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The Effect of Interscalene Brachial Plexus Block with a Single-dose Intra-articular Local Anesthetic on Postoperative Pain

Tek Doz İntraartiküler Lokal Anestezik ile İnterskalen Brakiyal Pleksus Bloğunun Postoperatif Ağrı Üzerine Etkisi

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Abstract

Aim: Postoperative pain management is important because shoulder surgery causes severe pain. In this present study our aim was to analyse the comparison of the influences of ultrasonography-guided interscalene block and perioperative intra-articular local anesthetic injection on postoperative pain in cases who will undergo arthroscopic shoulder procedure.

Material and Method: It was planned as a prospective randomized controlled trial. After the confirmation of the local ethical committee, our cases were randomly divided into two groups and one group (Group ISBPB) was administered general anesthesia after ultrasonography guided interscalene block. In the other group (Group LA), surgical procedure was carried out under general anesthesia and a single dose of intra-articular local anesthetic was administered peroperatively. Postoperative analgesia requirement, time, VAS scores, patient and surgeon satisfaction were registered.

Results: We could not obtain a statistically significance between group LA and group ISBPB groups according to gender, side, comorbidity, additional procedure and age variables in the participants included in the study ($p>0.05$). A numerically significance was observed between Group LA and Group ISBPB groups in terms of first analgesia requirement and patient satisfaction variables in the participants included in the study ($p<0.05$).

Conclusions: We observed that the application of interscalene block considerably decreased the requirement for postoperative analgesia compared to the application of intra-articular single dose local anesthetic. Concerns about the possibility of reducing the complications that may occur with ultrasound-guided interscalene block application and the possibility of chondrolysis with a single dose of intra-articular local anesthetic bring interscalene block to the fore.

Keywords: Shoulder arthroscopy, orthopedic surgery, local anesthetic

Öz

Amaç: Omuz cerrahisi şiddetli ağrıya neden olduğu için ameliyat sonrası ağrı yönetimi önemlidir. Bu çalışmada amacımız, artroskopik omuz cerrahisi geçirecek olgularda ultrasonografi eşliğinde interskalen blok ve perioperatif intraartiküler lokal anestezik enjeksiyonunun postoperatif ağrı üzerine etkilerinin karşılaştırılmasını incelemektir.

Gereç ve Yöntem: Prospektif randomize kontrollü bir çalışma olarak planlandı. Lokal etik kurul onayından sonra hastalarımız rastgele iki gruba ayrıldı ve bir gruba (Grup ISBPB) ultrasonografi eşliğinde interskalen blok uygulandıktan sonra genel anestezi uygulandı. Diğer grupta (Grup LA) cerrahi işlem genel anestezi altında yapıldı ve peroperatif olarak tek doz eklem içi lokal anestezik uygulandı. Postoperatif analjezi gereksinimi, süresi, VAS skorları, hasta ve cerrah memnuniyeti kaydedildi.

Bulgular: Çalışmaya alınan katılımcılarda cinsiyet, taraf, komorbidite, ek prosedür ve yaş değişkenlerine göre grup LA ve grup ISBPB grupları arasında istatistiksel olarak anlamlı bir fark elde edemedik ($p>0.05$). Çalışmaya alınan katılımcılarda ilk analjezi gereksinimi ve hasta memnuniyeti değişkenleri açısından Grup LA ve Grup ISBPB grupları arasında sayısal olarak anlamlılık gözlendi ($p<0.05$).

Sonuç: İnterskalen blok uygulamasının intraartiküler tek doz lokal anestezik uygulamasına göre postoperatif analjezi gereksinimini önemli ölçüde azalttığını gözlemledik. Ultrason rehberliğinde interskalen blok uygulaması ile oluşabilecek komplikasyonları azaltma olasılığı ve tek doz intraartiküler lokal anestezik ile kondroliz olasılığı konusundaki endişeler interskalen bloğu ön plana çıkarmaktadır.

