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SCIENTIFIC ARTICLE

Comparison of interscalene brachial plexus block and intra-articular local anesthetic administration on postoperative pain management in arthroscopic shoulder surgery



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KEYWORDS

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surgery

Abstract

Background and objectives: In this study, the aim was to compare postoperative analgesia effects of the administration of ultrasound-guided interscalene brachial plexus block and intra-articular bupivacaine carried out with bupivacaine.

Methods: In the first group of patients 20 mL 0.25% bupivacaine and ultrasound-guided interscalene brachial plexus block (ISPB) were applied, while 20 mL 0.25% bupivacaine was given via intra-articular (IA) administration to the second group patients after surgery. Patients in the third group were considered the control group and no block was performed. Patient-controlled analgesia (PCA) with morphine was used in all three groups for postoperative analgesia.

Results: In the ISPB group, morphine consumption in the periods between 0–4, 6–12 and 12–24 postoperative hours and total consumption within 24 h was lower than in the other two groups. Morphine consumption in the IA group was lower than in the control group in the period from 0 to 6 h and the same was true for total morphine consumption in 24 h. Postoperative VASr scores in the ISPB group were lower than both of the other groups in the first 2 h and lower than the control group in the 4th and 6th hours ($p < 0.05$). In the IA group, VASr and VASm scores in the 2nd, 4th and 6th hours were lower than in the control group ($p < 0.05$).

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PALAVRAS-CHAVE

Bupivacaína;
Bloqueio do plexo braquial por via interescalênica guiado por ultrassom;
Anestésico local intra-articular;
Cirurgia artroscópica do ombro

Conclusion: Interscalene brachial plexus block was found to be more effective than intra-articular local anesthetic injection for postoperative analgesia.

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Comparação de bloqueio do plexo braquial por via interescalênica e administração de anestésico local intra-articular no manejo da dor no pós-operatório de cirurgia artroscópica do ombro**Resumo**

Justificativa e objetivos: Neste estudo, o objetivo foi comparar os efeitos da analgesia no pós-operatório da administração de bloqueio do plexo braquial por via interescalênica guiado por ultrassom e bupivacaína intra-articular, realizado com bupivacaína.

Métodos: No primeiro grupo de pacientes, 20 mL de bupivacaína a 0,25% e bloqueio do plexo braquial por via interescalênica guiado por ultrassom (BPBI) foram administrados, enquanto 20 mL de bupivacaína a 0,25% foram administrados por via intra-articular (IA) ao segundo grupo de pacientes após a cirurgia. Os pacientes do terceiro grupo foram considerados grupo controle e nenhum bloqueio foi realizado. Analgesia controlada pelo paciente (ACP) com morfina foi usada nos três grupos para analgesia pós-operatória.

Resultados: No grupo BPBI, o consumo de morfina nos períodos entre 0-4; 6-12 e 12-24 horas após a cirurgia e o consumo total em 24 horas foram mais baixos que nos outros dois grupos. O consumo de morfina no grupo IA foi menor que no grupo controle no período de 0-6 horas, como também foi menor o consumo total de morfina em 24 horas. Os escores EVAr no pós-operatória do grupo BPBI foram menores que os escores dos dois outros grupos nas primeiras 2 horas e menores que os do grupo controle nos períodos de 4 e 6 horas ($p < 0,05$). No grupo IA, os escores EVAr e EVAM nos períodos de 2, 4 e 6 horas foram menores que no grupo controle ($p < 0,05$).

Conclusão: O bloqueio do plexo braquial por via interescalênica mostrou ser mais eficaz que a injeção intra-articular de anestésico local para analgesia pós-operatória.

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Introduction

In the postoperative period, 30–70% of shoulder joint surgery patients report a painful process.¹ In arthroscopic shoulder surgery, in order to reduce the level of pain, methods such as intra-articular local anesthetic, opioids, ketamine, non-steroidal anti-inflammatory drugs, patient-controlled analgesia (PCA), brachial plexus block, and suprascapular and axillary nerve block are being performed. Even though all of these methods have been found to be successful at certain rates in postoperative pain management, a consensus regarding which of them is the most effective method of analgesia has not yet been reached.^{2–5}

Inter-scalene brachial plexus block (ISPB) is being widely used for postoperative analgesia in arthroscopic shoulder surgery.⁶ However, experience is required to use this technique. Today, although success has increased with the use of ultrasonography in this field and complication rates have been decreased, the success rate is still not 100% and the possibility of serious complications has not been completely prevented.⁷

In this study, a comparison the analgesia effects of the application of ultrasound-guided interscalene brachial plexus block consisting of bupivacaine and intra-articular bupivacaine in the postoperative period will be performed.

