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ORIGINAL ARTICLE

Interscalene brachial plexus bolus block versus patient-controlled interscalene indwelling catheter analgesia for the first 48 hours after arthroscopic rotator cuff repair

Jong-Ho Kim, MD[a,1], Hyun Jung Koh, MD[b,1], Dong Kyu Kim, MD[b], Hyo-Jin Lee, MD, PhD[a], Ki-Hyun Kwon, MD[a], Kwang-Yeol Lee, MD[c], Yang-Soo Kim, MD, PhD[a,*]

[a]*Department of Orthopedic Surgery, Seoul St. Mary's Hospital, Catholic University of Korea, Seoul, Republic of Korea*
[b]*Department of Anesthesiology and Pain, Seoul St. Mary's Hospital, Catholic University of Korea, Seoul, Republic of Korea*
[c]*Department of Orthopedic Surgery, Seoul Nanuri Hospital, Seoul, Republic of Korea*

Background: We sought to compare the efficacy of interscalene brachial plexus bolus blockade (IBPBB) and patient-controlled interscalene indwelling catheter analgesia (PCIA) for postoperative pain management within 48 hours postoperatively in patients undergoing arthroscopic rotator cuff repairs (ARCR).
Methods: Patients undergoing ARCR were randomized into 3 groups by postoperative analgesia method. The IBPBB group received a mixed solution of 16 mL of 0.75% ropivacaine and 4 mL of 2% lidocaine as a bolus postoperatively. The PCIA group received a 10-mL bolus solution of 0.75% ropivacaine (4 mL) and 5% dextrose water (6 mL) just after the operation and continuous infusion of this solution. The control received only meperidine as needed, 12.5 mg, intravenously. Visual analog scale (VAS) pain scores were evaluated for the first 48 hours postoperatively.
Results: For the first 2 hours postoperatively, VAS scores in the IBPBB group were significantly lower than in the PCIA group and control group, but at 12 and 24 hours postoperatively, VAS scores of the IBPBB group were significantly higher than the PCIA group ($P < .05$). At 48 hours postoperatively, there was no significant difference in VAS scores among the 3 groups ($P = .169$). The method of analgesia was the only factor affecting pain scores at 24 hours postoperatively ($P < .05$).
Conclusions: IBPBB provided effective immediate postoperative analgesia until 6 hours postoperatively. Especially until postoperative 2 hours, the VAS pain score was less than 1 point in the IBPBB group; however, there was significant rebound pain at 12 hours after surgery. During the first 24 hours postoperatively, PCIA reduced postoperative pain without rebound pain. Surgeons should choose methods for control of postoperative pain considering the advantages and disadvantages of each analgesic method.

This Institutional Review Board of Seoul St. Mary's Hospital, Catholic University of Korea, approved this study (Study No.: KC17OESI0118).

[1]These authors contributed equally to this study and are joint first authors.

*Reprint requests: Yang-Soo Kim, MD, PhD, Department of Orthopedic Surgery, Seoul St. Mary's Hospital, Catholic University of Korea, 505 Banpo-dong, Seocho-gu, Seoul 137-701, Republic of Korea.

E-mail address: kysoos@catholic.ac.kr (Y.-S. Kim).

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The incidence of arthroscopic rotator cuff repair (ARCR) has significantly increased recently.[10,13] Despite being a minimally invasive procedure, ARCR is usually associated with remarkable postoperative pain in the early postoperative period.[2,26,38] If postoperative pain is well controlled after the operation, patients have a shortened hospital stay and exhibit improved satisfaction and functional recovery.[14] For this reason, adequate control of immediate postoperative pain has recently become a very important issue for patients who undergo ARCR. Most shoulder surgery centers have tried many postoperative pain control modalities in patients who undergo ARCR. These tools for relieving postoperative pain include oral or intravenous medications,[2,33,35] cold therapy,[12,21,28] continuous subacromial or intra-articular infusions,[26,27] patient-controlled analgesia (PCA), and suprascapular nerve[24,29] and interscalene nerve block.[3,8,14,34] Among these modalities, interscalene nerve block has grown in popularity for shoulder surgery due to its efficacy in controlling postoperative pain.[9,11,36,38] Many studies have concluded that interscalene regional blocks provide excellent pain relief and decrease the use of narcotics in shoulder surgery patients.[9,11,36,38] The ultrasound-guided procedure has provided more accurate injection for anesthesiologists, resulting in a greater analgesic effect.[16,31] Interscalene brachial plexus bolus blockade (IBPBB) can be effective for pain management after ARCR because it can provide blockade effect of the brachial plexus, including sensory and motor innervation of the entire upper extremity.[31]