Anahtar Kelimeler: Omuz artroskopisi, ortopedik cerrahi, lokal anestezik

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INTRODUCTION

Arthroscopic shoulder surgery is one of the most frequent orthopedic operations.[1] Postoperative pain is observed in major surgeries, especially in the first 48 hours.[2] As a result, opioid use may be needed for a few days due to pain following shoulder surgery.[3] Opioid requirement ranks third after gastrectomy or thoracotomy.[2] The application of only an opioid analgesic with shoulder surgery may cause opioid dependent side influences, including nausea, vomiting, itching, sleep disturbances, and constipation.[4] Surgeons are seeking ways to improve analgesia management without sacrificing the effectiveness of analgesia for shoulder surgery. Regional nerve blocks are commonly utilized in shoulder surgery to overcome acute surgical pain.[5] The administration of intra-articular local anesthetic has become increasingly popular among surgeons because it is easy to apply, provides effective analgesia, reduces the need for analgesics, and increases patient satisfaction.[6] An interscalene nerve block, which is another option in shoulder surgery, maintains perfect intraoperative anesthesia as well as muscle relaxation and analgesia in the postoperative period.[7]

In this present study, our aim was to investigate the influence of a single dose of intra-articular local anesthetic with an interscalene block on postoperative pain and patient and surgical satisfaction following shoulder surgery, which may induce serious postoperative pain.

Our aim in this study was to divide the patients who will experience arthroscopic shoulder surgery under general anesthesia into two groups, and to investigate the influences on postoperative pain, patient and surgical satisfaction after interscalene block application in one group and peroperative single dose intra-articular local anesthetic application in the other group.

MATERIAL AND METHOD

The research was initiated with the approval of the local ethics committee. We included cases planned for arthroscopic shoulder surgical procedure under general anesthesia. 61 patients with ASA classification I–III and older than 18 years were included. General anesthesia was given to 41 patients (Group ISBPB) after the interscalen block, while 20 patients (Group LA) were peroperatively given 20 cc of intra-articular 0.5% bupivacaine after general anesthesia.

The postoperative analgesic requirements of the two groups were recorded, and the results were compared. The patient exclusion criteria were the presence of coagulopathy, neuropathy, severe cardiopulmonary disease, local anesthetic drug allergy, local site infection, chronic opioid use, and a body mass index more than 35 kg/m².

Standard monitors, covering noninvasive arterial blood pressure, heart rate and peripheral pulse oximetry were utilized with the cases, and midazolam (0.05 mg/kg) and fentanyl (0.5 mcg/kg) were given as premedication after intravenous (IV) cannula was placed in the forearm. Following local skin infiltration carried out lidocaine (20 mg) for those in group ISBPB, long axis–guided (in-plane) imaging was performed with the nerve block ultrasound (Samsung HM70A with plus, Korea) linear probe (12L-RS, 7–11 MHz), and brachial plexus nerve roots at the C6 level were detected. A 21 G, 50 mm neurostimulation needle (B. Braun Melsungen AG, Germany) was advanced through the anterior and middle scalene muscles toward the nerve roots that form the brachial plexus (**Figure 1**). Regarding the absence of reply at currents smaller than 0.2–0.3 mA, to prevent the hazard of intraneural injection, a distal motor answer was detected at < 0.5 mA via a peripheral nerve stimulator (Stimuplex Dig RC, B. Braun Melsungen AG, Germany).

