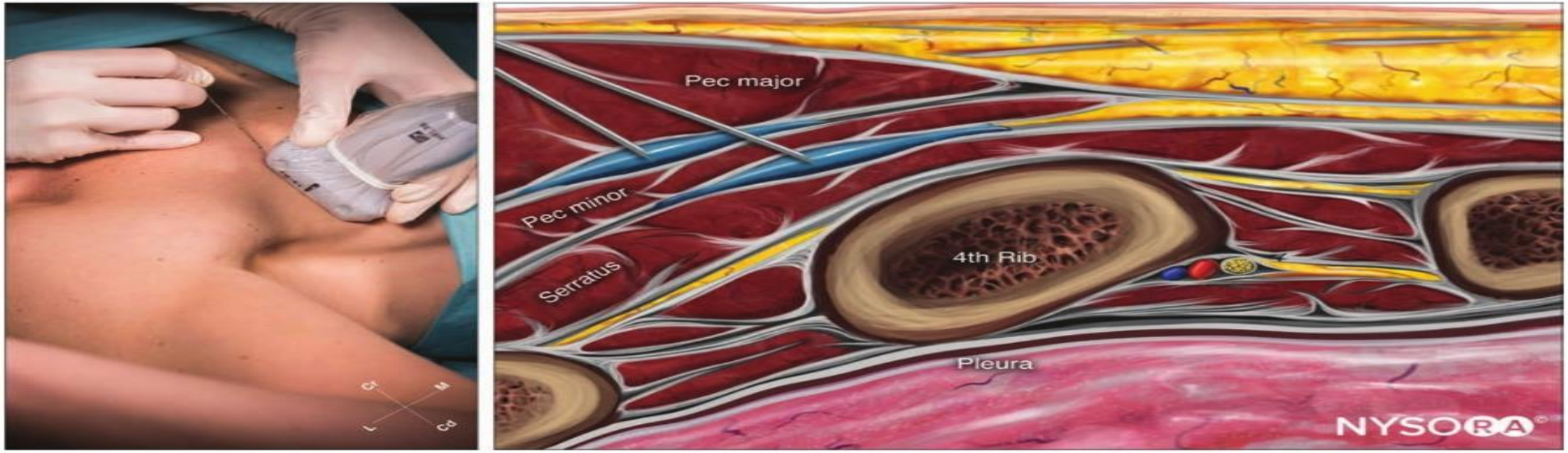


FIGURE 34-7. Pecs block; reverse ultrasound anatomy showing needle insertion in-plane.

Serratus Plane Block

Interfascial plane injection of local anesthetic (LA) either deep or superficial to the serratus anterior muscle at the level of the third-sixth ribs. •

Indications: Analgesia after breast surgery, thoracoscopy, rib fractures, and procedures requiring lateral or anterior thoracic wall incisions •

Goal: Spread of LA under the superficial or deep fascia of the serratus anterior muscle to block the lateral branches of the intercostal nerves III to VI •

Local anesthetic volume: 15 to 20 mL

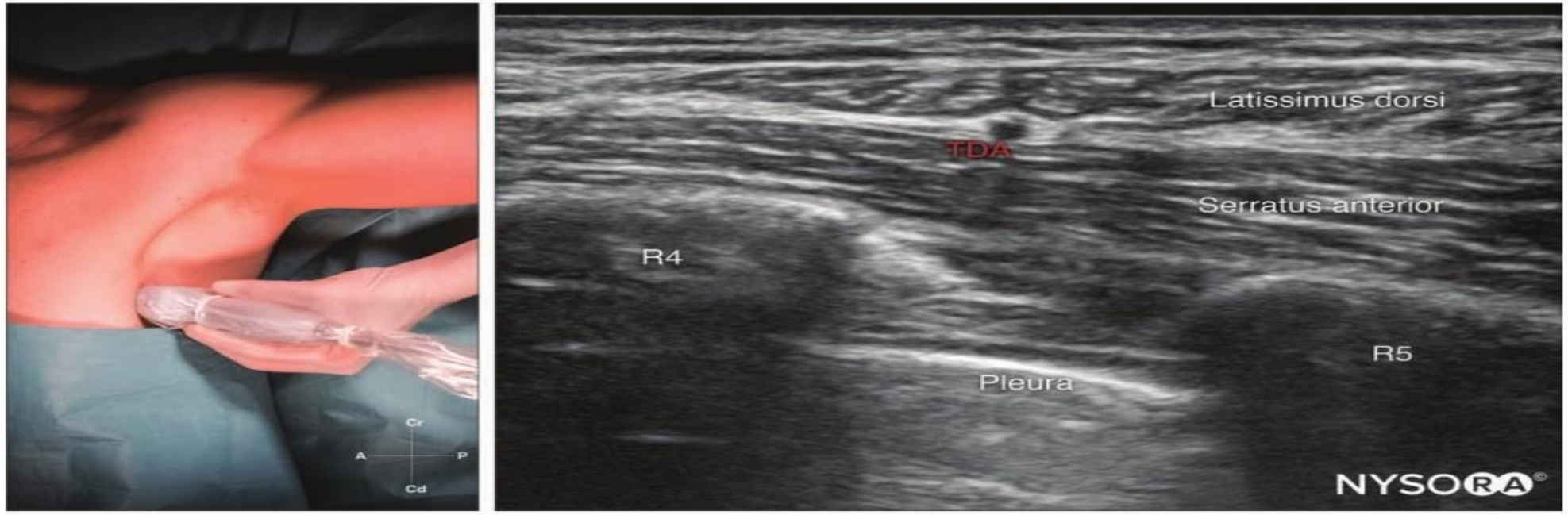
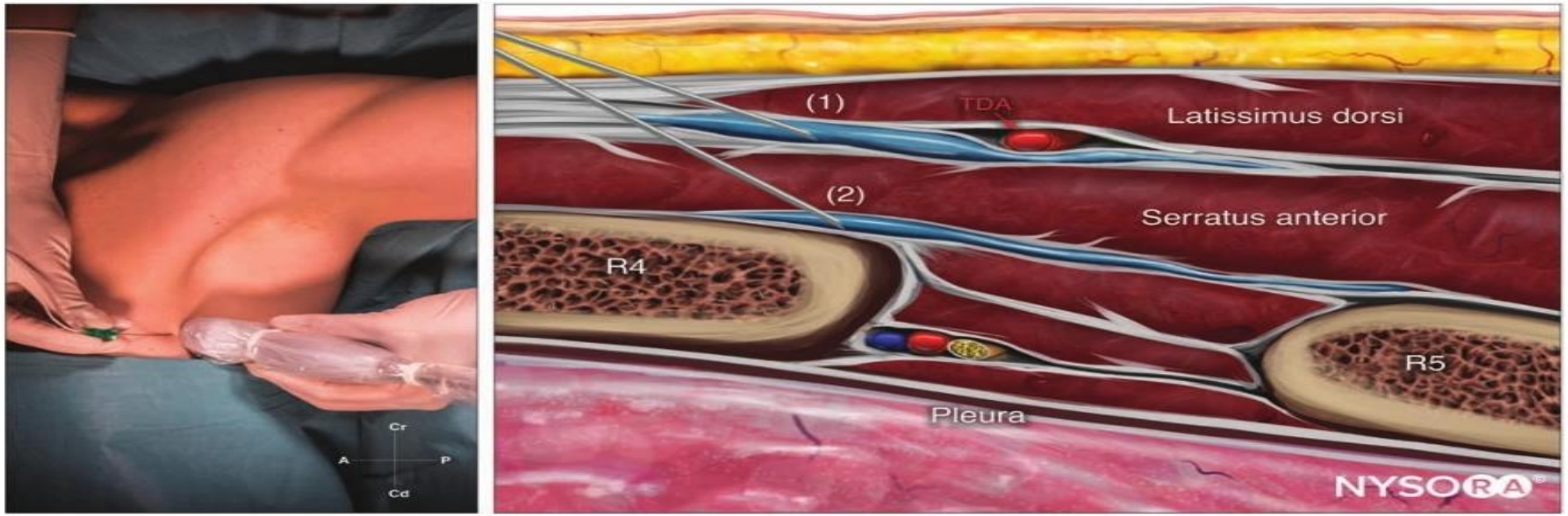


FIGURE 35-5. Transducer position and sonoanatomy for a serratus anterior plane block. TDA, thoracodorsal artery.