Methods

After receiving approval of the Erciyes University Faculty of Medicine Ethics Committee, 60 patients of both genders, between 18 and 65 years of age, being treated with arthroscopic shoulder surgery under general anesthesia between February 2013 and February 2014, and being categorized into the American Society of Anesthesiologists (ASA) 1–2 groups, were included in the study. The patients had been informed about the study and had provided approval in the written form. Those patients with a weight <50 kg or >100 kg, and who had major psychiatric problems, neurological deficits, diabetes mellitus, pulmonary and cardiac disease, coagulopathy, were dependent on drugs, used analgesia for chronic pain, were unable to constitute cooperation, were allergic to morphine, bupivacaine or dexketoprofen trometamol and who were under gestational suspicion were excluded from the study.

All patients were randomly allocated into three groups using a table of random sampling numbers. Ultrasound-guided interscalene brachial plexus block was performed on patients in group I (Group ISBP). Patients were taken into the operating room 45 min before surgery, intravenous vascular access was established on the opposite arm to the shoulder being surgically operated on, and they were

started with a 5 mL/h 0.9% NaCl infusion; they were monitored non-invasively with an EKG, noninvasive arterial blood pressure and pulse oximetry. Skin cleansing with betadine was carried out on the location on which the block would be performed. Under the guidance of ultrasonography, hypoechoic nerve roots on short-axis view in between anterior scalene muscle and middle scalene muscle were visualized in a round-oval honeycomb form with a 5–10 MHz linear probe. The best point of view for C5/6/7 roots was determined. The location was draped with a linear probe sterile gel and wrap. Local skin anesthesia was provided for the area to be operated upon with 1 mL 2% lidocaine. A 50 mm, 22 G peripheral nerve block needle was connected to the nerve stimulator and inserted with in-plane method. The needle tip was directed into the C5/6 roots or superior trunk tunica. Responses against electrical stimulation received in the deltoid muscle, pectoral major muscle, triceps muscle or biceps muscle were lost under 1 Hz and 0.5 mA and it was noted that the patient did not bleed following aspiration; then, 20 mL pre-operatively prepared 0.25% bupivacaine (10 mL 0.5% bupivacaine + 10 mL 0.9% NaCl) was injected and the block was completed.

All interscalene block applications were performed by the same anesthetist, and all surgical operations were carried out by the same surgeon.

Evaluation of the sensorial and motor block was carried out after 30 min and the findings were recorded. The level of sensorial block was evaluated with a pinprick test on the shoulder using a 3-point scale (0 = normal sensation, sharp to pinprick; 1 = pinprick felt but not sharp; 2 = no sensation, pinprick not felt).

Motor function was evaluated by shoulder abduction (0 = normal abduction; 1 = decreased movement, moves shoulder but not normal; 2 = unable to abduct shoulder).

As a result of evaluation of the sensorial and motor block, a score of 1 or above was accepted as a sufficient block.

Anesthesia induction was provided with i.v. 1 µg/kg fentanyl, and 5–7 mg/kg thiopental. After muscle relaxation was provided with 0.6 mg/kg rocuronium, tracheal intubation was performed and respiration was continued with controlled ventilation. Anesthesia maintenance was continued using 40% oxygen and 60% nitrous oxide with 1–2% sevoflurane inhalation anesthesia.

At the end of surgery, before they were woken, patients in the second group (Group Ia) were given 20 mL 0.25% bupivacaine (10 mL 0.5% bupivacaine + 10 mL 0.9% NaCl) via intra-articular (Ia) administration and the drain in the surgical area was kept closed for 30 min. The third group of patients (Group C) were considered the control group and no block or intra-articular drug injection was performed with them. Each type of surgery performed on patients in 3 groups was recorded.

