

Intercostal Nerve Block with Liposomal Bupivacaine vs Plain Bupivacaine vs Continuous Thoracic Paravertebral Nerve Block for post-VATS Pain Control: Preliminary Results

Fang Yu^{1,2}, Ismat Mrad^{1,3}, Muhammad Shabsigh¹, Saman Yaghoubian¹, Tracy Weigel⁴ & Jeff L. Xu¹

¹Department of Anesthesiology, ²Department of Neurology & ⁴Department of Thoracic Surgery Westchester Medical Center New York Medical College, Valhalla, NY

³Department of Anesthesiology and Perioperative Medicine, University of Rochester Medical Center, Rochester, NY

Background

- ❑ Thoracic paravertebral (TPVB) and intercostal nerve block (ICNB) have been applied for postoperative pain control in patients undergoing video-assisted thoracoscopic surgery (VATS).
- ❑ TPVB is thought to be superior to ICNB in some studies, mainly due to longer lasting analgesia.
- ❑ Liposomal bupivacaine (LB) is a long-acting local anesthetic that could provide pain relief for up to 72 hours based on the studies.
- ❑ This study is to examine the analgesic effects of continuous TPVB, ICNB with LB and plain bupivacaine.

Material and Methods

- ❑ Study approved by Institutional Review Boards (IRBs) New York Medical College (protocol ID: 14010). Informed consent was obtained before surgery. Randomization was performed by computer software.
- ❑ Patients undergoing VATS surgery were included in the study.
- ❑ Exclusion criteria were 1) age < 18 yrs; 2) history of opioid use disorder or other illicit drug use; 3) history of VATS or thoracotomy in the past; 4) end stage liver or kidney dysfunction; 5) pregnancy and 6) patient refusal.
- ❑ Patients randomly assigned to: Group A-ICNB-LB: 20ml liposomal bupivacaine 1.33% mixed with 20ml 0.25% bupivacaine HCl split between 4-5 intercostal nerves. Group B-TPVB: two TPVB catheters placed to cover surgical incisions and chest tube(s) after a bolus of 10-20ml 0.25% bupivacaine HCl for each. Group C-ICNB-B: same injection approach as group A with 40ml 0.25% bupivacaine HCl.
- ❑ Postoperative Numerical Rating Scale (NRS), opioid consumption (morphine milligram equivalent, MME), time to first rescue opioid, and side effects were recorded for further analysis.
- ❑ Mixed model or two-way ANOVA repeated measurement was used to compare postop pain score and opioid use at different time points (*p adjusted by Bonferroni*). One-way ANOVA or Kruska-Wallis H test was used to compare the time for first rescue opioid and other demographic data depending on data distribution.

Table 1. Demographic characteristics of study subjects

	Group A-liposomal bupivacaine (n=12)	Group B-thoracic paravertebral block (n=8)	Group C-plain bupivacaine (n=17)	P value
Sex (% female)	67%	37.5%	52.9%	0.44
Age (yrs, mean)	62.75	57.25	61	0.48
BMI (kg/m ² , mean)	28.39	25.2	30.10	0.35
Surgery time (min)	199.83	219.38	291.76	0.13
Anesth. time (min)	182.17	211.38	265.41	0.06
ASA (median)	3	3	3	0.25
Fentanyl (mcg)	177.5	258.8	209.7	0.07