Erector Spinae Plane Block (ESP Block)

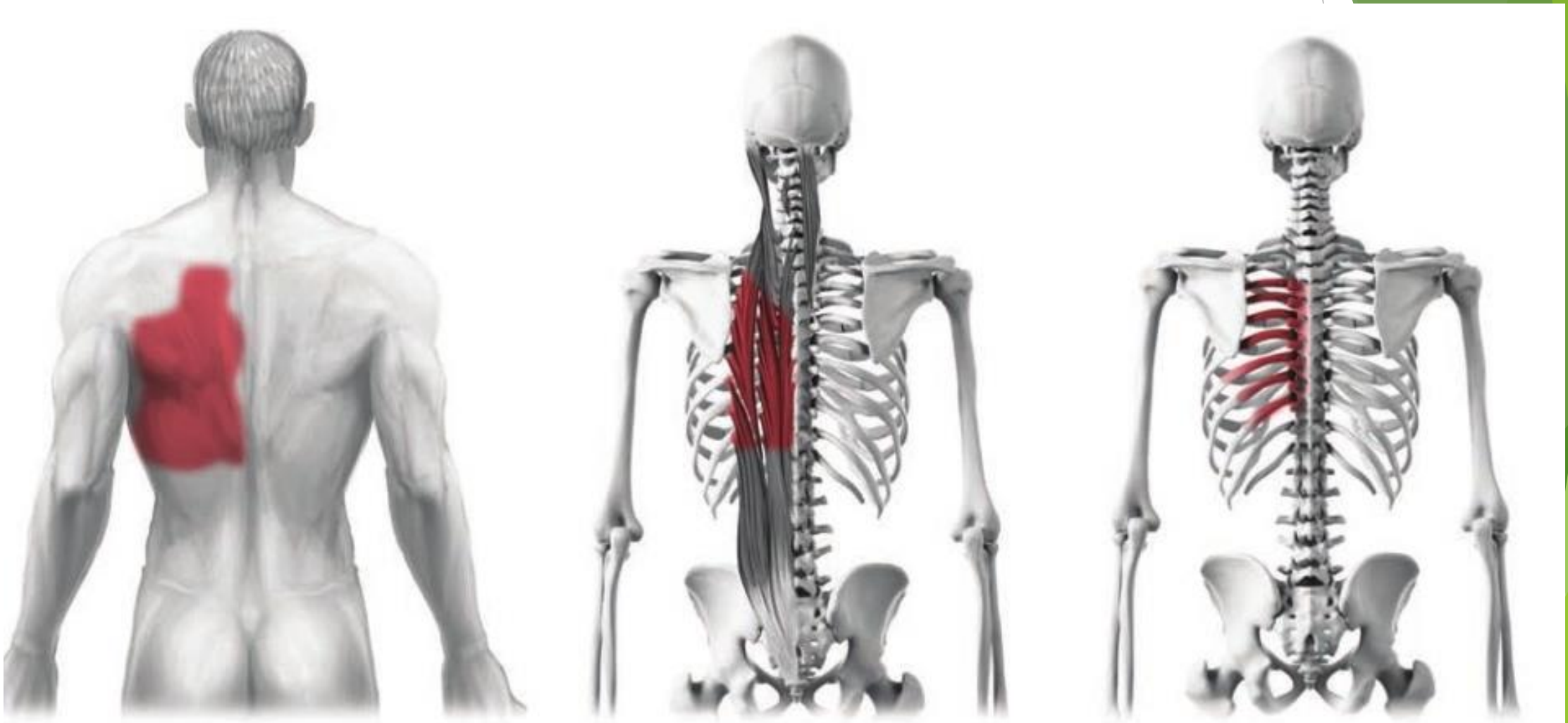
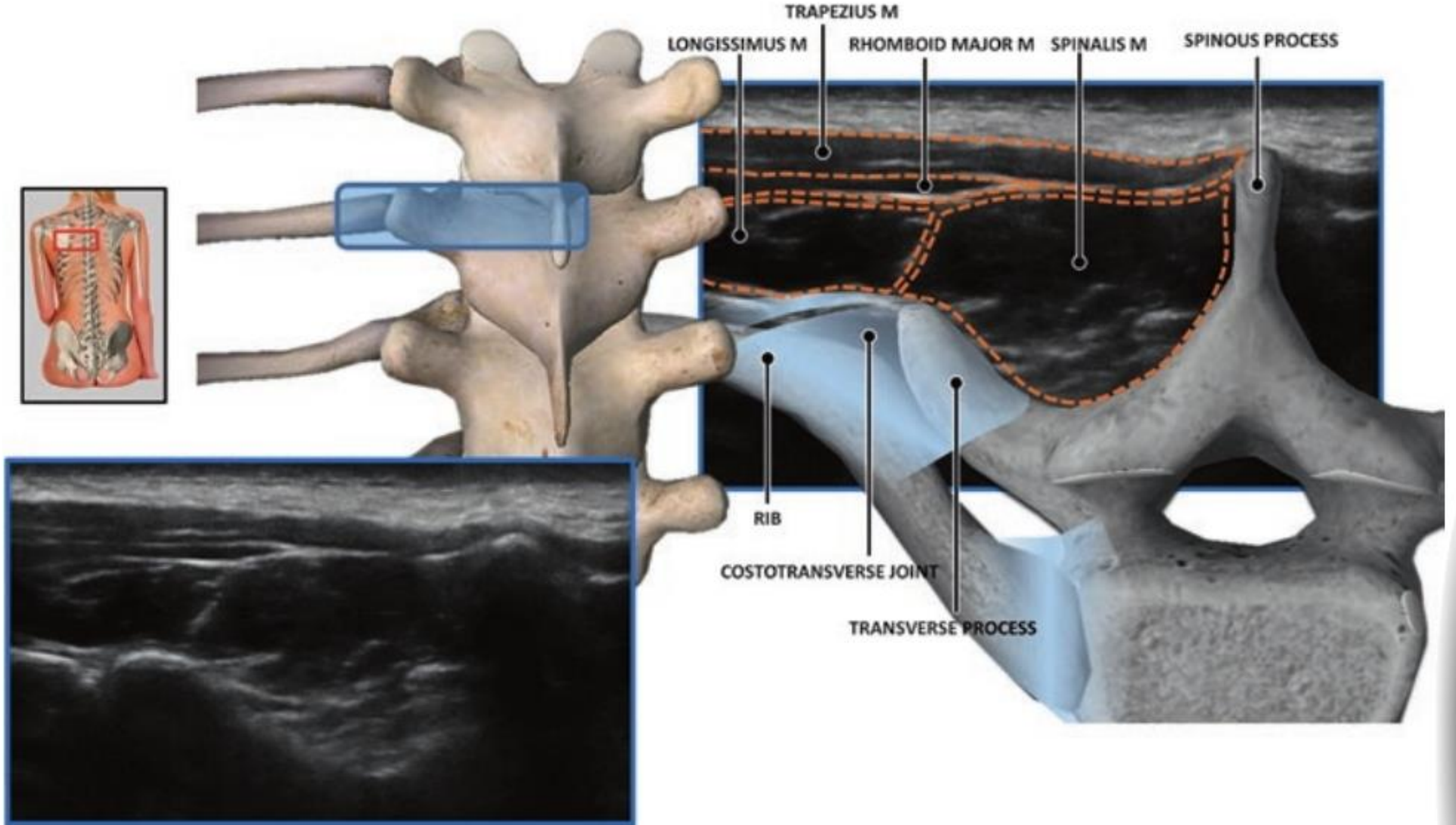