Interscalene nerve block can be applied to patients as single brachial plexus bolus injection or as continuous indwelling catheter infusion.[6] The benefits of both IBPBB and continuous indwelling catheter infusion in shoulder surgery have been reported recently in several articles.[1,14,30,32] Abdallah et al[1] demonstrated that IBPBB can provide effective analgesia up to 8 hours after a shoulder procedure. Fredrickson et al[14] reported that patients with interscalene infusion had reduced pain during the first 2 days after minor arthroscopic shoulder surgery. The patients enrolled in the study underwent minor arthroscopic shoulder surgery (acromioplasty, excision lateral clavicle, and labral repair) compared with conventional rotator cuff repair surgery, and there were no data within first 24 hours.

Salviz et al[30] compared the recovery profile of patients receiving a single interscalene injection or continuous interscalene brachial plexus block or general anesthesia for outpatient ARCR. In their study, mean visual analog scale (VAS) pain scores were lower for patients in the continuous-block group than in the single-block and general anesthesia groups on postoperative days 1 and 2, and use of narcotics was lower until postoperative day 3. However, the authors could not evaluate immediate postoperative change of pain status within 24 hours because the enrolled patients underwent an outpatient system–based operation. The pain score data were collected by telephone after discharge.

To the best of our knowledge, no studies have compared the clinical outcome of interscalene single-bolus blockade and continuous infusion for relieving pain after ARCR in the early postoperative period (≤24 hours postoperatively). The purpose of this study was to compare postoperative pain during the first 48 hours in patients undergoing ARCR using IBPBB or continuous infusion using patient-controlled interscalene indwelling catheter analgesia (PCIA).

Materials and methods

Inclusion and exclusion criteria

The study followed the Consolidated Standards of Reporting Trials (CONSORT) criteria and was designed as a nonblinded, prospective, randomized study of patients who underwent ARCR between March 2016 and August 2017. All surgical procedures were performed at a single institution by 1 senior shoulder surgeon (Y.S.K.). Enrolled patients were of American Society of Anesthesiologists (ASA) Physical Status Classification I, II, or III and able to understand the use of the VAS score for pain evaluation. Patients with known allergies or contraindications to opiates and local anesthetics were excluded as were patients with chronic pain syndromes, psychiatric diagnoses (bipolar disorder, schizophrenia, major depressive disorder), substance abuse, and those who had treatment based on industrial accident insurance. Also excluded were patients who were unable to understand how to use the infusion pump or the pain scales.

Baseline characteristics

Patients were allocated to 3 groups depending on the type of postoperative analgesia: IBPBB (group 1), continuous infusion using PCIA (group 2), and no postoperative analgesic procedure other than meperidine as needed (12.5 mg) intravenously (control; group 3). Assignment of patients to each group was achieved using computer-generated block randomization numbers. After confirmation of inclusion and exclusion criteria, the treatment method was determined according to a random number taken from a sealed envelope. All patients were blinded at the time of allocation and informed about the pros and cons of analgesic procedures before allocation.

There were 154 patients randomly allocated to the 3 groups: 52 were allocated to group 1, 51 were allocated to group 2, and 51 patients were allocated to group 3. We dropped from the study the patients who had adverse effects to meperidine injection(s), or who missed describing their pain VAS score at any check time point to evaluate the exact degree of pain. Also dropped was 1