


LETTER



# Erector spinae plane block ameliorates acute gastrointestinal injury

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Dear Editor,

Acute gastrointestinal injury (AGI) is a malfunctioning of the gastrointestinal tract in critically ill patients due to their acute illness, which could lead to organ dysfunction, delayed enteral nutrition, and increased mortality [1]. Sympathetic hyperactivity is involved in the occurrence and development of AGI, and targeting coeliac plexus block can alleviate gastrointestinal dysfunction [2]. The same benefit is also seen in patients undergoing thoracic epidural anesthesia (TEA) after major abdominal surgery [3]. However, current evidence does not support the routine use of TEA in severe patients.

In this single-centered, randomized controlled study (supplementary Appendix 1), erector spinae plane (ESP) block (Fig. 1) was first attempted for the treatment of critically ill patients with AGI grade II or greater severity. The primary outcomes were the remission and cure rates on days 3 and 7. The remission was defined as a decrease in AGI severity of more than one grade, and cure was defined as the disappearance of AGI symptoms and signs. The secondary outcomes included indicators of gastrointestinal function, inflammation, and clinical outcomes. Comparison was performed using chi-square test for binary outcomes and Mann–Whitney *U* test for

continuous outcomes. The trial was registered with ClinicalTrials.gov (NCT04934904).

Among 100 patients enrolled, 49 in the ESP block group and 44 in the control group completed the study (supplementary Fig. 1). The baseline characteristics in both groups were relatively comparable (supplementary Table 1). The remission rate of AGI on day 3 (46.9 vs. 20.5%), cure rate on day 7 (14.3 vs. 2.3%) and achieved median dosage of enteral nutrition on day 7 were higher in the ESP block group than in the control group ( $P < 0.05$ ) (supplementary Table 2). The Sequential Organ Failure Assessment (SOFA) scores were significantly reduced in the ESP block group on days 3 and 7 ( $P < 0.05$ ) (supplementary Table 3), with a marked decrease in 28-day all-cause mortality (20.4 vs. 40.9%,  $P = 0.03$ ) (supplementary Fig. 2). There was no difference in prokinetic agents use (supplementary Table 1), opioid consumption or inflammatory status (supplementary Table 3) in two groups. ESP block catheters were performed successfully in all patients at the first attempt. Catheter displacement occurred in 2 patients (4.1%), and puncture site bleeding occurred in 1 patient (2%). No catheter-related infections were identified.

Currently, the mechanism of ESP block in improving AGI remains unclear. In the acute phase of critical illness, excessive circulating catecholamines could lead to intestinal hypo-perfusion and mucosal barrier hyperpermeability [4]. Abdominal sympathetic nerve block has been proven to improve intestinal microcirculation and autonomic dysfunction in animal models [5]. Opioid analgesics have also been recognized to impair gastrointestinal motility. Compared with opioids alone, adjuvant analgesia with local nerve block can improve gastrointestinal function [3]. Limitations of this study are open-label design, limited sample size, and the secondary outcomes need to be further confirmed.