After removing the neuromuscular block with 0.04 mg/kg neostigmine and 0.02 mg/kg atropine after surgery, following the return of sufficient muscle strength, patients were extubated and taken to the post-anesthetic unit (PACU).

Heart rate and noninvasive blood pressure of patients taken in PACU were measured and recorded. All patients were connected to a patient-controlled analgesia (PCA)

device (no basal infusion, locked for 10 min, PCA intravenous set dose 1 mg morphine, maximum dose limit for 4 h of 30 mg morphine) and they were asked to inform staff if they felt discomfort.⁸ Morphine consumption and additional analgesic requirement of patients were checked postoperatively in the periods 0–2; 2–4; 4–6; 6–12 and 12–24 h and recorded.

Hemodynamic data, pain scores, and observed side effects of patients were checked at baseline (0 h) and at 2, 4, 6, 12 and 24 h postoperative and recorded.

Evaluation of pain occurring when shoulder was in the resting position (VASr) and when the shoulder was moving (VASm) was carried out with a 10 point (ranging from 0 = no pain to 10 = worst pain imaginable) Visual Analog Scale (VAS) by an anesthetist who was blinded to the groups. Then, 0.1 mg/kg i.v. morphine as a bolus was given to patients with VAS scores of 4 and above. For additional analgesia, 50 mg dexketoprofen trometamol was given intramuscularly to patients with VAS scores of 4 and above despite being given morphine.

Postoperative patient satisfaction scores in 24 h were evaluated using a 5-point scale (1 = very unsatisfactory; 2 = rather unsatisfactory; 3 = fair; 4 = rather satisfactory and 5 = very satisfactory).

In cases of nausea and vomiting, 5 mg tropisetron was given as an antiemetic. Observed side effects were recorded.

The primary outcome of this study was the postoperative 24-h VAS scores and the consumption of morphine.

The secondary outcome was the number of patients who required additional analgesia in the first 24 h postoperative, the time passing prior to the requirement of additional analgesia, and the 24-h patient satisfaction scores.

Sample size calculation was used as reported by Singelyn et al.²; they previously assessed the mean difference in the VASr scores between the intra-articular PACU and ISPB groups and used the results as a reference and found this to be 34 with an SD of 29 and 16. At $\alpha=0.05$; $\beta=0.01$ (power 99%), it was calculated that each group required at least 18 patients.

Statistical analysis

Statistical analysis was carried out using the software program SPSS 15.0. Characteristics, morphine consumption of patients and VAS scores, as well as whether the scores were normally distributed in each of the 3 groups, were evaluated with Kolmogorov–Smirnov test and comparison of groups with normal distribution was performed using one-way analysis of variance (ANOVA). Those results found to be significant were compared with post hoc analysis Tukey HSD test. Comparison of data with non-normal distribution and non-parametric data was performed with the Kruskal–Wallis test. Categorical variables were evaluated with chi-squared and Pearson tests. p value <0.05 was accepted as statistically significant.

Results

Patients in groups were similar in terms of age, weight, height, gender, ASA categorization, surgical time and surgical type ($p > 0.05$) (Table 1).

Table 1 Patients' demographic data and operation type.

	Interscalene block group (n=20)	Intra-articular group (n=20)	Control group (n=20)	p
Age (years)	45.1 ± 15.5	44.2 ± 15.9	43.4 ± 13.5	0.938
Weight (kg)	73.4 ± 10.7	77.7 ± 10.3	78.1 ± 11.7	0.333
Height (cm)	168.5 ± 10.8	168.8 ± 11.3	170.0 ± 7.0	0.887
Gender (M/F) (n)	13/7	12/8	13/7	0.931
ASA (1/2) (n)	17/3	14/6	13/7	0.330
Duration of surgery(min)	109.7 ± 48.5	120.2 ± 37.6	119.7 ± 27.7	0.632
Operation type (n)				
Rotator cuff repair and acromioplasty	12	13	15	
Bankart repair	5	5	2	0.658
Slap repair	1	0	0	
Restoring articular cartilage	2	2	3	

Sufficient block for postoperative analgesia developed in patients of the ISPB group who were studied (motor and sensorial block ≥1). The successful block ratio was found to be 100% (Table 2).

