



A novel “double-dye” technique to determine the injectate spread of bolus versus continuous infusion in erector spinae plane block in cadavers

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The mechanism of action of the erector spinae plane block (ESPB) remains debatable.¹ In ESPB, a local anesthetic (LA) bolus is typically injected in the interfascial plane between the vertebral transverse process and the erector spinae muscle,² followed by catheterization for prolonged analgesia through LA boluses and/or continuous infusion.

We have often noticed that intermittent LA boluses through an erector spinae plane (ESP) catheter provide better/more extensive analgesia than continuous (with equivalent LA volume/concentration) infusion. To test the hypothesis that LA boluses provide a wider cephalocaudal spread compared with continuous infusion, we performed, with approval by the Queen's University

and Kingston Health Sciences Center Research Ethics Board (Kingston, ON, Canada; TRAQ #6030180; no consent was required), bilateral ESP bolus injections in a cadaver (fresh/frozen, male, ~1.70 m, ~65 kg) with LA + fluorescein (Figure, panel A) followed by catheterization. Subsequently (Figure, panel B), we ran a continuous LA + methylene blue (LA + MB) infusion through the right-sided catheter at the end of which we bolused a similar volume of LA + MB through the left-sided catheter (infusion details in figure caption) prior to cadaveric dissection.

A wider cephalocaudal spread was observed with bolus injection (Figure, panel A and panel B, left side) than with continuous infusion (Figure, panel B, right side) following similar injectate volume. Notably, the use of two dyes allowed us to differentiate the spread of the initial bilateral bolus (fluorescein) from that of the follow-up left-sided bolus (MB) and right-sided infusion (MB). The spread after the follow-up bolus was much wider than that from the follow-up continuous infusion. Had we only used one dye, we could not have ruled out that the wider left-sided spread was from the initial bolus.

This is the first report to demonstrate (1) the utility of fluorescein as a dye in cadaveric studies investigating LA spread in regional blocks; (2) the concurrent use of different dyes to determine the spread of LA in different (bolus vs. continuous infusion) regimens; and (3) the difference in LA spread between ESP (bolus and continuous infusion) injections. Our findings could help future studies to investigate ideal volumes and injection techniques for ESPB and other blocks.

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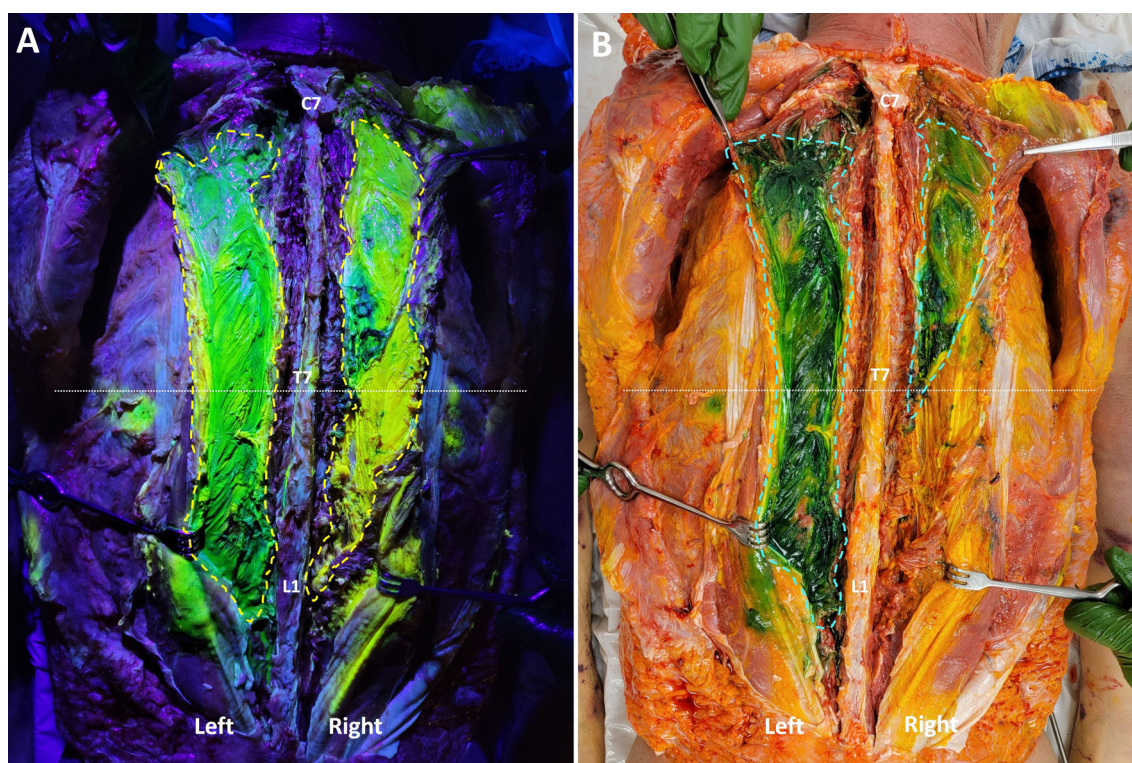


Figure Cadaveric dissection depicting local anesthetic (LA) spread following erector spinae plane injections. (A) Initial 20 mL ultrasound-guided bolus of ropivacaine 0.2% (19 mL) mixed with fluorescein (1 mL) (LA + fluorescein) administered bilaterally through a 17G Tuohy needle at the level (T7–T8) of the tip of the scapula (dotted line). The photo in panel A was taken under ultraviolet light for optimal visualization/delineation of the LA + fluorescein spread (yellow dashed outlines). Upon completion of the initial bolus (with cadaver in prone position), a catheter was threaded 5 cm beyond the needle tip and secured. The cadaver was subsequently positioned supine and a continuous 24 mL infusion of

ropivacaine 0.2% (22 mL) mixed with methylene blue (MB; 2 mL) (LA + MB) was initiated at 6 mL/hr through the right-sided catheter. Thirty minutes before the end of the right-sided infusion, 24 mL of LA + MB was manually injected over ~3 minutes through the left-sided catheter. Upon completion of the right-sided infusion, the cadaver was dissected. A wider cranio-caudal spread was observed with manual injection than with continuous infusion following a similar injectate volume (panel B, blue dashed outlines). (B) The photo in this panel was taken under ordinary room light which precludes visualization of the LA + fluorescein but allows adequate visualization/delineation of the LA + MB spread.

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