Araştırma Makalesi
Research Article

The effect of general anesthesia and combined general and regional anesthesia on postoperative pain in arthroscopic rotator cuff surgery: a randomized controlled prospective study

ARTROSKOPİK ROTATOR MANŞET AMELİYATLARINDA GENEL ANESTEZİ İLE KOMBİNE GENEL VE REJİYONEL ANESTEZİ KULLANIMININ POSTOPERATİF AĞRIYA OLAN ETKİSİ: RANDOMİZE KONTROLLÜ ÇALIŞMA

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ABSTRACT

Objective: Postoperative pain seen in the first 48 hours after surgery, is an important problem and various methods are used in postoperative pain control. This study aims to investigate the effects of general anesthesia and combined general and regional anesthesia use on postoperative pain in arthroscopic rotator cuff repair operations.

Materials and Methods: Twenty-eight female patients who were planned for arthroscopic rotator cuff surgery were included. The patients were randomly divided into two groups. Scalene block was applied to patients in Group 1 (n=14) in addition to general anesthesia while the patients in Group 2 (n=14) received only general anesthesia. Pain levels of the groups at the sixth, 12th, and 24th hours were evaluated with the Visual Analogue Scale (VAS). The findings were analyzed with Student's-t test and Mann-Whitney U test using SPSS 18.0 statistical program.

Results: The average age of the Group 1 was 57 (45 ± 68); and the average age of the patients in Group 2 was 57.93 (47 ± 69). The postoperative pain levels of Group 1 was 1.57 (± 1.74) at the 6th hour; 2.57 (± 1.28) at the 12th hour, 2.71 (± 1.20) at the 24th hour; in Group 2 the 6th hour pain level was 8.00 (± 1.75); 12th hour level was 7.00 (± 1.52); and it was 6.00 (± 1.57) at the 24th hour. There was a statistically significant difference in all measurements in terms of VAS scores ($p < 0.001$).

Conclusion: It is concluded that implementation of scalene block in addition to general anesthesia, increases the success of the operation in arthroscopic rotator cuff repair surgery.

Keywords: postoperative pain, analgesia, interscalene block, arthroscopic rotator cuff repair

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ÖZ

Amaç: Cerrahi sonrası özellikle ilk 48 saatte görülen postoperatif ağrı önemli bir problemdir ve postoperatif ağrı kontrolünde çeşitli yöntemler kullanılmaktadır. Bu çalışmada artroskopik rotator manşet tamiri ameliyatlarında genel anestezi ile kombine genel ve rejiyonel anestezi kullanımının postoperatif ağrıya olan etkisini araştırmak amaçlanmıştır.

Gereç ve Yöntem: Artroskopik rotator manşet cerrahisi planlanan 28 kadın hasta çalışmaya dâhil edildi. Hastalar randomize edilerek iki gruba ayrıldı. Grup 1'de yer alan hastalara (n=14) genel anesteziye ek skalen blok, Grup 2'de yer alan hastalara (n=14) genel anestezi uygulandı. Grupların postoperatif 6., 12. ve 24. saatteki ağrı düzeyleri Visuel Analog Skala (VAS) ile değerlendirildi. Bulgular SPSS 18.0 istatistik programı ile Student t testi ve Mann-Whitney U testi ile analiz edildi.

Bulgular: Çalışmaya katılan ve Grup 1'de yer alan hastaların yaş ortalamasının 57 (45±68); Grup 2'de yer alan hastaların yaş ortalamasının 57,93 (47±69) olduğu görüldü. Grup 1'de yer alan hastaların postoperatif 6. saat ağrı düzeylerinin 1,57 (±1,74); 12. saat 2,57 (±1,28); 24. saat 2,71 (±1,20) olduğu; Grup 2'de 6. saat ağrı düzeylerinin 8,00 (±1,75); 12. saat 7,00 (±1,52); 24. saat 6,00 (±1,57) olduğu görüldü. VAS skorları açısından tüm ölçümlerde istatistiksel olarak anlamlı farklılık saptanmıştır ($p<0.001$).

Sonuç: Genel anesteziye ek skalen blok uygulamasının artroskopik rotator manşet tamiri ameliyatlarında operasyonun başarısını artırdığı düşünülmektedir.

Anahtar Sözcükler: postoperatif ağrı, analjezi, interskalen blok, artroskopik rotator manşet tamiri

Shoulder arthroscopy is one of the most common operations in orthopedics, including arthroscopic rotator cuff repair. It is frequently performed as day case surgery (1, 2), and severe pain is observed, especially in the first 48 hours after surgery (3-5). This pain should be managed effectively since the pain that occurs after the surgery generally affects the operation's success. After arthroscopy, early postoperative pain management provides early mobilization of the patient, accelerates functional and final recovery, and increases patient satisfaction (6, 7) Effective postoperative pain management is critical for recovery after shoulder arthroscopy, not only for early rehabilitation and discharge after surgery but also for reducing treatment costs (8, 9).