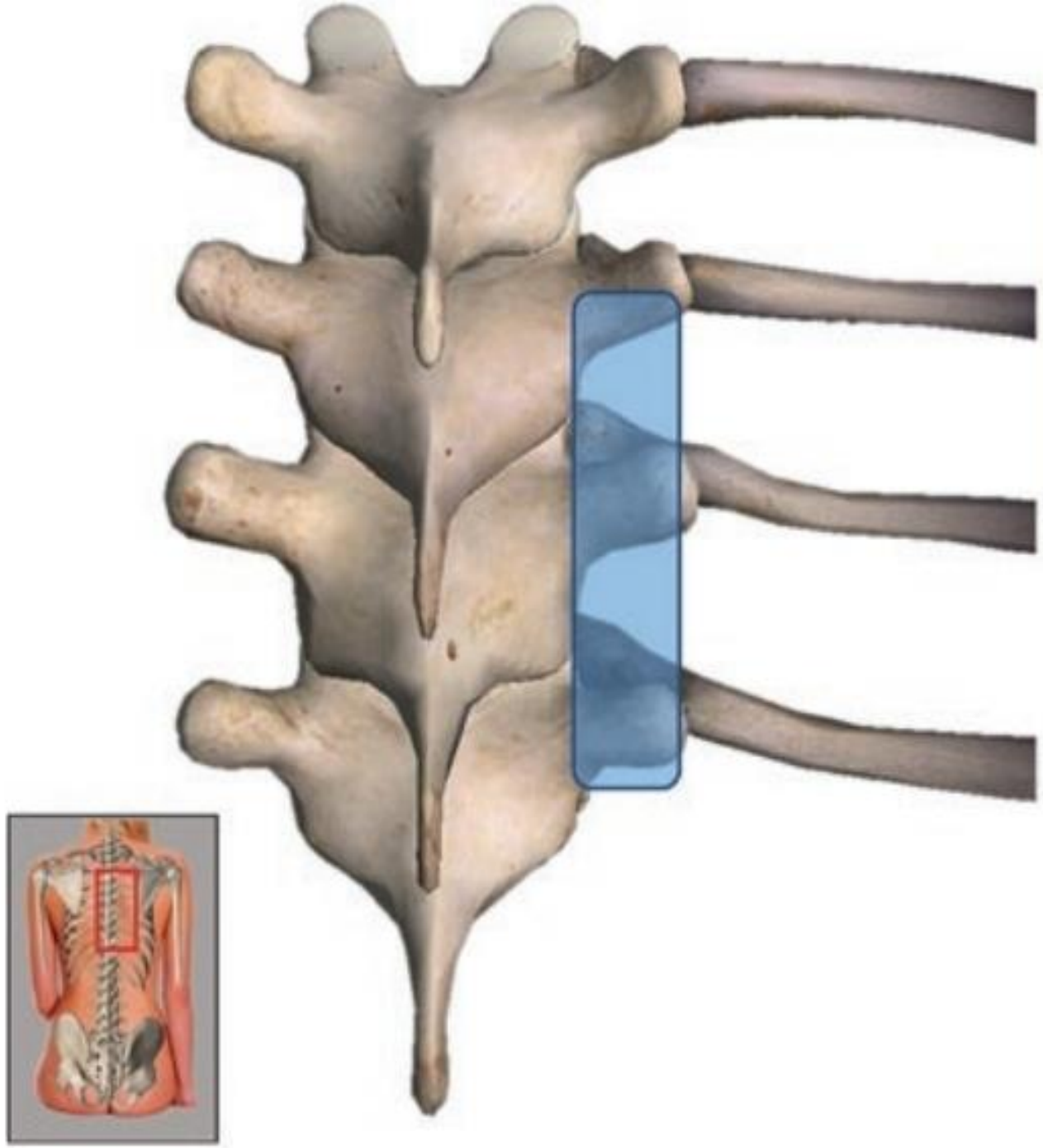
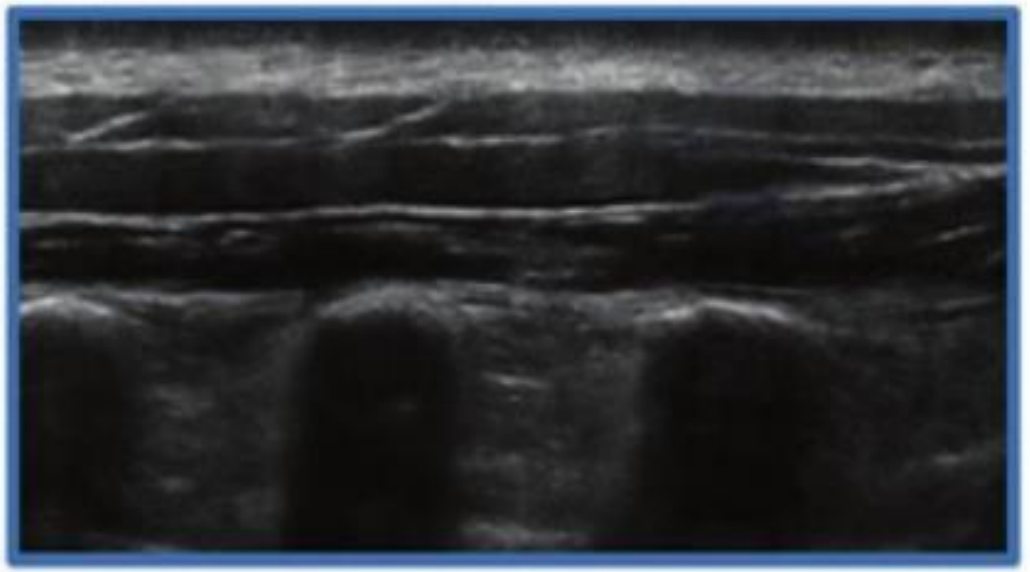


