

# Ultrasound guided erector spinae plane block in thoracic trauma

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## I. INTRODUCTION

Acute pain is a common occurrence on any intensive care unit as a result of trauma and major emergency surgery. In elective cases continuous neuraxial blocks are a cornerstone of multimodal analgesia. In an emergency setting, the issues of consent, coagulopathies and sepsis often preclude the use of such procedures. Additionally, performing neuraxials blocks in patients that are intubated and sedated is challenging. Neurological complications are also difficult to assess. Uncontrolled pain will increase sedation requirements, the likelihood of respiratory complications and long term morbidity as well as chronic pain. These issues become especially apparent in thoracic trauma and emergency thoracotomy which carry an increased of respiratory failure and persistent pain. We observe promising results with the erector spinae plane block (ESP) which is easy to perform with a steep learning curve.

We present a case of thoracic trauma, in which the ESP has been successfully employed to supplement general anaesthesia and alleviate postoperative pain which resulted in improved respiratory function and mobilisation.

## II. CASE: SERIAL RIB FRACTURE AND PNEUMOTHORAX

We report the case of a 40-year-old male who fell 16ft from a ladder doing yardwork. He presented with a haematopneumothorax and serial dislocated rib fracture (5-9) on the left side. With concurrent atelectasis an emergent VATS was scheduled. His past medical history consists of asthma and heavy smoking. Due to the acute setting of the situation, informed consent for a central neuraxial block was considered insufficient. Out of concern for postoperative respiratory compromise however, the patient agreed to the implementation of an ESP block with placement of a catheter for postoperative analgesia using an 18G Tuohy needle. Visualization was achieved using a Philips CX50 ultrasound system and linear probe. After routine induction of anaesthesia and maintenance with propofol and remifentanyl, the patient underwent uncomplicated surgery. Postoperatively, respiratory mechanics and pain scores allowed further treatment on the normal ward. Mobilisation could be achieved early and only non-opioid analgesics were needed in addition to intermittent 15 ml boluses of ropivacain 0,2% via the ESP catheter. The catheter was removed on postoperative day 3. No adverse side effects were noted.

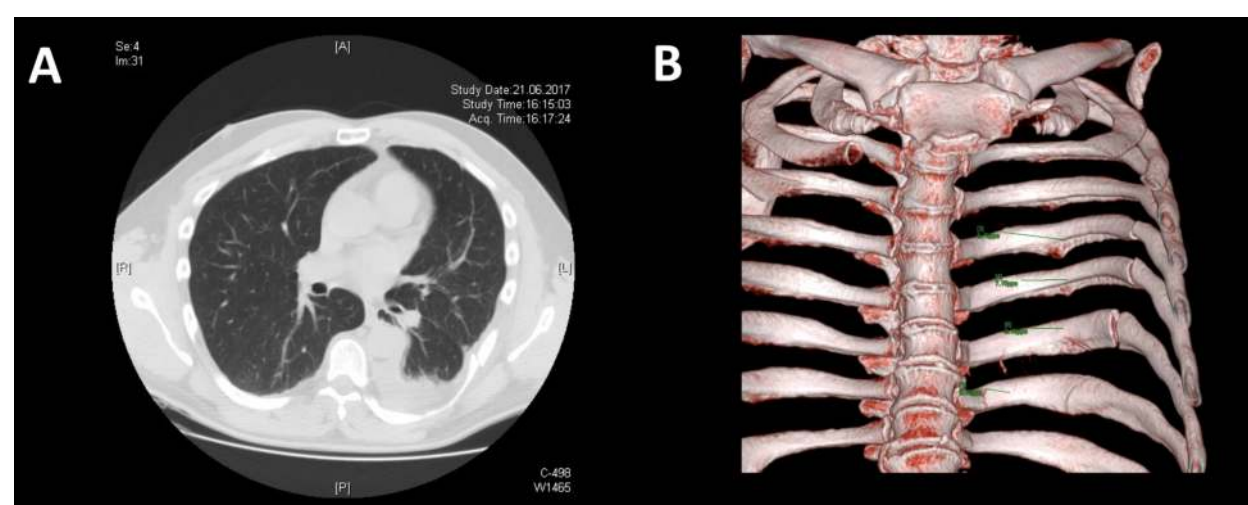


Fig. 1. Native CT (A) and 3D-reconstruction (B)

## III. TECHNIQUE

The erector spinae block was first described by Forero et al in 2016 (1) and further tested in ventral hernia repair by Chin and colleagues. A modification of the technique is described as the mid-point transverse process to pleura (MTP) block by Costache et al(2). Both techniques aim to access the paravertebral space through a more superficial injection site compared with traditional paravertebral approaches. The goal is to minimize complications like vascular puncture and perforation of the pleura. Chin and colleagues target the lateral tip of the transverse process (TP) while advancing the needle in plane in a cephalad-to-caudad direction at the level of T5. A successful application is signified by lifting of the erector spinae muscle off the transverse processes under ultrasound guidance. Costache describes the injection site as the midpoint between the TP and pleura where he observes pleural displacement similar to a traditional paravertebral block as well as lifting of the erector spinae muscle.

Due to the continuous nature and fascial surrounding of the erector spinae muscle it is most likely possible to use this technique on different levels for different indications as suggested by a small number of case reports (i.e. analgesia for hip arthroplasty after block performance at the level of L4(3). This is most likely made possible by the paravertebral space not being as distinct an entity as it was once believed.