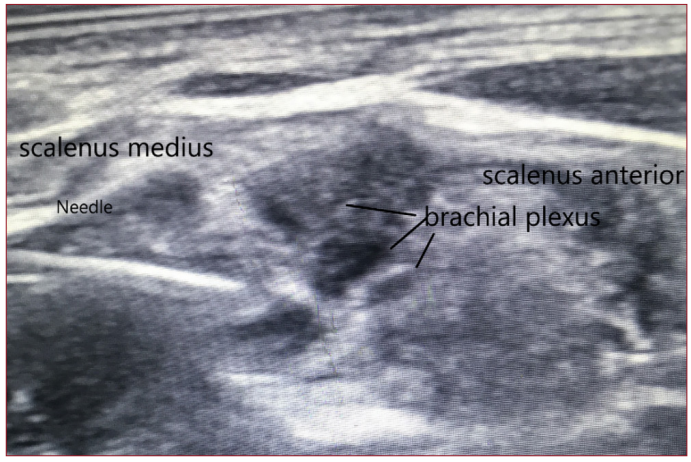

Figure 1. Interscalene block application with USG

Subsequently approving by negative aspiration that the needle was not intravascular, 0.5% bupivacaine (10 mL), 2% lidocaine (10 mL), and 2% prilocaine (10 mL) were injected around the roots of C5, C6, and C7. The dispersion of the local anesthetic, which expands the tissues and separates the nerve roots from other tissues, was monitored by ultrasonography (USG) to determine the involvement of the radial and median nerves. Sensorial involvement (incapability to define cold application) and motor involvement (failure to stretch the arm) were observed, so the block was considered sufficient.

The cases were transferred to the operating room, and fentanyl (1–2 µg/kg), propofol (2–2.5 mg/kg), and atracurium (0.6 mg/kg) were administered intravenously to the patients to induce provoke general anesthesia. After endotracheal intubation, maintenance 1–3% sevoflurane with nitrous oxide (50%) was given with oxygen (50%). A single dose of intra-articular local anesthetic was implemented to Group LA patients at the end of the operation: 0.5% bupivacaine 20 mL was administered intra-articularly through the port areas used at the end of the surgery by the surgeon. In the postoperative period, visual analog scale (VAS: 0=no pain; 10=most serious pain possible) scores were saved at 0, 1, 4, 6, 12, 24, and 36 hours. Paracetamol (1 gr) was applied intravenously to patients with a VAS score ≥4, and tramadol (0.5 mg/kg) was

applied intravenously to patients with a VAS score ≥4 one hour after the paracetamol (1 gr) IV administration.

Application times were recorded. The initial analgesic necessity and the total amount of analgesics over 24 hours were recorded. The course of the first analgesia was accepted as the time from the end of the surgery to the first demand for paracetamol (1 gr) IV.

Surgical Method

After appropriate antisepsis was applied to all patients, the first shoulder diagnosis was performed via the standard anterior and posterior portals. Cases with massive rotator cuff tears were excluded, while cases with partial rotator cuff tears were included. Arthroscopic single-row rotator cuff reparation and acromioplasty were performed with the help of the anterolateral portal. Arthroscopic biceps tenotomy was performed on eight patients included in the our study.

Statistical Analysis

The analyse of the research data was performed using SPSS Statistics 25. The Shapiro-Wilk test was utilized to analyse whether the data was appropriate for the normal distribution. The significative level (p value) was accepted as 0.05

Since normal distribution was provided in the variables (p>.05), parametric test methods were then applied. For comparisons of dependent pairs, since the supposition of normality was provided, paired sample t-test was conducted. In repeated measurements, variance analysis was utilized to analyze any differentiation among the groups, and multiple normal distribution and variance homogeneity controls were provided in the analysis. Analysis of variance (ANOVA) in recurrent measures is a generalized version of the test of significance of difference among two samples or more than two groups.

This technique is different from a one-way analysis of variance (ANOVA) in independent groups, that maintains to analyze alterations over time is maintained by it.[8] A two-way ANOVA for repetitive measures was used in cases where one of the factors had repetitions. In these trials, the first factor was groups, whereas the second agent was time. There were recurrent measurements on time, which was one of the factors. The goal was to examine whether there was any alteration in the dependent variable according to time differences among the experimental as well as control groups.[9] As an outcome of the analyse, both in-group and inter-group alterations based on time were compared. Additionally, the probability of rejection while the H0 hypothesis was true was I. The Type I error rate will reduce, and coherent outcomes will be acquired.[10] A chi-square analysis was performed in the categorical data analysis by creating cross tables.