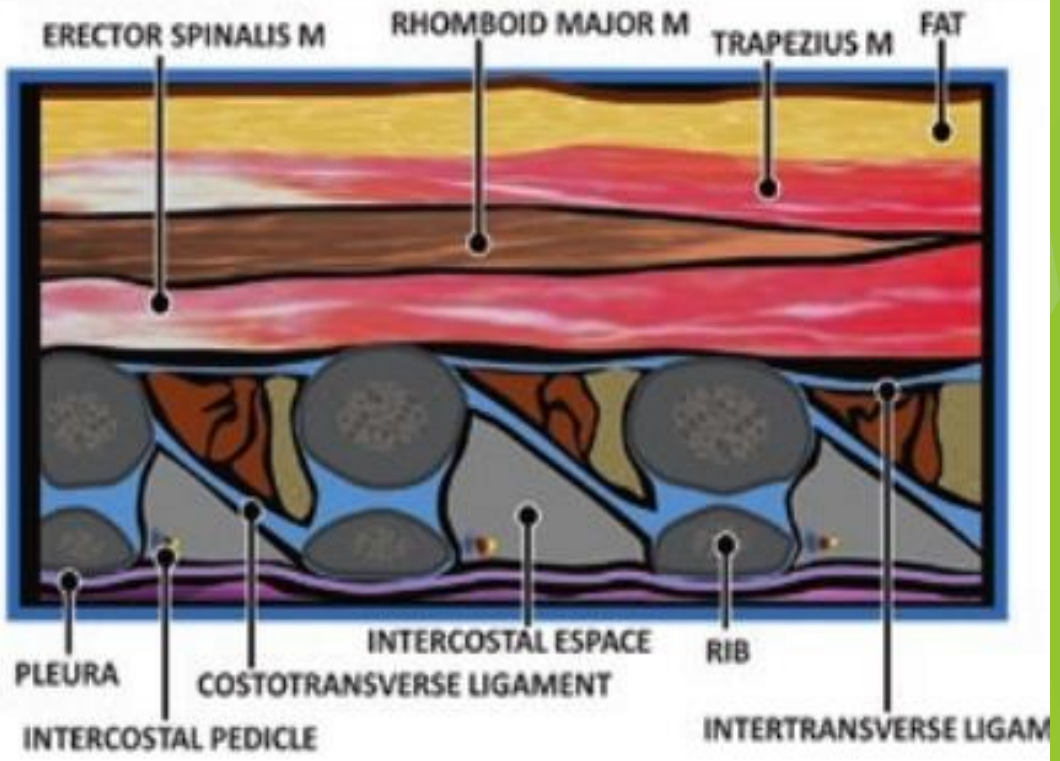
Table 11.1 Area of blockade for erector spinae plane block in different surgeries

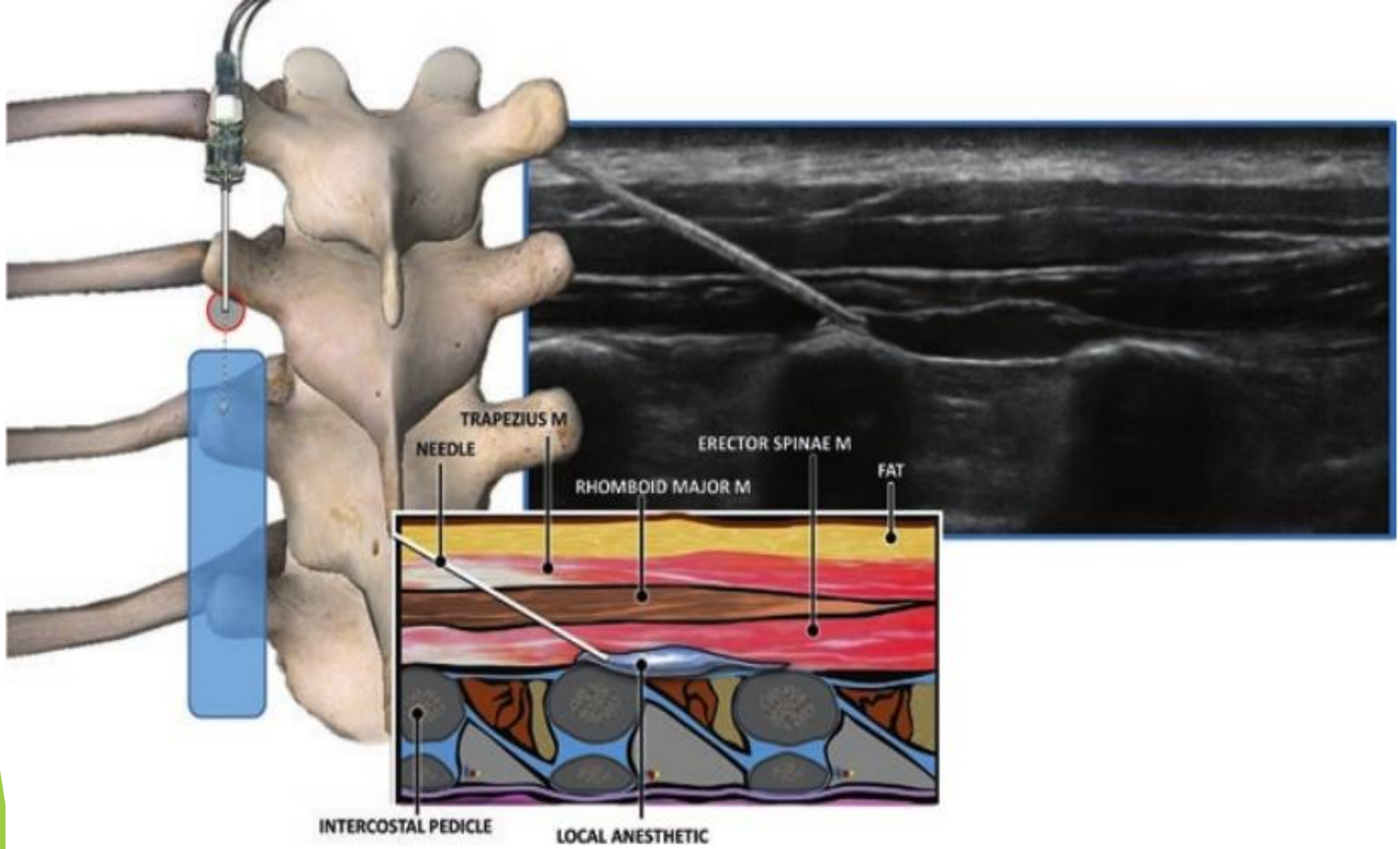
Spine region	Indications	Catheter after single shot	Single shot volume
High thoracic T2 or T3	Chronic shoulder pain syndrome	Unilateral	20 cc
	Post-surgical shoulder pain	Unilateral	
Mid thoracic T4 to T6	Rib fracture (midpoint of level of ribs fracture)	Unilateral or bilateral	20 cc
	Open thoracotomy and Vats lobectomy(T5)	Unilateral	
	Rescue after TE failure for thoracic surgery(T5)	Unilateral	
	Cardiac surgery – sternotomy (T5)	Bilateral	
	Breast surgery with axillary lymph node dissections (T3)	Unilateral	
	Chronic post-herpetic neuralgia (level of segments involved)	Unilateral	
	Chronic post-thoracotomy pain (level of segments involved)	Unilateral	
	Metastatic ribs cancer (level of segments involved)	Unilateral	