Many oral and intravenous drugs, regional nerve block applications, intralesional anesthesia, and multimodal anesthesia are recommended for effective postoperative pain management after arthroscopy (10, 11). Since the side effects of the opioids such as nausea, vomiting, itching, sedation, and respiratory distress are reported. It is known that interscalene block application is the most effective regional block type in addition to general anesthesia to relieve pain after arthroscopic rotator cuff repair (12) and provides superior pain control, especially in the first few hours postoperatively (11, 13, 14).

Interscalene block is the technique of blocking the brachial plexus in the inter-scalenus space at the neck. Since it is a procedure with low side effects, easy to perform, high success rate, and postoperative analgesia, its use in the shoulder and upper extremity surgery is increasingly common. It is considered an effective way of providing anesthesia - analgesia clinically (12, 15). Despite optimal postoperative pain management and patient satisfaction, clinicians' risk of postoperative complications is still an important challenge. Many studies have been conducted to reveal which method is superior in postoperative pain control after arthroscopic rotator cuff operations (6, 10, 16-19). However, although the blocks performed at the surgical site and general anesthesia in shoulder arthroscopy are known to be safe, easy, and have lesser

complication rates, there are controversies about this method's effectiveness (12, 20).

This study aimed to investigate the effect of general anesthesia and combined regional and general anesthesia on postoperative pain in arthroscopic rotator cuff repair operations. We hypothesized that combined general and regional anesthesia would be effective on postoperative pain in arthroscopic rotator cuff surgery.

MATERIAL AND METHODS

Our study, planned as prospective and randomized controlled, was conducted after the ethics committee (27.04.2017: 8/08). Twenty-eight female patients between the ages of 45 - 69 were admitted to the Orthopedics and Traumatology outpatient clinic of a hospital affiliated to the Ministry of Health between 27.04.2017 – 31.12.2017, who was decided to treat with arthroscopic rotator cuff surgery. The study was homogenized in terms of gender to obtain more expressive results from the patient group.

Between the study dates, 50 patients underwent rotator cuff repair surgery with the arthroscopic method. Twenty-eight patients who met the inclusion criteria were randomly divided into general anesthesia + interscalene (n=14) and general anesthesia (n=14). All of the operations were performed by the principal author of the study. An anesthesiologist performed the blocking procedure of the patients in the scalene block group. After the first patient was selected to the general anesthesia + interscalene group, the other patient was necessarily appointed to the other group. An equal number of patients was taken into both groups. Male patients, those with co-existing diseases such as diabetes and (Chronic Obstructive Pulmonary Disease) COPD, and patients using opioids for more than six months were excluded from the study (n=22). Data on postoperative pain were collected by the nurse who was not in the study group at the sixth, 12th, and 24th hours using the VAS scale.

Statistical Analysis

SPSS 18 program (SPSS Inc. Released 2009. PASW Statistics for Windows, Version 18.0. Chicago: SPSS Inc.) was used to analyze the study's findings. The consistency of continuous variables to normal distribution was examined with the Kolmogorov-Smirnov test. To describe the example to define the sample, variables suitable for normal distribution were expressed as mean ± standard deviation, and variables that were not suitable for normal distribution were indicated by median (minimum-maximum). When parametric test assumptions were provided, "Student's t-test" was used to differentiate the two independent groups' averages. In cases where parametric test assumptions were not provided, the non-parametric alternative "Mann-Whitney U" test was used. A 95% confidence interval (or α = 0.05 margin of error) was used to determine the analysis's differences (Figure 1).

The minimum sample size of the study was determined by power analysis. The effect size value (d) was calculated using the standardized medium-level value (0.5), which Cohen decided (21). Accordingly, d = 050, α = 0.05, β = 0.80 were taken, and the total number of patients was determined to be 28 so that the difference between the two groups could be found significant. Our study assumed that interscalene block procedure added to general anesthesia significantly reduced the pain in the period after arthroscopic rotator cuff repair surgery.

In the general anesthesia patient group, iv propofol was administered for induction, and 2-3 microgram/kg fentanyl rocuronium and remifentanil were administered intraoperatively. Systolic blood pressure was adjusted around 90-110 mm Hg. In the general anesthesia + interscalene block patient group, before the general anesthesia induction, interscalene block was performed with 20 ml of 0.5% bupivacaine using a nerve stimulator. For postoperative pain control, paracetamol tablets 3x1 orally and contramal amp1x1 iv were administered until the 24th hour.

