Can we minimize a rebound pain after arthroscopic rotator cuff repair under interscalene brachial plexus block anesthesia - A prospective randomized controlled trial –

Young Dae Jeon[1], Ki-Bong Park[2]
[1]Ulsan Univeristy Hospital, Ulsan Univeristy Colleg, [2]Ulsan University Hospital

INTRODUCTION:

Pain control after arthroscopic rotator cuff repair is known to be important for postoperative rehabilitation, range of motion, and functional recovery of the shoulder.[1] The use of interscalene brachial plexus block (ISBPB) anesthesia for arthroscopic rotator cuff repair (ASRCR) is increasing.[2] ISBPB anesthesia can be more effective in postoperative pain control than general anesthesia and reduces opioid consumption.[3] However, owing to the short analgesic period of ISBPB, patients experience more severe pain for 24 h postoperatively than patients who do not receive ISBPB.[3-7] This phenomenon is called rebound pain and is defined as a rapid increase in pain once the peripheral nerve block disappears.[8] Though the procedure of adding perineural dexamethasone to ISBPB to reduce rebound pain has been introduced, rebound pain remains an unresolved issue.[9]

Han et al. conducted a prospective randomized control comparing patients who received multimodal shoulder injection for pain control after ASRCR and patients who received intravenous patient-controlled analgesia (IV-PCA).[10] In their study, multimodal shoulder injection was performed by subacromial space injection with suprascapular nerve block and axillary nerve block, using a modified Ranawart regimen.[11] The authors reported that multimodal shoulder injection was a safe and effective method and achieved better pain control than that observed in the IV-PCA group.

We investigated the effects of multimodal shoulder injections on the management of postoperative rebound pain. The hypothesis of this study was that patients who received multimodal injection experienced less rebound pain 12 h after surgery and used fewer narcotic rescue analgesics than those in the control group after ASRCR under ISBPB anesthesia.

METHODS:

A single-blind randomized controlled trial was conducted between April 2023 and December 2023.

Multimodal shoulder injection

The patients were randomly allocated by stratified block randomization to either the injection group (n = 38) or the control group (n = 38). Computer-generated randomization was performed by a statistician at our institution who was not involved in the study (assignment ratio, 1:1). The assigned number was placed in an opaque envelope and opened immediately before multimodal shoulder injection.

Patients assigned to the injection group were administered multiple shoulder injections after ASRCR by modifying the method suggested by Ranawart et al.[11] Two 50 mL syringes were prepared by mixing 40 mL 0.75% ropivacaine, 20 mg morphine, and 1:200,000 epinephrine with normal saline for a total volume of 100 mL. After the repair was completed, all normal saline solution in the subacromial space was aspirated using a suction device. Subsequently, the drug was administered from the first syringe to the anterior, middle, and posterior areas of the subacromial space using an 18-gauge spinal injection needle. The needle was inserted through the lateral port used during arthroscopic surgery. The second syringe drug was injected into the suprascapular and axillary nerve blocks. Each nerve block was performed blindly,[14, 15] and 25 mL was administered to each nerve. Swelling of the shoulder area occurs after arthroscopic surgery, making it difficult to perform a nerve block at the exact location. However, because a relatively large amount (25 mL) of the drug was administered, it is believed to have a certain nerve-blocking and analgesic effect.

Patients assigned to the control group were aspirated of all the normal saline solution present in the subacromial space after the surgery was completed, after which 100 mL of normal saline placebo was placed into two 50 mL syringes and injected in the same manner as was done for the injection group.

Following surgery, the injection was administered to the subacromial space with blind suprascapular nerve block and blind axillary nerve block. Controls received 100 mL of saline solution. Intravenous patient-controlled analgesia (IV-PCA) was used as adjuvant analgesia for all patients. The primary outcome was evaluated using the visual analog scale (VAS) pain score at 12 h after surgery, with secondary outcomes of the incidence of rebound pain and VAS pain scores at 0, 2, 4, 8, 24, 36, and 48 h postoperatively. Fentanyl in IV-PCA and rescue analgesic amounts, complications, and satisfaction were recorded.

RESULTS:

Sixty-seven patients (32 in the injection group, 35 in the control group) with a mean age of 61.1±9.0 years were included. The primary outcome assessment, VAS pain score at 12 h, significantly favored the injection group (2.69±0.93 vs. 4.06±1.70, $p<0.001$). The incidence of rebound pain was 18.8% and 65.7% in the injection and control groups, respectively ($p<0.001$). The injection group reported better VAS pain scores at 24, 36, and 48 h, and lower fentanyl use

(p=0.014). The use of rescue analgesics was similar between groups and no complications were associated with multimodal shoulder injections. Satisfaction levels were similar in both groups.

DISCUSSION AND CONCLUSION:
The major findings of the present study are as follows: (1) multimodal shoulder injection when performing arthroscopic rotator cuff repair under ISBPB anesthesia reduced VAS pain scores 12 h after surgery and the incidence of rebound pain; (2) multimodal shoulder injection reduced the use of additional opioids; and (3) no complications occurred, and patient satisfaction was consistent.

Conclusions

Multimodal shoulder injections is safe and effectively reduces rebound pain after ASRCR under ISBPB anesthesia and lowers postoperative opioid consumption.