Morphine consumption in the first 2 h postoperative in PACU was found to be statistically significantly lower than in the ISPB group, control group and intra articular group ($p < 0.001$), and in the intra-articular group, it was found to be statistically significantly lower than that of the control group ($p = 0.008$) (Table 3).

Morphine consumption in the first 2–4 h postoperative in the ISPB group was found to be statistically significantly lower than in the intra-articular group ($p < 0.001$), and the results for the intra-articular group were statistically significantly lower than for the control group ($p < 0.001$) (Table 3).

Morphine consumption in first 4–6 h postoperative in the ISPB group and intra-articular group was statistically significantly lower than in the control group ($p < 0.001$). There were no statistically significant differences between the ISPB group and the intra-articular group ($p = 0.361$) (Table 3).

Morphine consumption in the first 6–12 h postoperative in the ISPB group was lower than in the intra-articular group ($p = 0.032$) and control group ($p < 0.001$) (Table 3). There

were no statistical differences between the control group and the intra-articular group ($p = 0.249$) (Table 3).

Morphine consumption in the first 12–24 h postoperative in the ISPB group was lower than in the intra-articular group ($p = 0.027$) and control group ($p < 0.001$) (Table 3). There were no statistical differences between the control group and the intra-articular group ($p = 0.320$) (Table 3).

Total morphine consumption in the ISPB group was statistically significantly lower than in the control and intra-articular groups ($p < 0.001$), and in the intra-articular group it was found to be statistically significantly lower than that of the control group ($p < 0.001$) (Table 3).

Postoperative additional analgesia (dexketoprofen trometamol) starting time in the ISPB group was statistically significantly later than in both the control and intra-articular groups ($p < 0.001$) (Table 3).

The number of patients who required postoperative additional analgesia (dexketoprofen trometamol) in the ISPB group was found to be statistically significantly lower than in the control group ($p = 0.012$) (Table 3).

VASr scores in the first 2 hours postoperative in the ISPB group were statistically significantly lower than in the control group and the intra-articular group, and in the 4th to 6th hours postoperative, the scores in the ISPB group were found to be statistically significantly lower than in the control group ($p < 0.001$) (Table 4).

VASm scores in the first 4 h postoperative in the ISPB group were statistically significantly lower than in the control and intra-articular groups, and at the 6th hour postoperative in the ISPB group, they were found to be statistically significantly lower than in the control group ($p < 0.001$) (Table 5).

VASr and VASm scores in 2nd, 4th and 6th hours postoperative in the intra-articular group were statistically significantly lower than in the control group ($p < 0.001$) (Tables 4 and 5).

While 24-h patient satisfaction scores in the ISPB group were significantly higher than in both the control and intra-articular groups ($p < 0.001$), in the intra-articular group the scores were statistically significantly higher than those of the control group ($p < 0.001$) (Table 4).

Table 2 Interscalene block sufficiency.

Block success rate (successful/unsuccessful)	100% (20/0)
Motor block degree (decreased shoulder abduction/unable to abduct shoulder) (n)	15/5
Sensorial block degree (analgesia/anesthesia) (n)	2/18
Sensorial block degree analgesia; Pinprick test 3 point scale score = 1.	
Sensorial block degree anesthesia; Pinprick test 3 point scale score = 2.	
Motor block degree decreased shoulder abduction; score = 1.	
Motor block degree unable to abduct shoulder; score = 2.	

Table 3 Morphine consumption (mg) and additional analgesic need.

	Interscalene block group (n = 20)	Intra-articular group (n = 20)	Control group (n = 20)	p
Postoperative 0–120 min	1.7 ± 1.9 ^b	10.5 ± 2.9 ^a	12.9 ± 2.3	0.001<
Postoperative 2–4 h	1.3 ± 1.6 ^b	3.0 ± 2.2 ^a	6.5 ± 2.4	0.001<
Postoperative 4–6 h	1.8 ± 1.9 ^a	2.7 ± 1.6 ^a	6.5 ± 2.7	0.001<
Postoperative 6–12 h	4.9 ± 3.6 ^b	7.5 ± 2.4	9.1 ± 3.3	0.001<
Postoperative 12–24 h	6.4 ± 5.0 ^b	9.9 ± 2.5	11.8 ± 4.2	0.001
Postoperative Total morphine consumption	16.3 ± 7.8 ^b	33.7 ± 5.9 ^a	46.9 ± 9.6	0.001<
Additional analgesic need (once/two times)	(4/1) ^a	(8/4)	(4/9)	0.012
Additional analgesic need time (0–2/2–12/12–24 h)	0/1/4 ^b	7/5/0	12/1/0	0.001<

^a $p < 0.05$ statistical significant when compared to control group.