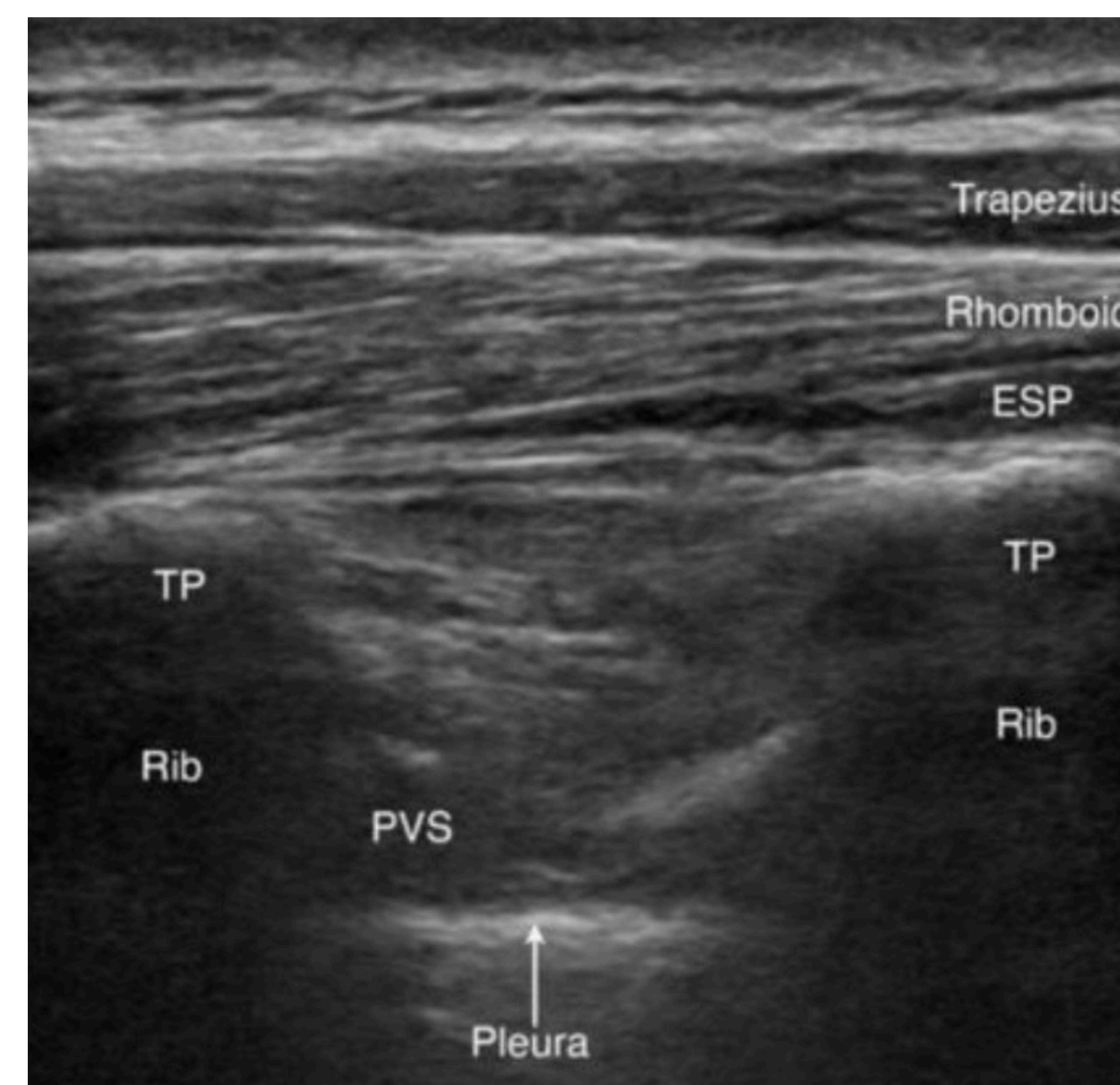


Figure 1. US image of paravertebral space (figure from NYSORA)