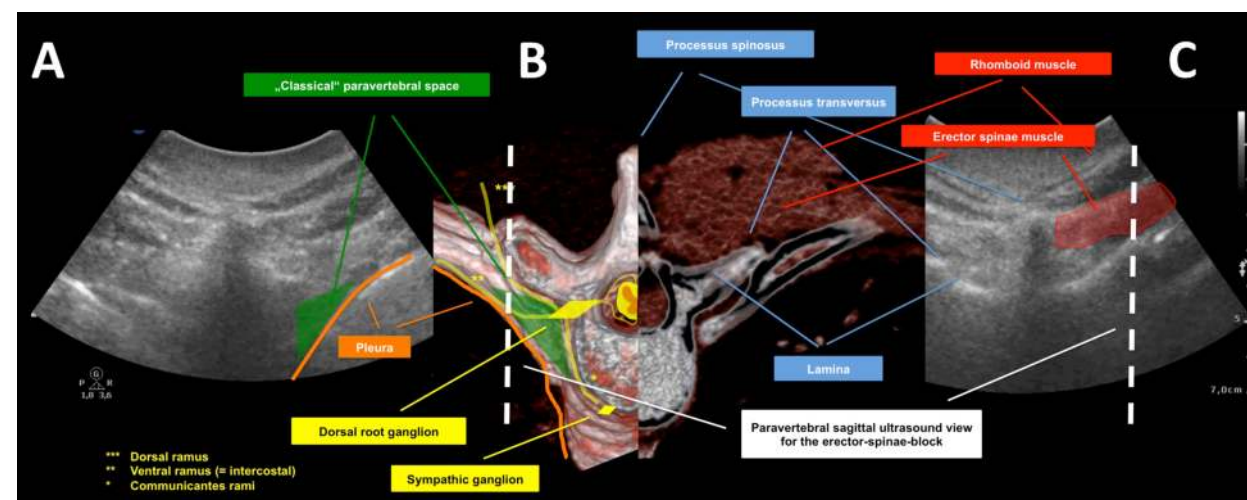


Fig. 2. A,C: transverse sections with C at the level of and A just below a transverse process; B: anatomical schematics within a 3D-reconstruction

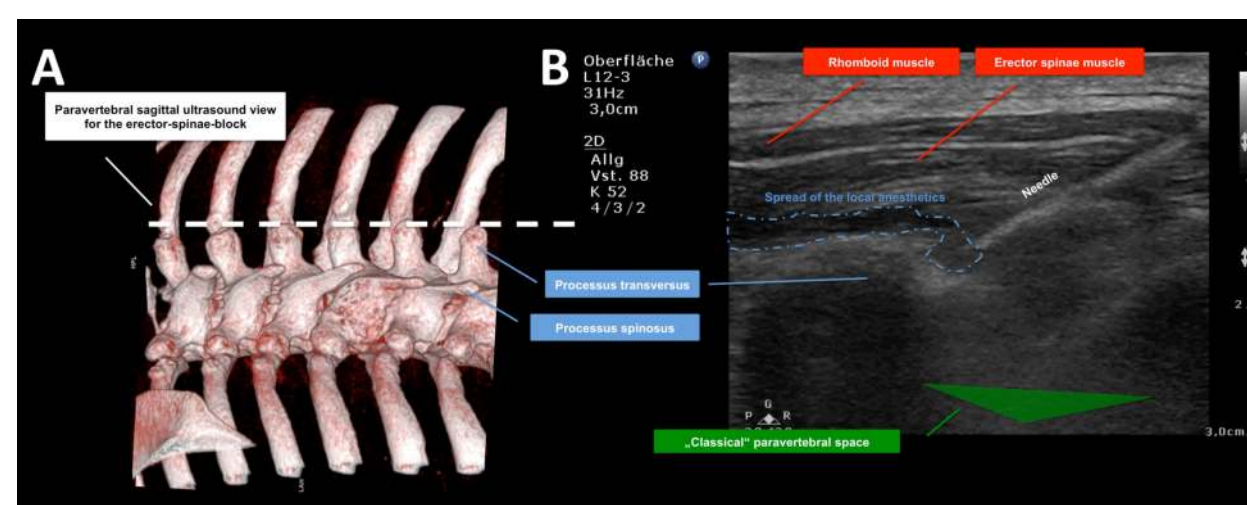


Fig. 3. A: 3D-reconstruction, probe placement for acquisition of image B; B: local anaesthetic deposit between erector spinae muscle and transverse process

## IV. DISCUSSION

Over the last few years the serratus anterior plane block among others have been utilized for pain relieve in rib fractures, placing chest drains and surgery of the lateral and anterior chest wall. However, in case of posterior rib fractures block failures have been described. The anatomical basis of the ESP block's efficacy in this setting is the closeness to the dorsal rami of the spinal nerves which innervate the posterior part of the chest wall(4).The dorsal rami transverse the erector spinae plane and are effectively covered by local anaesthetic. Additionally, the LA spreads anteriorly and cephalad to caudad (supposedly through gaps in the costotransverse ligaments) into the paravertebral space(1). This could explain the observed anaesthesia of the lateral and anterior chest wall.

The ESP block is a simple, easy and safe to perform technique with numerous potential applications in emergency and elective settings(1-5). It helps to avoid many of the risks of central neuraxial techniques. Systematic studies are needed to reliably assess block spread, efficacy and safety of catheter placement and optimal dosages of local anaesthetics. A direct comparison with established techniques is also warranted.

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