Plasma ropivacaine levels after ultrasound-guided erector spinae plane block and wound infiltration in laparoscopic colonic surgery – An observational study

Sir,

The erector spinae plane block (ESPB) is a new peripheral regional block that has been used for a wide variety of clinical settings.[1-3] The pharmacokinetics of ropivacaine have been well described following wound infiltration, but there is a paucity of data on plasma concentrations following ESPB.[4,5] Hence, we conducted a study to measure the plasma levels of ropivacaine in patients receiving ESPB and wound infiltration (WI). The study patients were part of a bigger trial assessing the analgesic effect of ESPB vs wound WI in laparoscopic colorectal surgery. After Human Ethics and Research Committee (HREC/18/CALHN/456) approval, the study was registered with the Clinical Trials Registry. The aim was to assess the safety of single-shot ESPB and WI by estimating the total ropivacaine levels. Patients aged between 18–85 years, of American Society of Anesthesiologists physical status I–III, undergoing elective laparoscopic colonic surgery were included. Patients with sensitivity or allergy to local anaesthetics were excluded.

Twenty adult patients were randomised through computer-generated sequence to receive standard general anaesthesia followed by bilateral ultrasound-guided ESPB or WI for postoperative analgesia before extubation. In the ESPB group, a high-frequency linear probe of 6- to 15-MHz (Sonosite X-Porte, SonoSite Inc. Bothell, WA, USA) was used to visualise the erector spinae (ES) muscles, slightly cephalad to the T8 transverse process. A 22-gauge Stimuplex ®(B-Braun Medical, Bethlehem, PA, USA) nerve block needle was inserted deep into the ES muscle beneath the fascia in a cephalad to caudal direction. Drug dissemination was confirmed by visualising the lifting of the ES muscle in real-time. Ropivacaine (AstraZeneca Pty Ltd, Sydney, NSW, Australia) diluted to 0.5%, up to 3 mg/kg (not to exceed 200 mg), was administered bilaterally up to 20 mL per side. In the WI group, the surgeons injected a similar dose in the laparoscopic port-sites and into the minimally invasive wound. Arterial blood samples were collected 5 min prior and 10, 60, and 180 min following ropivacaine injection. The patients were observed for signs and symptoms of local anaesthetic systemic toxicity (LAST) for the next 24 h. After calibration, total ropivacaine levels were assayed using high-performance liquid chromatography-tandem mass spectrometry.

The demographic profile was similar in both groups. The overall mean [+/- standard deviation (SD)] ropivacaine doses administered in the ESPB and WI groups were 198+/-3.7 and 192 mg+/-7.3, respectively. In the ESPB group, the highest mean (+/- SD) and highest individual peak concentrations were 1.65 +/- 0.37 μg/mL and 2.22 μg/mL, respectively. In the WI group, the highest mean (SD) and the highest individual peak concentration were 0.91 and 2.33 μg/mL, respectively. The peak levels were reached earlier in the ESPB (10 min) group than in the WI group (60 min), probably reflecting a faster vascular absorption near the posterior muscle. The mean (SD) with 95% confidence intervals at 10 mins in the ESPB and 60 min in the WI were 1.65 +/- 0.37 μg/mL [1.28–2.02] and 0.91 +/- 0.36 μg/mL [0.55–1.2], respectively [Figure 1]. In Griffith *et al.*'[6] study, the total venous plasma concentrations of ropivacaine following transversus abdominis plane block exceeded the widely quoted toxic threshold of 2.2 μg/mL (4.3 μg/mL of arterial equivalent) in 12 out of 30 patients. Levels in the current study did not exceed the toxic threshold. In another study, the highest arterial total ropivacaine level observed after thoracic paravertebral block with

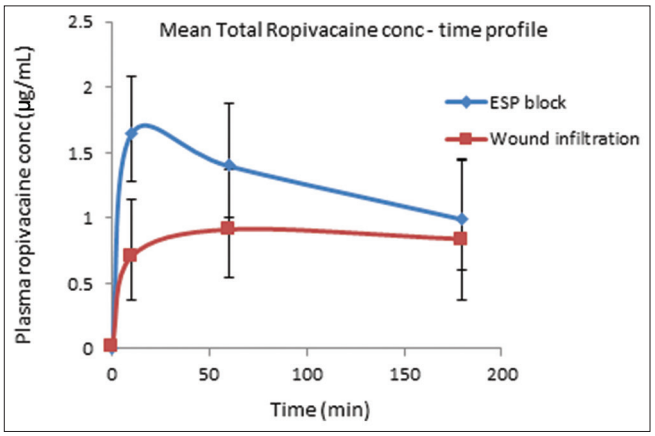

Figure 1: Showing the mean total ropivacaine levels over the time course in Erector spinae plane block and wound infiltration groups. Blue diamond shape represents time points for ESP = Erector spinae plane and orange square for WI = wound infiltration group. Error bars (+/-) represent 95% confidence intervals

2 mg/kg ropivacaine was 2.47 μg/mL at 7.5 min.[7] The highest concentrations following paravertebral block were achieved at a time frame similar to our ESPB group. However, our levels were very low (2.47 vs 1.65 μg/mL). As the ropivacaine levels following ESPB are yet to be established, our data may provide some information to guide future trials. The limitations of the study were small sample size, a ceiling dose of ropivacaine (200 mg) and the unavailability of free fraction levels.

To conclude, mean total ropivacaine levels following a single injection of EPSB or WI are well below toxic thresholds, if the total dose is limited to less than 3 mg/kg, and are unlikely to cause any adverse effects.

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Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patients have given their consent for their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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