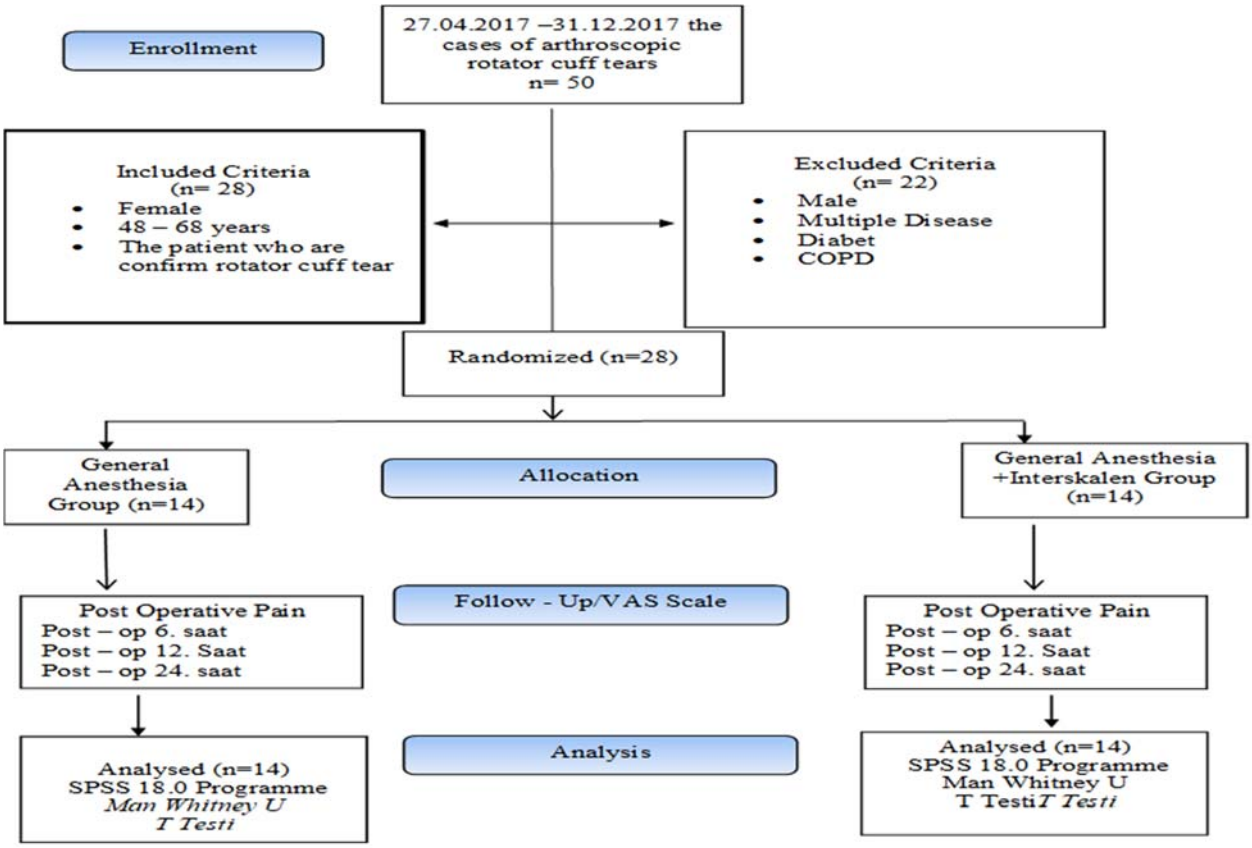

Figure 1: CONSORT Flow Chart

RESULTS

The mean age of the patients who participated in the study and the general anesthesia + scalene block group (Group 1) was 57, and the average age of the patients in the general anesthesia group (Group 2) was 57.93. The mean postoperative 6th-hour pain level of the patients in Group 1 was 1.57 (SD 1.74); the mean 12th-hour pain level was 2.57 (SD 1.28), and the 24-hour mean pain level was 2.71 (SD 1.20). The mean postoperative 6th-hour pain level of the patients in Group 2 was 8 (SD 1.75); the mean pain level at the 12th hour was 7 (SD 1.52), and the 24-hour mean was 6 (SD 1.57). When the groups were compared in terms of VAS averages, the lowest level of pain in Group 1 was at the postoperative 6th hour, and the lowest level of pain in Group 2 was at the postoperative 24th hour. As a result of the statistical analysis regarding the groups, a statistically significant difference was obtained in 6th, 12th, and 24th-hour measurements in all patients' VAS scores ($p < 0.05$). In patients who had the scalene block in addition to general anesthesia, the pain scores were significantly reduced compared to the other group ($p < 0.05$). (Table 1).