TRAPEZIUS M
LONGISSIMUS M
RHOMBOID MAJOR M
SPINALIS M
SPINOUS PROCESS
RIB
COSTOTRANSVERSE JOINT
TRANSVERSE PROCESS






ERECTOR SPINALIS M
RHOMBOID MAJOR M
TRAPEZIUS M
FAT
PLEURA
INTERCOSTAL PEDICLE
COSTOTRANSVERSE LIGAMENT
INTERCOSTAL ESPACE
RIB
INTERTRANSVERSE LIGAM


TRAPEZIUS M
NEEDLE
ERECTOR SPINAE M
FAT
RHOMBOID MAJOR M
INTERCOSTAL PEDICLE
LOCAL ANESTHETIC

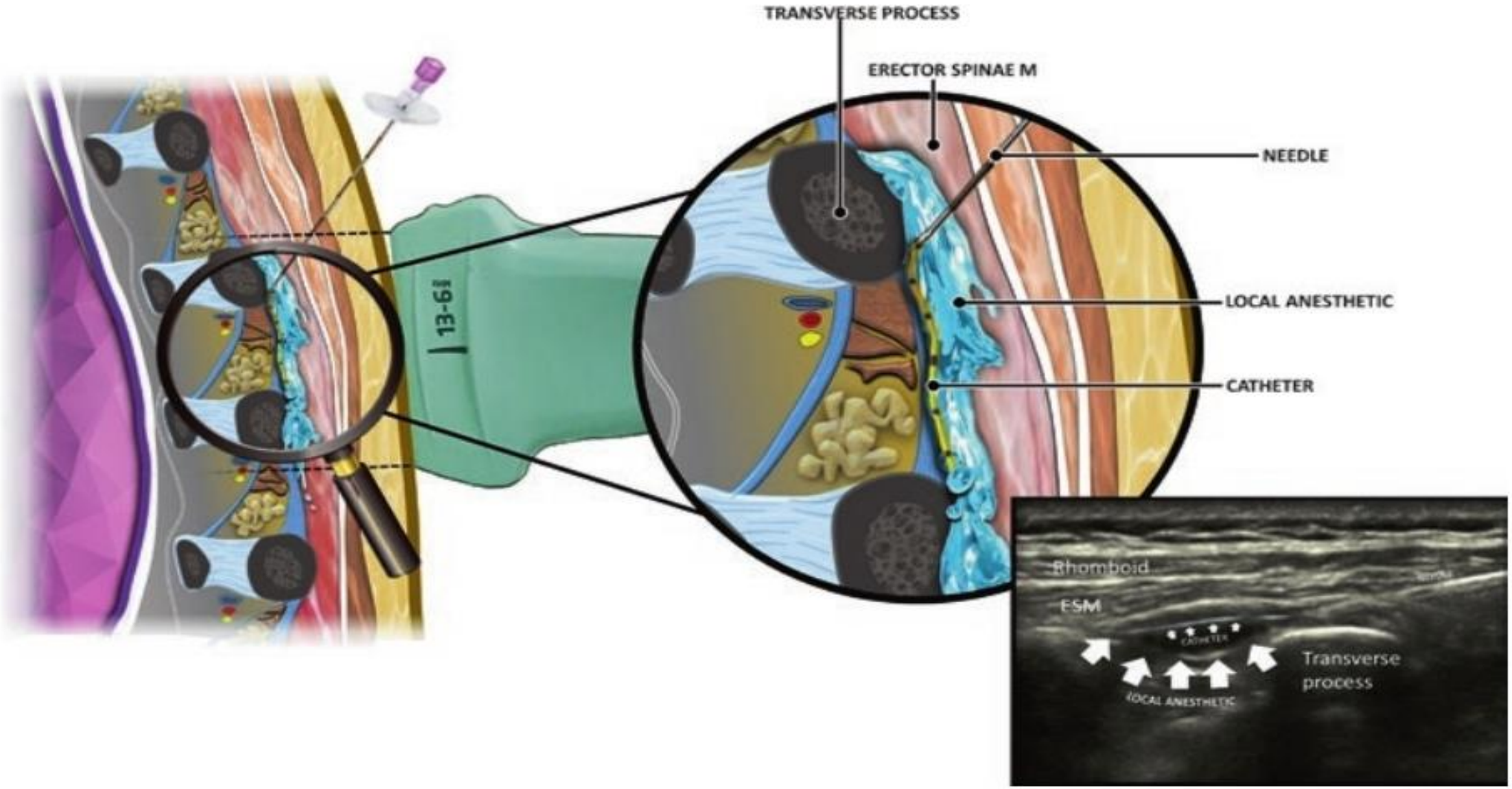
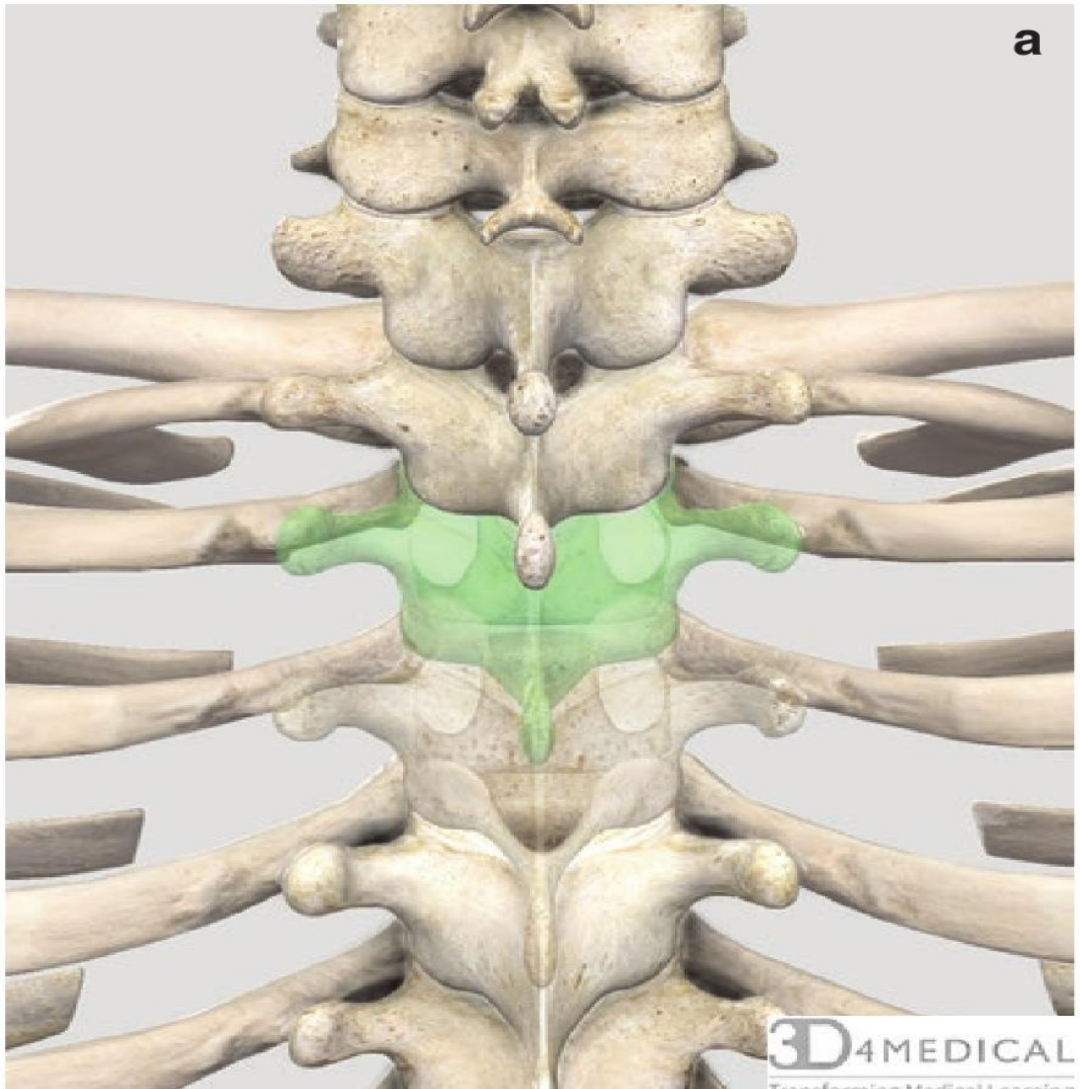
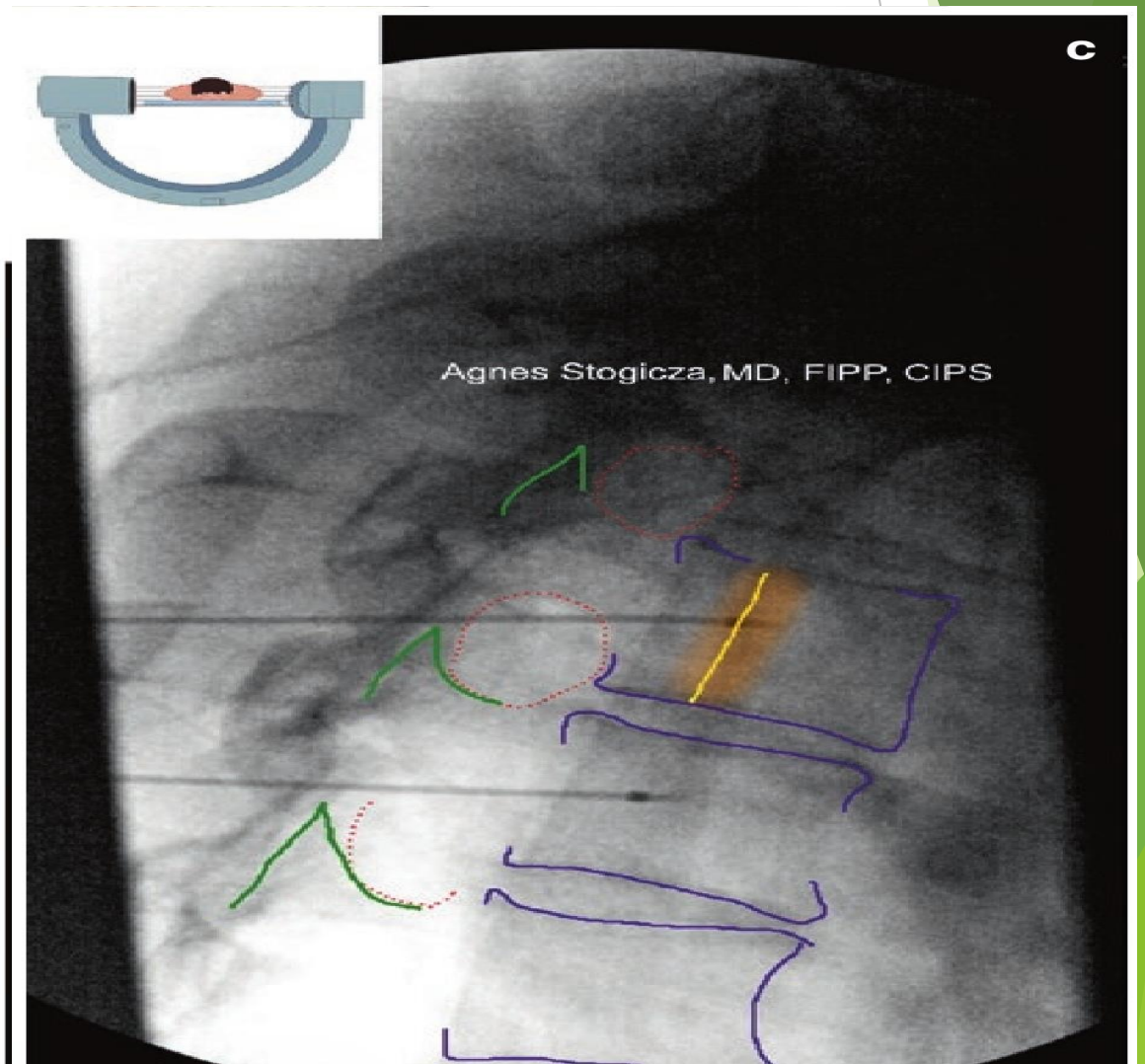
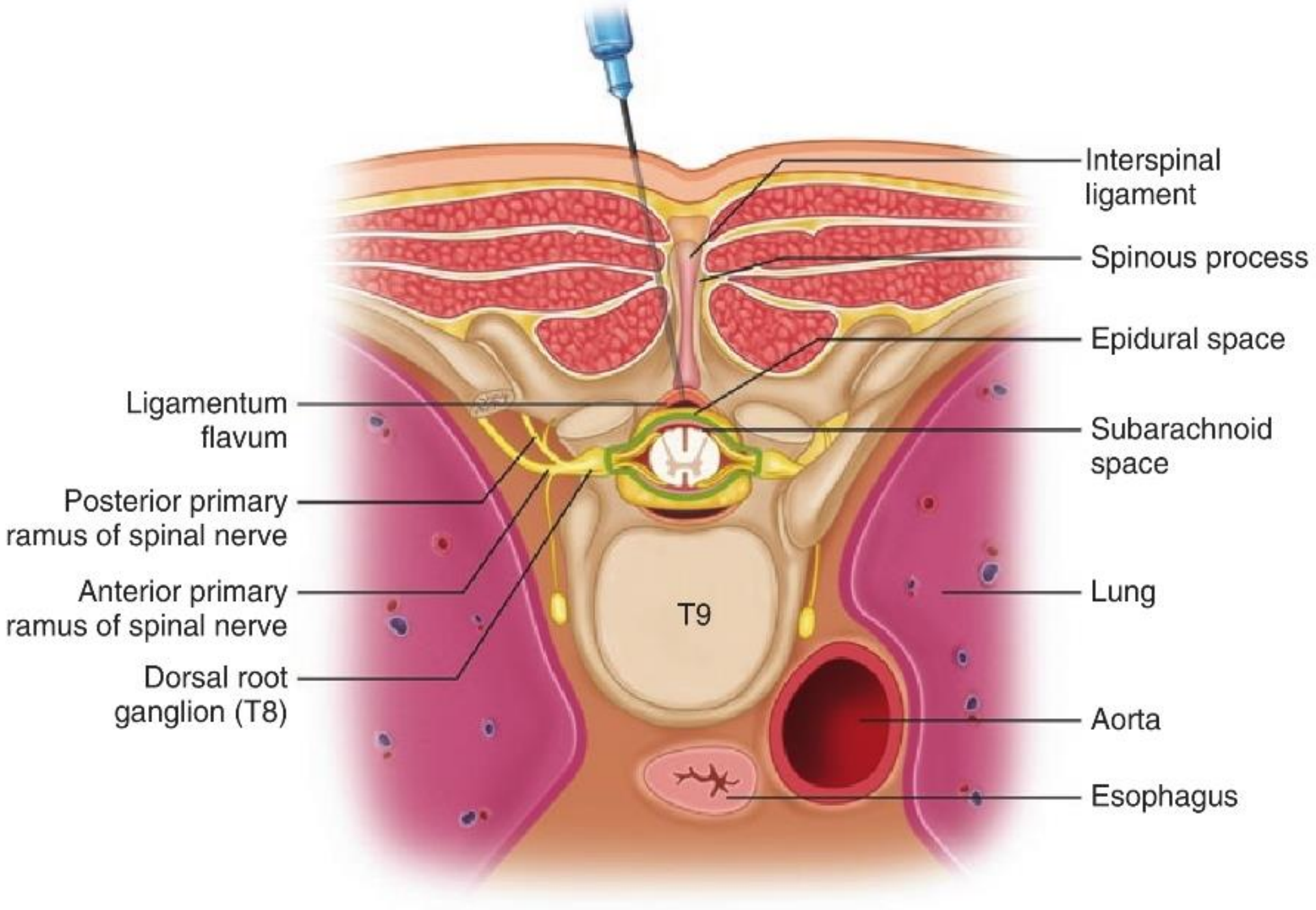