RESULTS

Sixty-five cases were included in this present study. Four cases who underwent interscalene blocks were excluded from the study due to insufficient block formation. No statistically significance was observed among the participants included in the LA and ISBPB groups, according to gender, side, comorbidity, additional procedure, and age variables (p>0.05; **Table 1**). A homogeneous distribution was shown in the groups according to gender, side, additional diseases, additional surgeries, and age (**Table 1**). No statistically significance was detected among Group LA and Group ISBPB groups according to the variables of diagnosis, ASA Score and surgical satisfaction in the participants included in this present research (p>0.05, **Table 2**).

Table 1: Comparison of Groups by Distribution of Demographic Variables

Variable	Group		Group		Control	Test Value	P Value
			LA	ISBPB	Total		
Gender	Female	Number	10	24	34	0.396	0.529
		Percent	50.0%	58.5%	55.7%		
	Male	Number	10	17	27		
		Percent	50.0%	41.5%	44.3%		
Side	Rigth	Number	15	26	41	0.841	0.359
		Percent	75.0%	63.4%	67.2%		
	Left	Number	5	15	20		
		Percent	25.0%	36.6%	32.8%		
Comorbidite	No	Number	9	19	28	0.011	0.921
		Percent	45.0%	46.3%	45.9%		
	Yes	Number	11	22	33		
		Percent	55.0%	53.7%	54.1%		
Additional Procedure	Biceps Tenotomy	Number	2	2	4	3.452	0.063
		Percent	100.0%	33.3%	50.0%		
	Tenotomy	Number	0	4	4		
		Percent	0.0%	66.7%	50.0%		
TOTAL			20(%32.8)	41(%67.2)		61	
		Gruop	**Ort±Ss**		**Min-Max**	**Test Value**	**P Value**
Age		LA	52.2±13.6		19-79	-0.091	0.928
		ISBPB	52.56±15.03		18-80		

Test valuea; Chi-square Test value (2), Avg; mean, ss; standard deviation, Test Valueb; test of significance (t test) of the difference between two means, p value; statistical significance, *p<0.05; There is a statistically significant difference between the groups.

Table 2: Comparison of Categorical Variables Between Groups

Variable	Gruop		Gruop La	Gruop Isbpb	Control Total	Test Value	P Value
Diagnosis	Bancart Lesion	Number	10	14	24	1.402	0.236
		Percent	50.0%	34.1%	39.3%		
	Rotator Cuff Tear	Number	10	27	37		
		Percent	50.0%	65.9%	60.7%		
ASA Score	1	Number	7	13	20	0.128	0.721
		Percent	35.0%	31.7%	32.8%		
	2	Number	12	25	37		
		Percent	60.0%	61.0%	60.7%		
	3	Number	1	3	4		
		Percent	5.0%	7.3%	6.6%		
First Analgesia Need	1	Number	4	3	7	17.888	0.001*
		Percent	20.0%	7.3%	11.5%		
	2	Number	12	5	17		
		Percent	60.0%	12.2%	27.9%		
	3	Number	4	14	18		
		Percent	20.0%	34.1%	29.5%		
	4	Number	0	12	12		
		Percent	0.0%	29.3%	19.7%		
	5	Number	0	7	7		
		Percent	0.0%	17.1%	11.5%		
Surgical Satisfaction	No	Number	10	14	24	1.402	0.236
		Percent	50.0%	34.1%	39.3%		
	Yes	Number	10	27	37		
		Percent	50.0%	65.9%	60.7%		
Patient Satisfaction	No	Number	16	12	28	14.566	0.001*
		Percent	80.0%	29.3%	45.9%		
	Yes	Number	4	29	33		
		Percent	20.0%	70.7%	54.1%		

ASA (American Society of Anesthesiologists) Test value; Chi-square Test value (2), p value; statistical significance, *p<0.05; There is a statistically significant difference between the groups. No statistically significant difference was found between Group LA and Group ISBPB groups according to the variables of diagnosis, ASA Score and surgical satisfaction in the participants included in the study (p>0.05, Table2). The groups show a homogeneous distribution according to the variables of diagnosis, ASA Score and surgical satisfaction.

