

The effect of epinephrine as an additive to ropivacaine during ultrasound-guided interscalene brachial plexus block

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Background and aims

Ropivacaine is a long-acting local anesthetic, but the duration of analgesia after single-shot interscalene brachial plexus block (ISBPB) is often insufficient after shoulder surgery. The addition of epinephrine to ropivacaine has various effects on the duration of analgesia; however, its ability to decrease the volume of ropivacaine needed for sufficient anesthesia remains unclear. Therefore, we aimed to investigate the superiority of epinephrine as additive to ropivacaine on the duration of analgesia after ISBPB and to evaluate the noninferiority of ropivacaine alone with a reduced volume of ropivacaine plus epinephrine on duration of analgesia.

Methods

In this prospective randomized, superiority with noninferiority, and single-blind study, a total of 65 patients who underwent shoulder arthroscopy under ISBPB with general anesthesia were included. Participants were randomly allocated into three groups: Group R20 ($n = 9$, 20ml of 0.5 % ropivacaine alone), group R10E ($n = 28$, 0.5 % 10 ml of 0.5 % ropivacaine with 5 $\mu\text{g ml}^{-1}$ epinephrine), or group R20E ($n = 28$, 20 ml of 0.5 % ropivacaine with 5 $\mu\text{g ml}^{-1}$ epinephrine). The duration of analgesia (time to first pain at surgical site) after shoulder surgery was compared as a primary outcome. In addition, duration of motor blockade, onset of sensory block, consumption of opioid delivered via intravenous patient-controlled anesthesia, and rescue analgesics in the first 24 hours following surgery were recorded.

Results

The mean (SD) analgesic durations were 562 (134) min, 470 (76) min, and 488 (109) min in R20E, R20, and R10E groups, respectively. The duration of analgesia in the Group R20E was increased by 16% compared to Group R20 ($P = 0.017$) and by 13% compared to Group R10E ($P = 0.027$). The cumulative IV morphine equivalent dose at postoperative 8 h was significantly lower in Group R20E than Group R20 and Group R10E ($P = 0.042$ and $P < 0.001$, respectively) No participants experienced any adverse effect including neurologic sequelae.

Conclusions

The use of epinephrine as an additive and increased volume of local anesthetics to 0.5% ropivacaine prolonged the duration of postoperative analgesia after ISBPB.

Figure. The cumulative IV morphine equivalent dose and time after surgery

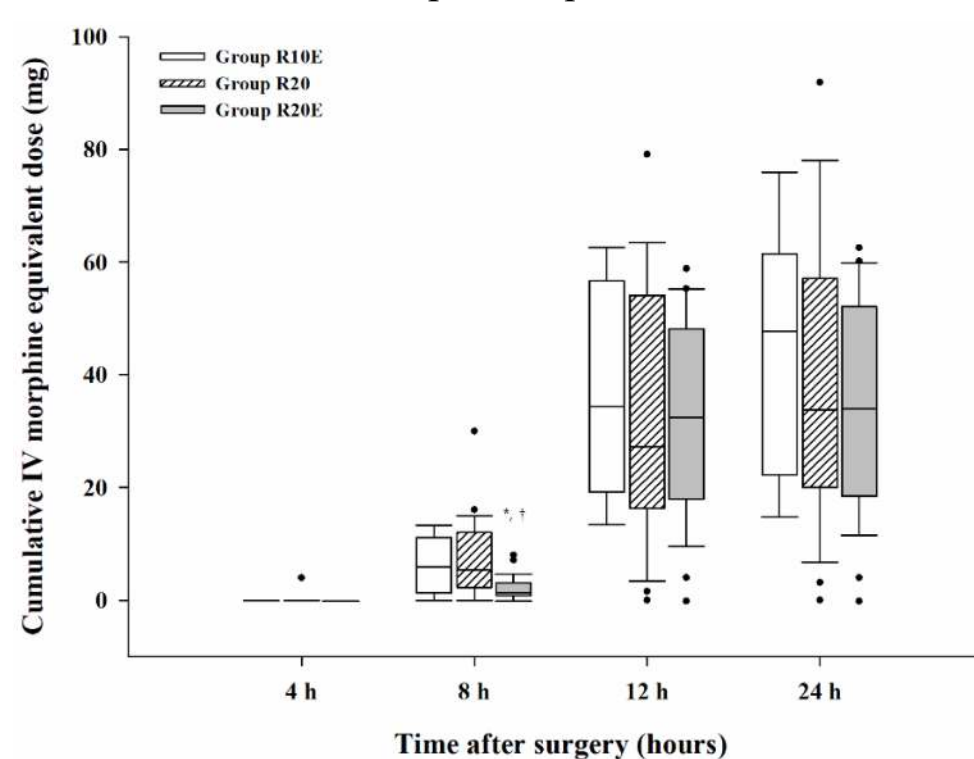


Table. Interscalene brachial plexus block characteristics and intraoperative data

Variables	Group R20 (n=9)	Group R10E (n=28)	Group R20E (n=28)	P value
Onset of block (min)	10 (10-15)	10 (10-15)	10 (5-14)	0.301
Duration of motor block (min)	454 (65)	448 (122)	480 (156)	0.652
Neurologic symptoms within 24 h	1 (11.1)	4 (14.3)	4 (14.3)	> 0.999
Patient's satisfaction score (Likert scale; 1 to 5)	4 (4-4.5)	4 (4-5)	4 (4-5)	0.660
Intraoperative remifentanil consumption (mg)	0.15(0-0.45)	0.20 (0.1-0.39)	0.23 (0-0.44)	0.708