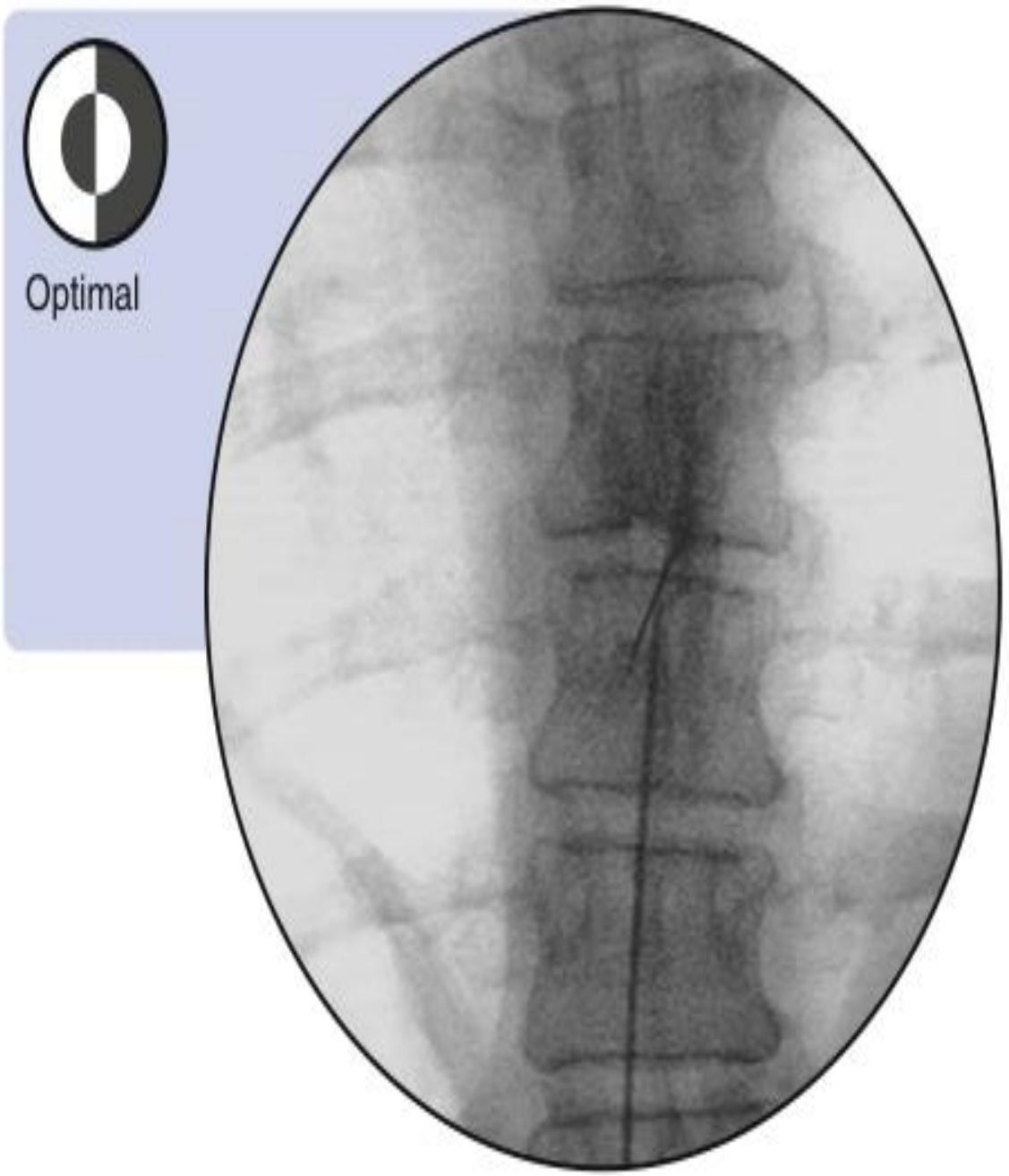
Fig. 11.14 Catheter insertion in ESP. (Reprinted with permission from Dr. Vicente Roques from imedar.com)