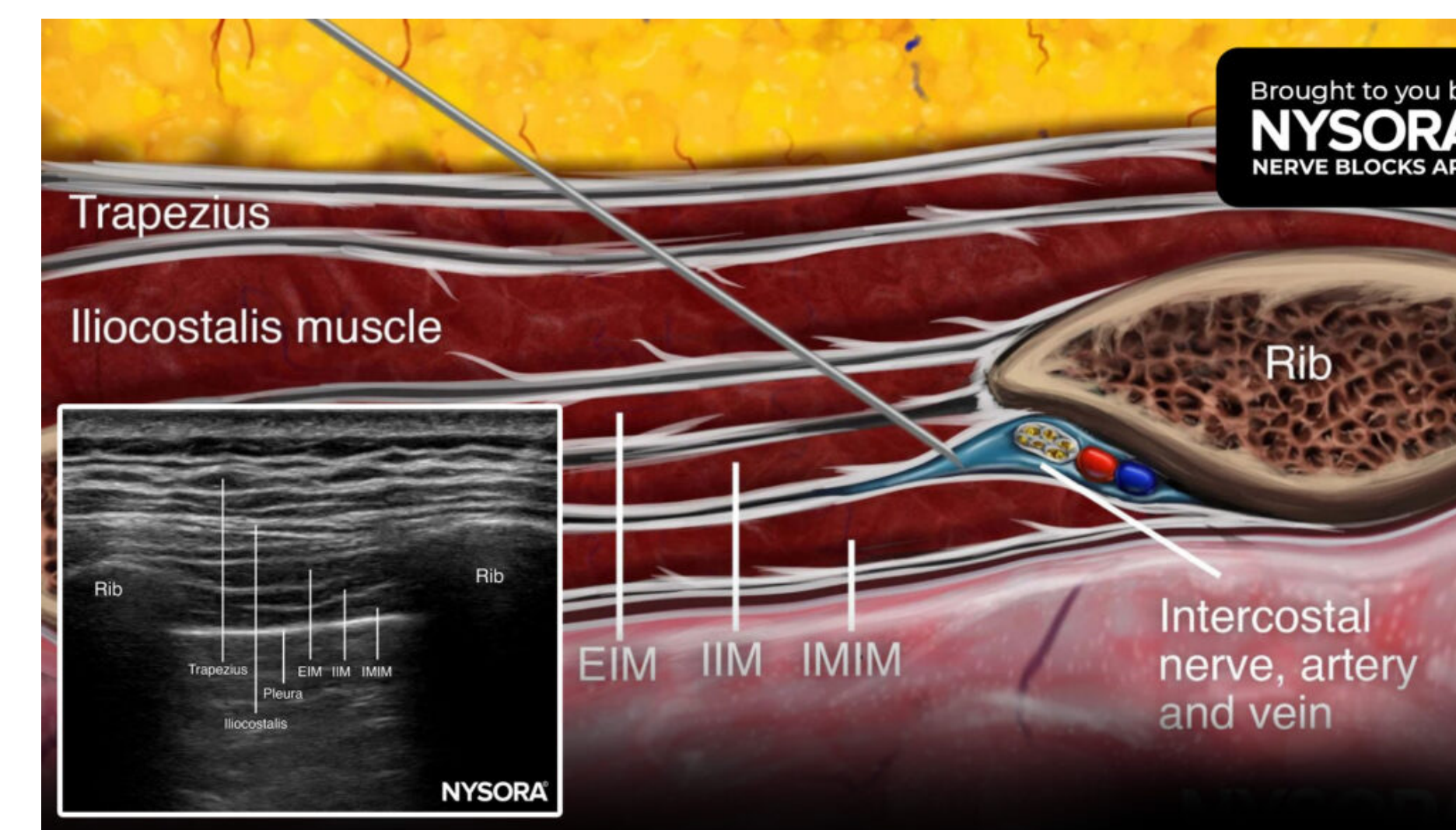
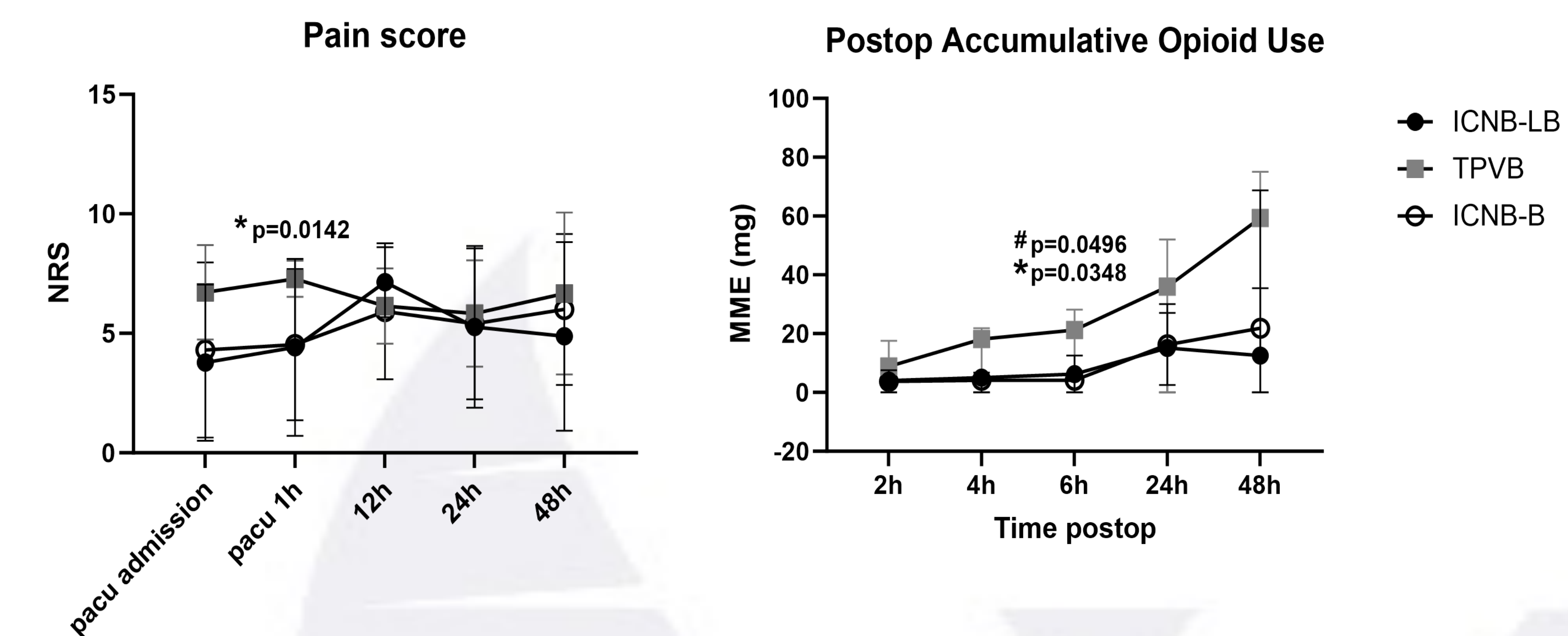


Figure 2. Intercostal nerve block (figure from NYSORA)

Disclosures

None

Figure 3. Postoperative Pain score (A) and Accumulative Opioid use (B)



Results and Discussion

- ❑ Our preliminary results of this randomized controlled clinical study showed that ICNB-LB and ICNB-B had comparable analgesic effect in patients undergoing VATS surgery.
- ❑ However, TPVB may have less analgesic potential in patients undergoing VATS procedure.
- ❑ More patients are needed to draw solid conclusion given TPVB group has smaller study size and data distribution is extremely skewed.
- ❑ Not every TPVB group patients get the nerve block right after surgery (in PACU instead), which may further bias the data analysis.
- ❑ ICNB-B might be a good option for post VATS analgesia given it's less expensive and technically easier to approach than TPVB.