^b $p < 0.05$ statistical significant when compared to intra-articular and control groups.

Table 4 VAS rest score and patient satisfaction score.

VASr	Interscalene block group (n = 20)	Intra-articular group (n = 20)	Control group (n = 20)	p
Basale	1.1 ± 1.5	1.6 ± 1.8	1.2 ± 1.2	0.604
PACU 0 min	2.1 ± 2.8 ^b	5.7 ± 4.3	7.8 ± 2.6	<0.001
PO 30 min	2.0 ± 2.3 ^b	5.2 ± 2.0	5.8 ± 1.3	<0.001
PO 60 min	1.9 ± 2.2 ^b	5.2 ± 1.3	4.7 ± 1.0	<0.001
PO 90 min	1.3 ± 1.5 ^b	4.0 ± 1.6	4.9 ± 1.2	<0.001
PO 120 min	1.1 ± 1.4 ^b	3.5 ± 1.5 ^a	4.9 ± 1.8	<0.001
PO 4 h	1.1 ± 1.5 ^a	2.4 ± 1.6 ^a	4.3 ± 2.3	<0.001
PO 6 h	1.2 ± 1.8 ^a	2.4 ± 1.6 ^a	4.1 ± 2.1	<0.001
PO 12 h	2.2 ± 2.1	2.2 ± 1.8	3.2 ± 2.0	0.227
PO 24 h	2.0 ± 1.7	2.2 ± 1.2	2.9 ± 1.9	0.231
24 hours patient satisfaction score (median) (min-max)	5 (3–5) ^b	3 (2–5) ^a	2 (1–3)	<0.001

VASr, VAS during rest; PACU, postanesthesia care unit; PO, postoperative.

^a $p < 0.05$ statistical significant when compared to control group.

^b $p < 0.05$ statistical significant when compared to intra-articular and control groups.

The mean arterial pressure (MAP) values at baseline (0 h) and after 60 and 120 min postoperative were significantly higher in the control group than in the ISPB group ($p < 0.05$) (Table 6). In the 30th and 90th minutes postoperative, the control and intra-articular groups had significantly higher normal clinic values than the ISPB group ($p < 0.05$) (Table 6).

Mean values of preoperative heart rate were similar among groups ($p > 0.05$) (Table 7).

Nausea and vomiting were observed in 5 patients (25%) in the control group, 4 patients (20%) in the intra-articular group and 3 patients (15%) in the ISPB group; antiemetic treatment was needed in these cases. Groups were similar in terms of incidence ($p = 0.732$).

Ptosis was observed in 2 patients from the ISPB group ($p = 0.126$).

Discussion

For arthroscopic shoulder surgery postoperative analgesia, several methods were used, including interscalene brachial plexus block, intra-articular local anesthetic injection, suprascapular block, subacromial block and i.v. PCA analgesic infusion.^{2–4,6,9}

Although some methods such as suprascapular block and axillary block are found to be more effective in postoperative analgesia when used together, interscalene block, when used separately, is considered to be one of the most effective methods in arthroscopic shoulder surgery.^{2–6,9}

Our results have shown that both techniques are effective in ISPB and shoulder joint local anesthetic infiltration on

Table 5 VAS shoulder movement score.

VASm	Interscalene block group (n=20)	Intra-articular group (n=20)	Control group (n=20)	p
Basale	2.5 ± 1.5	3.0 ± 2.7	3.2 ± 1.9	0.599
PACU 0 h	2.5 ± 3.1 ^b	6.6 ± 3.9	8.5 ± 2.2	<0.001
PO 30 min	2.6 ± 2.6 ^b	7.3 ± 2.6	8.4 ± 2.3	<0.001
PO 60 min	2.4 ± 2.2 ^b	6.4 ± 2.2	7.7 ± 2.0	<0.001
PO 90 min	1.7 ± 1.7 ^b	5.4 ± 1.6	6.8 ± 2.2	<0.001
PO 120 min	1.5 ± 1.6 ^b	4.1 ± 1.5 ^a	6.0 ± 2.0	<0.001
PO 4 h	1.7 ± 2.0 ^b	3.5 ± 2.0 ^a	5.4 ± 2.5	<0.001
PO 6 h	2.2 ± 2.4 ^a	3.3 ± 1.6 ^a	5.4 ± 2.5	<0.001
PO 12 h	3.9 ± 2.9	3.6 ± 1.9	4.5 ± 2.3	0.499
PO 24 h	3.4 ± 2.3	3.4 ± 1.5	4.5 ± 2.3	0.151