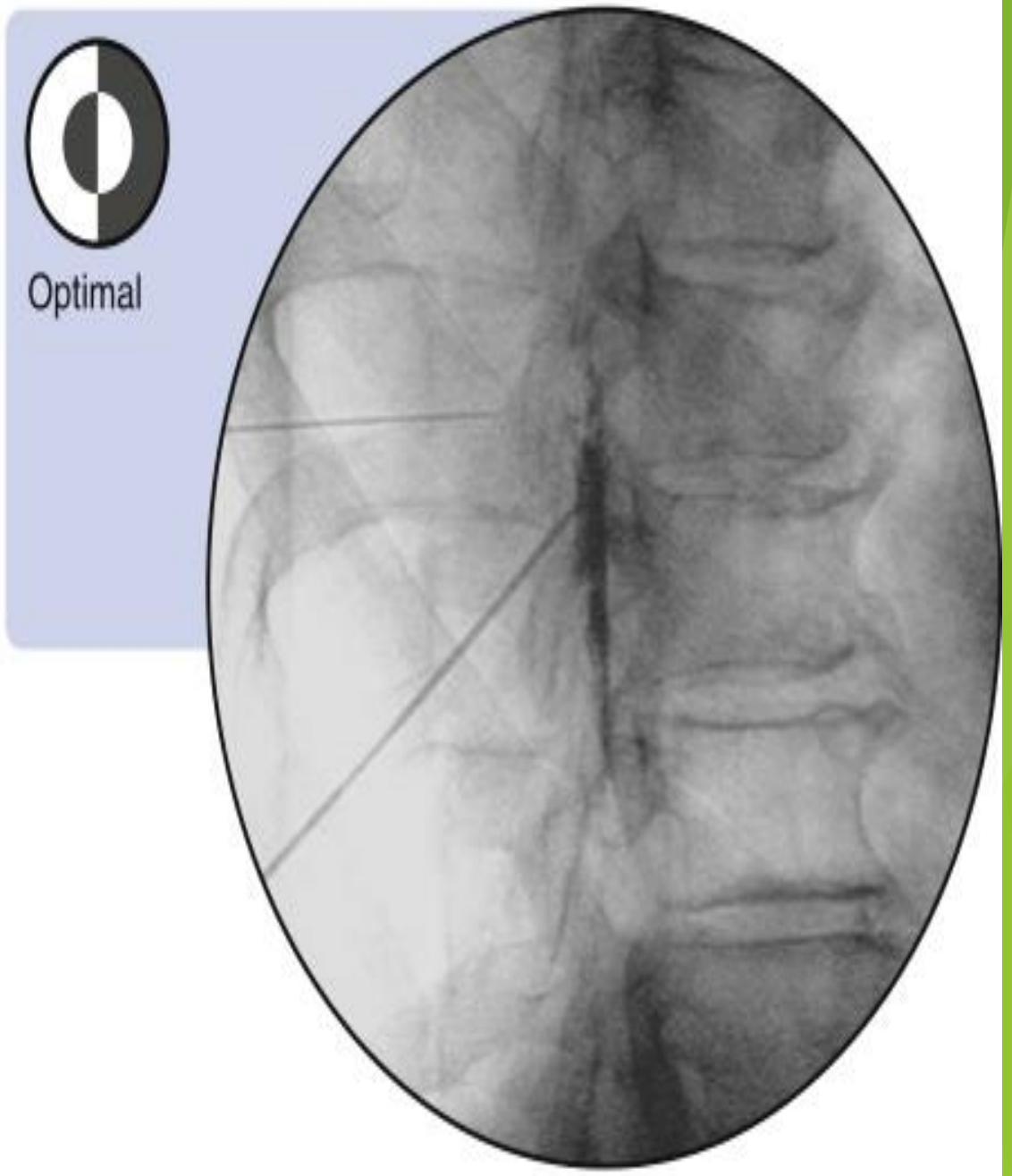
Thoracic Sympathetic Block and Radiofrequency Ablation

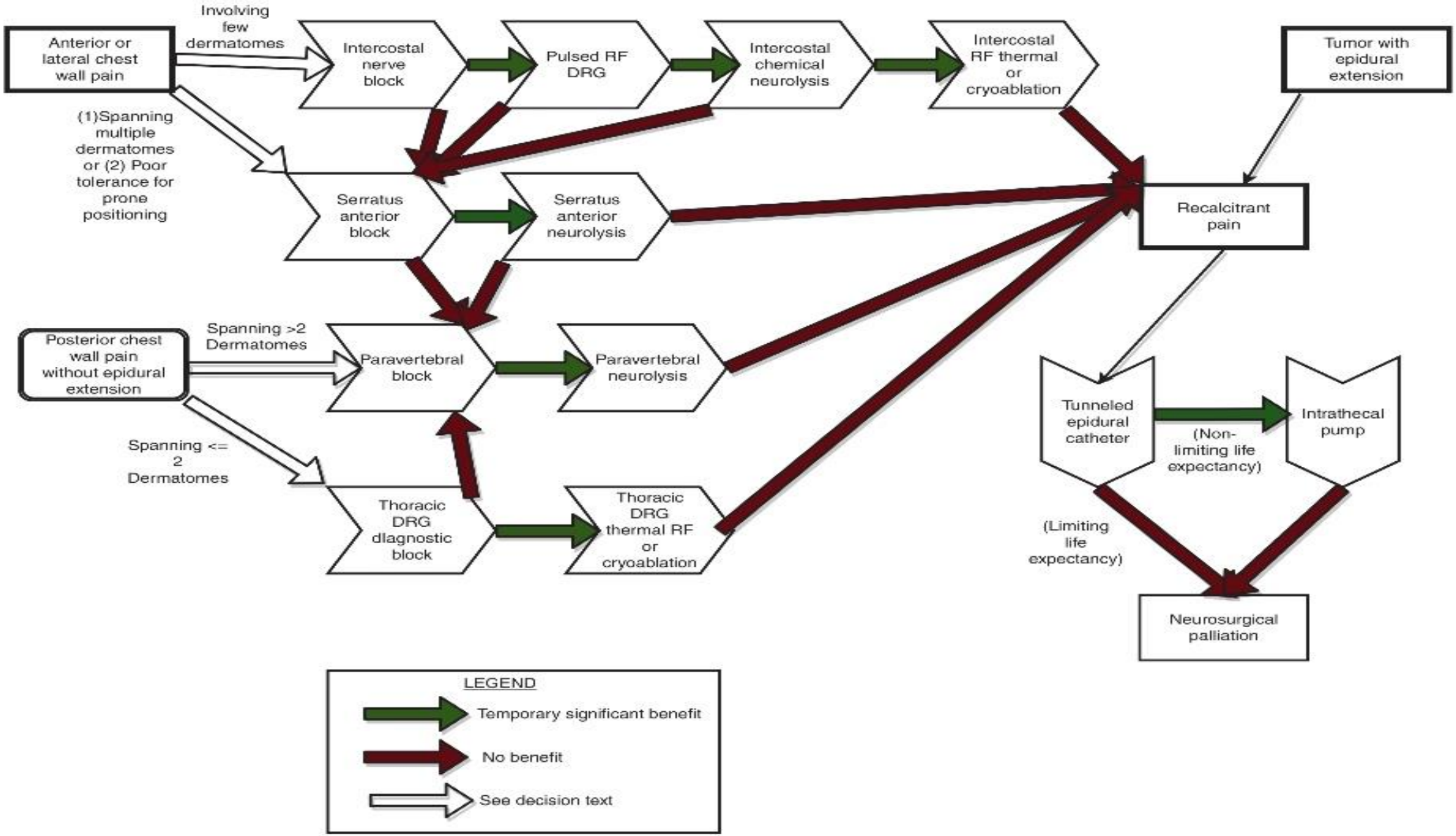





Interspinal ligament
Spinous process
Epidural space
Ligamentum flavum
Subarachnoid space
Posterior primary ramus of spinal nerve
Anterior primary ramus of spinal nerve
Dorsal root ganglion (T8)
T9
Lung
Aorta
Esophagus


Optimal


Optimal


Anterior or lateral chest wall pain
Involving few dermatomes
Intercostal nerve block
Pulsed RF DRG
Intercostal chemical neurolysis
Intercostal RF thermal or cryoablation
Tumor with epidural extension
(1)Spanning multiple dermatomes or (2) Poor tolerance for prone positioning
Serratus anterior block
Serratus anterior neurolysis
Recalcitrant pain
Posterior chest wall pain without epidural extension
Spanning >2 Dermatomes
Paravertebral block
Paravertebral neurolysis
Tunneled epidural catheter
(Non-limiting life expectancy)
Intrathecal pump
Spanning <= 2 Dermatomes
Thoracic DRG dlagnostic block
Thoracic DRG thermal RF or cryoablation
(Limiting life expectancy)
Neurosurgical palliation
LEGEND
Temporary significant benefit
No benefit
See decision text


شكراً لاصغائكم
Zhang Zhang