Approach affects injectate spread in ultrasound-guided thoracic paravertebral block: a cadaveric trial

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Editor—Ultrasound-guided thoracic paravertebral block has made much progress, and various approaches have been developed in the past decade. However, the differences in local anaesthetic distribution patterns are unknown. We adopted two patterns of injections, namely the intercostal approach (IC approach) and the paralaminar in-plane approach (PL approach), and compared their injectate spreading patterns in three Thiel-embalmed human cadavers using a dye injection method. For the IC approach, a 6–13 MHz linear array transducer was placed at the T4, T5 and T9 intercostal levels to visualize the transverse process. An 18-gauge Tuohy needle was inserted from lateral to medial beside the probe to penetrate the

Fig 1 Spread of the colour dye produced by (A) the intercostal (IC) approach at the T5 level and (B) the paralaminar in-plane (PL) approach at the T10 level. The injected dye in the IC approach mainly covered the intercostal area whereas the injected dye in the PL approach covered the medial area around the vertebral column. ST, sympathetic trunk; VB, vertebral body.

References
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internal intercostal membrane next to the tip of the transverse process. For the PL approach, the needle was inserted from medial to lateral using a 5–8 MHz microconvex array transducer to visualize the lateral edge of the vertebral lamina at the T6, T7 and T10 levels. We investigated five injections by the IC approach and four injections by the PL approach using 10 ml of dye of various colours. One injection in each group included real-time, direct observation of the distribution pattern after dissection via a pre-inserted catheter 2.5 cm beyond the needle tip. Paravertebral spread was confirmed in all procedures. In the IC approach, dye covered the respective intercostal space and the adjacent paravertebral space (PVS) (Fig. 1A), consistent with previous reports. The injected dye in the PL approach group covered the more longitudinal and medial PVS rather than the lateral intercostal space (Fig. 1B). Real-time dye injections from the catheter showed that in the IC approach dye first spread to the respective intercostal level following PVS whereas in the PL approach dye first covered the area around the sympathetic trunk followed by the intercostal area.

These findings are based on the anatomical features of the endothoracic fascia (ETF), which lines and clings to the parietal pleura in the intercostal area. Apart from the parietal pleura, the ETF tends to cover the vertebral body from the inner side of the transverse process. Thus, dye injected by the medial approach would be more likely to penetrate the ETF and spread in the medial direction around the vertebral body. Although this was a small-scale trial, our findings suggest that there is a difference in injectate distribution between the lateral and medial approaches of ultrasound-guided thoracic paravertebral block in human cadavers, and that the medial approach could produce a greater sympathetic blocking effect than the lateral approach.

**Declaration of interest**

None declared.

**Simulated emergency cricothyroid incision length**

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Editor—The revised 2015 Difficult Airway Society (DAS) guidelines for the ‘unanticipated difficult airway’ include a standardized approach to performance of emergency front-of-neck access in the ‘can’t intubate, can’t oxygenate’ (CICO) scenario. We have subsequently changed how we educate colleagues in the management of a CICO scenario using the surgical technique as part of our airway update days and on the Aintree Difficult Airway Management course.

On reviewing the guidelines before teaching, it struck us that for the impalpable cricothyroid membrane, the advised vertical midline incision length of 8–10 cm was significantly long, and that it could cause excessive bleeding and potentially worsen an already high-risk situation. There is no clinical evidence supporting such a large incision, and in personal communications with the authors of the guideline they suspected that anaesthetists would be reluctant to perform an incision of useful length in real life and this proposed length would enable this to happen, with subsequent successful tracheal intubation.

Timmermann and colleagues discuss the psychological barriers posed by a scalpel-based technique and are correct in their statement that using a scalpel is likely to remain ‘a rare and intimidating intervention for most anaesthetists’. A jointly published paper between the British Journal of Anaesthesia and Clinical Otologyngology aims to make our surgical colleagues aware of national anaesthetic guidelines that impact them, as surgical input during airway emergencies is likely to be required. Information should be disseminated to all those who could potentially be involved, ensuring a multidisciplinary approach, including rehearsals for this emergency. The DAS guideline does have the caveat that ‘other valid techniques’ for front-of-neck access are available, which leaves this incision length up to interpretation depending on individual experience and training.

**References**


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