The groups show a homogeneous distribution according to the variables of diagnosis, ASA Score and surgical satisfaction. No statistically significance was detected among group LA and group ISBPB groups in each of the Duration of surgery (min), postoperative SBP mmHg, SpO_2 %, VAS24, VAS36 measurements of the participants included in the research (p>0.05, **Table 3**). The decrease in the period values measurements according to time in the patients in the LA group was detected to be numerically significant (p<0.05, **Table 4**). It was determined numerically significant that the period values measurements increased according to time in the patients in the ISBPB group (p<0.05, **Table 4**).

A numerically significance was detected between the participants included in the LA and ISBPB groups regarding first analgesia need and patient satisfaction variables (p<0.05). A numerically significance was observed among the LA and ISBPB groups in each postoperative DBP mmHg, HR, beats/min, VAS 0, VAS1, VAS4, VAS 6, and VAS 12 measurements of the participants included in the research (p<0.05). A numerically significance was detected between the groups (LA and ISBPB) in the change of VAS values of the patients in the study, according to time (p<0.05). Statistical significance was found in the period values measurements, which increased according to time in the inheritors in the ISBPB group (p<0.05).

Table 3: Comparison of Scores Between Groups

Variable	Gruop	Mean±Ss	Test Value	P Value
Duration Of Surgery (Min)	LA	126,05±37,88	0,096	0,923
	ISBPB	124,98±42,17		
Postoperative SBP Mm/hg	LA	135,4±11,68	1,988	0,051
	ISBPB	128,37±13,55		
Postoperative DBP Mm/hg	LA	85,4±10,4	2,419	0,019*
	ISBPB	78,32±10,89		
HR Beats/min	LA	84,95±4,29	2,375	0,021*
	ISBPB	79,59±9,61		
SpO_2 %	LA	96,8±1,01	-1,374	0,175
	ISBPB	97,24±1,26		
VAS 0	LA	2,2±0,7	12,469	0,001*
	ISBPB	0,17±0,54		
VAS 1	LA	3,9±0,79	8,171	0,001*
	ISBPB	1,73±1,05		
VAS 4	LA	5,65±0,81	5,298	0,001*
	ISBPB	4,05±1,22		
VAS 6	LA	6,85±0,99	3,804	0,001*
	ISBPB	5,61±1,28		
VAS 12	LA	6,65±0,93	5,298	0,001*
	ISBPB	5,05±1,18		
VAS 24	LA	4,25±0,79	1,064	0,292
	ISBPB	3,98±1,01		
VAS 36	LA	3,45±0,94	1,980	0,052
	ISBPB	3±0,77		

Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBB), HR: Heart Rate, VAS: Visual Analogue Scale Avg; mean, ss; standard deviation, Test Value; test of significance (t test) of the difference between two means, p value; statistical significance. There was no statistically significant difference between group LA and group ISBPB groups in each of the Duration of surgery (min), postoperative SBP mmHg, SpO_2 %, VAS24, VAS36 measurements of the participants included in the study (p>0.05, Table 3).

Table 4: Intra-Group and Inter-Group Comparison of Period Values

Gruop	Period	Ort±ss	Test Value1	p1 value	Test value2	p2 value
LA	VAS 0	2,2±0,7	0,082	0,001*	9,873	0,001*
	VAS 1	3,9±0,79				
	VAS 4	5,65±0,81				
	VAS 6	6,85±0,99				
	VAS 12	6,65±0,93				
	VAS 24	4,25±0,79				
	VAS 36	3,45±0,94				
ISBPB	VAS 0	0,17±0,54	0,026	0,001*		
	VAS 1	1,73±1,05				
	VAS 4	4,05±1,22				
	VAS 6	5,61±1,28				
	VAS 12	5,05±1,18				
	VAS 24	3,98±1,01				
	VAS 36	3±0,77				