Table 1. Age and VAS Scale

	Groups								
	1-General Anesthesia+Scalene Block(n=14)				2-General Anesthesia (n=14)				
	Mean	SD	Min	Max	Mean	SD	Min	Max	p*
Age	57,00	7,62	45,00	68,00	57,93	7,51	47,00	69,00	0.747
VAS 6th hour	1,57	1,74	0,00	6,00	8,00	1,75	4,00	10,00	<0.001
VAS 12th hour	2,57	1,28	0,00	5,00	7,00	1,52	4,00	8,00	<0.001
VAS 24th hour	2,71	1,20	0,00	4,00	6,00	1,57	4,00	8,00	<0.001

*To analyze with Mann Whitney U

When the VAS scores of the groups were examined, the patients in Group 1 were observed to have mild pain (0-4) at the sixth, 12th, and 24th hours; and the patients in Group 2 felt moderate to severe pain (5 - 10) at the 6th, 12th and 24th hours postoperatively (Figure 2).

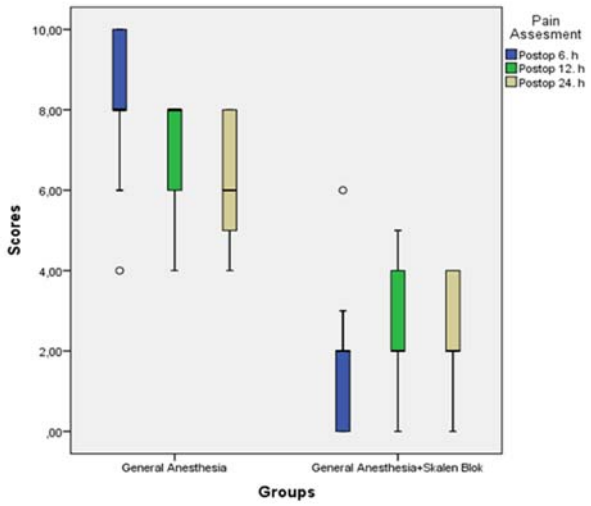

Figure 2: VAS Scale

DISCUSSION

Optimal postoperative pain management, patient satisfaction, and the risk of postoperative complications are still a significant challenge faced by clinicians. There is controversy over the effectiveness of the methods used to reduce postoperative pain.

Our study aimed to investigate the effect of general anesthesia and combined general and regional anesthesia on postoperative pain in arthroscopic rotator cuff repair operations. Our research conducted on two groups as general anesthesia + scalene block and general anesthesia concluded that interscalene block procedure performed preoperatively significantly reduced the pain at the sixth, 12th, and 24th postoperative hours.

When the methods applied to reduce postoperative pain in the literature are examined, it was found that the blocks are done in addition to general anesthesia to reduce pain in the immediate postoperative period (7, 11, 16, 19, 22-24). Our study also found that the general anesthesia + scalene block procedure reduced postoperative pain by more than 50% compared to the other group.

In our study, the VAS scale was preferred for postoperative pain assessment. Toyooka et al. (25) investigated the effects of interscalene block and multimodal drug injection in postoperative pain management after rotator cuff repair surgery. They concluded that the analgesic effect of performing interscalene block was significantly higher in the first 6 hours than the other group, according to the VAS scores. Our study concluded that the effectiveness of interscalene block application, which was done in addition to general anesthesia, was at the highest level in the postoperative 6th hour, according to VAS scores.

In the general anesthesia + interscalene block patient group in our study, the scalene block was performed with

20 ml of 0.5% bupivacaine and a nerve stimulator before the induction of general anesthesia. Sahu et al. (26) used a single-shot inter-scalene block with 20 mL of 0.5% ropivacaine, whereas other groups received the same with 10 mL. They found significantly lower VAS scores at the 1st, 4th, 6th, 12th 24th hours postoperatively. Our study also observed that there are results compatible with the results of this study.

Although our study's strength is a randomized controlled study, this study should be examined within the framework of certain limitations. The sample of our study was planned with a minimum number of samples. Our study consists of female patients only. In our study, an evaluation of the complications of scalene block application performed in addition to general anesthesia was not made. Despite these limitations, we think that our study reflects the effect of scalene block procedure on postoperative pain, which is performed in addition to general anesthesia after arthroscopic rotator cuff repair.

As a result of the study, it was observed that the scale block procedure added before general anesthesia in women who underwent arthroscopic rotator cuff repair significantly reduced postoperative pain compared to patients who underwent general anesthesia only. It is concluded that performing scalene block in addition to general anesthesia increases the success of the operation in arthroscopic rotator cuff repair surgery.

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