VASm, VAS during shoulder movement; PACU, postanesthesia care unit; PO, postoperative.

^a p < 0.05 statistical significant when compared to control group.

^b p < 0.05 statistical significant when compared to intra-articular and control groups.

Table 6 Mean arterial blood pressure (mmHg).

	Interscalene block group(n=20)	Intra-articular group(n=20)	Control group(n=20)	p
Basale	94.8 ± 14.1	95.5 ± 16.5	100.6 ± 12.9	0.397
IO 30 min	89.3 ± 12.3	86.2 ± 8.8	91.2 ± 14.3	0.415
PACU 0 min	88.5 ± 13.5 ^a	98.7 ± 19.5	105.2 ± 13.8	0.006
PO 30 min	90.7 ± 15.1 ^b	106.9 ± 18.7	105.6 ± 14.9	0.004
PO 60 min	89.2 ± 14.0 ^a	97.9 ± 15.5	106.0 ± 9.4	0.001
PO 90 min	88.6 ± 14.7 ^b	100.4 ± 18.9	103.6 ± 11.9	0.008
PO 120 min	87.7 ± 10.7 ^a	95.6 ± 12.3	99.0 ± 10.6	0.008
PO 4 h	84.7 ± 7.9	88.7 ± 10.2	90.3 ± 9.2	0.149
PO 6 h	83.2 ± 7.0	87.2 ± 9.0	87.0 ± 8.1	0.234
PO 12 h	84.4 ± 9.7	88.7 ± 7.7	87.8 ± 11.4	0.348
PO 24 h	86.6 ± 9.6	87.9 ± 6.6	88.6 ± 8.5	0.735

IO, intraoperative; PACU, postanesthesia care unit; PO, postoperative.

^a p < 0.05 statistical significant when compared to control group.

^b p < 0.05 statistical significant when compared to intra-articular and control groups.

analgesia in the early postoperative period. However, it was found that analgesic efficiency was much better and analgesia time was longer in the ISPB group. These findings are generally in accordance with previous studies.^{2,6}

When adrenaline is added to local anesthesia, it delays the absorption of the anesthetic by creating vasoconstriction, decreases local anesthetic toxicity and extends the duration; however, it also causes neurodeficits by

Table 7 Heart rate/min.

	Interscalene block group(n=20)	Intra-articular group(n=20)	Control group(n=20)	p
Basale	73.2 ± 9.6	76.5 ± 11.3	79.7 ± 11.9	0.180
IO 30 min	74.8 ± 13.1	74.8 ± 10.0	77.8 ± 11.3	0.638
PACU 0 min	71.7 ± 9.7	75.5 ± 13.5	74.6 ± 11.3	0.554
PO 30 min	70.3 ± 10.9	74.1 ± 9.7	74.8 ± 9.1	0.314
PO 60 min	72.7 ± 11.3	72.9 ± 11.2	75.3 ± 9.9	0.713
PO 90 min	71.8 ± 9.0	74.1 ± 12.4	76.6 ± 8.4	0.340
PO 120 min	73.9 ± 9.4	76.3 ± 12.1	77.3 ± 8.3	0.552
PO 4 h	78.9 ± 8.3	81.9 ± 11.4	80.0 ± 6.1	0.551
PO 6 h	79.2 ± 8.6	82.6 ± 7.5	82.3 ± 7.1	0.326
PO 12 h	83.0 ± 7.5	83.8 ± 8.5	83.5 ± 5.6	0.949
PO 24 h	84.7 ± 5.4	82.4 ± 8.2	80.6 ± 6.1	0.174

IO, intraoperative; PACU, postanesthesia care unit; PO, postoperative.

p < 0.05 statistically significant.

considerably decreasing nerve blood flow.^{10,11} In our study, we did not use any adjuvant, such as adrenaline, to extend the time of effect following ISPB application. However, we found similar block times to those reported in previous studies² using adjuvants such as adrenaline and we did not observe any toxic reaction related to local anesthetic.