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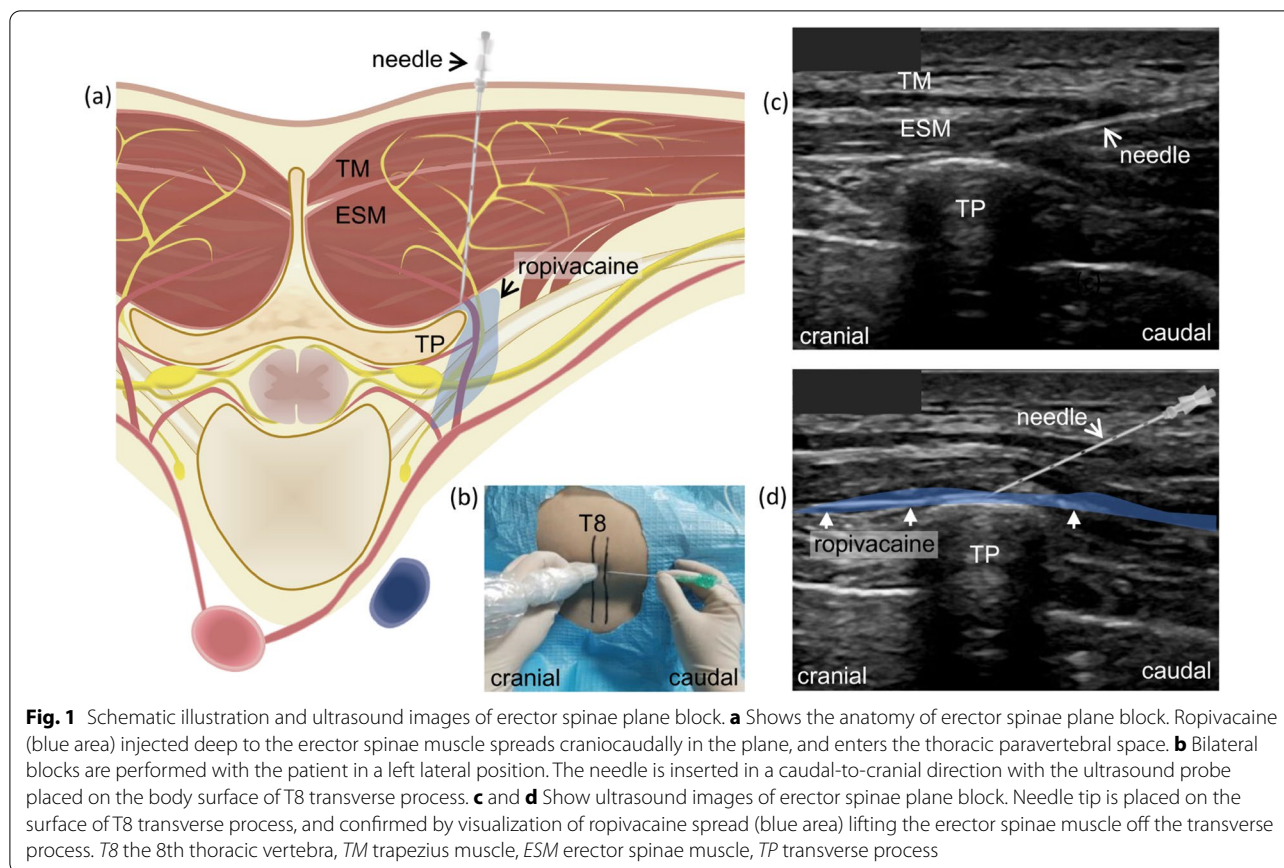
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**Fig. 1** Schematic illustration and ultrasound images of erector spinae plane block. **a** Shows the anatomy of erector spinae plane block. Ropivacaine (blue area) injected deep to the erector spinae muscle spreads craniocaudally in the plane, and enters the thoracic paravertebral space. **b** Bilateral blocks are performed with the patient in a left lateral position. The needle is inserted in a caudal-to-cranial direction with the ultrasound probe placed on the body surface of T8 transverse process. **c** and **d** Show ultrasound images of erector spinae plane block. Needle tip is placed on the surface of T8 transverse process, and confirmed by visualization of ropivacaine spread (blue area) lifting the erector spinae muscle off the transverse process. T8 the 8th thoracic vertebra, TM trapezius muscle, ESM erector spinae muscle, TP transverse process

In conclusion, ESP block reduces the severity of AGI, improves organ dysfunction and the status of enteral nutrition, and potentially decreases the 28-day all-cause mortality in critically ill patients with AGI, making it a potential treatment for AGI.

#### Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1007/s00134-023-06995-z>.

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Conception and design: JC, HWZ and HW; acquisition of data: YYW, BH, GLL, JJC, ZQG, MYSC, ZB, HJ, XXL, YT, YZK and XL; statistical analysis: SYZ; drafting of the manuscript: JC and HW; writing review and editing: HW, HWZ and ZL; funding acquisition: HW; All authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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#### Data availability

After publication, the data will be made available upon reasonable request by the corresponding author. A proposal with a detailed description of the study objectives will be required for the evaluation of the reasonability of requests. The data of de-identified participants will be provided after approval by the corresponding authors and the Zhujiang Hospital of Southern Medical University.

#### Declarations

#### Conflicts of interest

The authors have disclosed no conflicts of interest.

#### Ethical approval

This study was performed in line with the principles of the Declaration of Helsinki. The protocol was approved by the Medical Ethics Committee of

Zhujiang Hospital of Southern Medical University (No. 2020-KY-032), and informed consent was obtained from the patients or their proxy.

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