In the study carried out by Wilson et al.⁶ on 50 patients undergoing shoulder surgery in one day, they performed a 0.5% 20 mL bupivacaine and inter scalene block and stated that they provided approximately 20 h of analgesia with a success rate of 97.4%. Although we used 20 mL 0.25% bupivacaine in this study, unsuccessful block was not observed. All blocks were performed with ultrasound-guidance, which was found to have a high success rate and be effective in our study.

In the study by Singelyn et al.,² which compared ISPB, intra-articular injections and suprascapular blocks with a 1:200,000 dilution of epinephrine in addition to 20 mL 0.25% bupivacaine, they found that the use of morphine and paracetamol in the early postoperative period in the ISPB group was lower than in the other groups. Also, while the 24-h subcutaneous total morphine consumption in the ISPB group was significantly lower than in the control group, no difference was found between the control group and other groups. In our study, morphine consumption in the early postoperative period in the ISPB group was found to be lower than for other groups; however, no significant difference was found between IA and the control group for morphine consumption in the early period. Additionally, while the time of use of dexketoprofen trometamol in the ISPB group was later than in both the control and intra-articular groups, the number of patients requiring dexketoprofen trometamol was lower than in the control group.

In the study performed by Lee et al.,⁴ in which they used ISPB in one group and suprascapular and axillary nerve block in another group undergoing shoulder arthroscopy, in the first 8 h postoperative, they observed less analgesic requirement in the group undergoing ropivacaine and inter-scalene brachial plexus block than in the control group. However, there was no considerable difference in the total analgesic consumption between groups over 24 h. In our study, while similar results were seen in the first few hours, with differences reported between the ISPB and control groups, contrary to Lee et al., the difference between control group and the ISPB group remained significant for the entire 24 h period.

In the study carried out by Lee et al.,⁴ they found VAS scores in the ISPB group that were considerably lower than those in the control and suprascapular + axillary block groups in the postoperative period; however, they found VAS scores to be the same in the 8th, 16th and 24th hours postoperative. In the study by Lee et al.,¹² in which they observed intraoperative hemodynamic and postoperative pain following shoulder arthroscopy, they used ropivacaine and ISPB and found VAS scores to be lower than in the placebo group 12 h postoperative. Singelyn et al.² observed VASr and VASm scores in the first 4 h postoperative and reported lower VASr values in the ISPB group than in the IA and control groups, and that these remained lower than in the IA group for 24 h. They reported that VASm values in ISPB group were lower than those of the suprascapular, control and IA groups in the

first 4 h postoperative, and were lower than the control and intra-articular groups for 24 h.

In our study, we evaluated postoperative VASr and VASm values in the first 2 h every 30 min, which was more frequent than previous groups. VASr values in the ISPB group in the first 2 h postoperative and VASm values in the first 4 h were lower than in the IA group, and were lower than in the control group for the first 6 h. In the IA group, VASr and VASm values in the 2nd, 4th and 6th hours postoperative were lower than those reported for the control group. However, after 12 and 24 h, VASr and VASm values were the same for all groups.

The postoperative 24-h patient satisfaction scores in the ISPB group were the highest, and those of the IA group were higher than those reported for the control group. Lee et al.⁴ also observed higher postoperative 24-h patient satisfaction scores in the ISPB group compared to control, suprascapular and axillary block groups, but they indicated that there were no differences at later time points.

Lee et al.¹² indicated that more stable hemodynamic profiles were reported in patients undergoing the ISPB application than in those receiving placebo. In our study, in the ISPB group, hemodynamic stability in the first 2 h postoperative was much better than in the control group and in the intra-articular group after 30 and 90 min.

Consequently, interscalene brachial plexus block was found to be more effective than intra-articular local anesthetic injection for postoperative analgesia in arthroscopic shoulder surgery.

Conflicts of interest

The authors declare no conflicts of interest.

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