Cover; mean, ss; standard deviation, Test Value1; test of significance between two spouses, Test Value2; ANOVA significance test in repeated measures F Value, p1 Value; intra-group comparison significance test result, p2 Value; There is a statistically significant difference between the results of the ANOVA significance test in Repeated Measurements between the groups, *p<0.05 **p<0.05, there is a statistically significant difference between the groups. A statistically significant difference was found between the groups (LA and ISBPB) in the time-varying variation of VAS values of the participants included in the study (p<0.05, Table 4). The decrease in the period values measurements according to time in the patients in the LA group was found to be statistically significant (p<0.05, Table 4). It was found statistically significant that the period values measurements increased according to time in the patients in the ISBPB group (p<0.05, Table 4).

DISCUSSION

We have shown in our study that ISBPB, which is utilized in postoperative pain management in arthroscopic shoulder surgical procedure, is performed safely with USG, significantly reducing the need for postoperative analgesia. We also found that although intra-articular local anesthetic applications are easy to apply, they do not provide adequate analgesia in shoulder surgery. Arthroscopic rotator cuff reparation is a standard process, and there is severe pain after surgery.[11] Nausea, vomiting, pruritus, ileus, urinary retention, sedation, respiratory depression, and hypotension can be observed associated with parenteral opioids used to provide analgesia for severe postoperative pain.[12] Multimodal analgesic approaches (e.g., paracetamol, nonsteroidal anti-inflammatory drugs, and tramadol) can decrease opioid necessity. On the otherhand, opioid consumption survives essential, especially following rotator cuff surgical procedure.[13] In shoulder surgical procedure, the subacromial or intra-articular local anesthetic administration, suprascapular block, axillary block, or interscalene block methods are used to provide postoperative analgesia.[14] ISBPB is widely used in shoulder surgical procedure. Anesthesiologists usually perform it before the operation, whereas the patient is awake.[15] The ISBPB block is at the level of the sixth cervical vertebra, which is the root/body level of the brachial plexus. Analgesia maintenance for shoulder surgery is provided by it, requiring the blocking of the C5–6 nerve roots that form the suprascapular, axillary (circumflex), and lateral pectoral nerves that innervate the shoulder or the upper trunk.[16] The ISBPB block is traditionally carried out by palpating the sternomastoid muscle and then posteriorly, in the groove among the anterior and middle ISBPB muscles. Between these two muscles, there is the brachial plexus for ISBPB.[16]

The most frequently confirmed motor replies to exact needlepoint position at this level are deltoid, lateral pectoralis, biceps, or triceps stimulation.[17] Nerves, surrounding anatomical structures, needle, and local anesthetic distribution can be visualized in USG-guided ISBPB application.[18] Thus, the needle can be repositioned even in the course of the injection, and the local anesthetic can be optimally distributed around the brachial plexus. As a result, there are studies showing that there will be a rise in the block success ratio.[19] A safe and effective blockade was achieved in our research by using both USG and peripheral nerve stimulators. ISBPB maintains easily tolerated postoperative analgesia in shoulder surgery than other postoperative analgesia procedures, but may have severe side effects. ISBPB blocking in cases with chronic respiratory disease or contralateral phrenic nerve palsy may lead to ipsilateral phrenic paralysis, potentially leading to acute respiratory failure. Therefore, it is contraindicated in these cases.[20] Additionally, the frequent risks (e.g., nerve injury and local anesthetic toxicity) associated with peripheral nerve blocks, ISBPB block is also related to a chance of pleural puncture. In addition, central neuraxial needle insertion has been associated with cervical spinal cord injury and permanent paralysis.[21] The best outcomes require a high level of expertise and familiarity.

Complications related to this procedure are associated with block experience.[22] ISBPB, which has been performed in our clinic for many years, has low complication rates with the use of USG. Malik et al.[23] also emphasized that regional anesthesia techniques reduce bleeding during surgery compared to general anesthesia. Preoperative ISBPB has been shown in one study to improve visual clarity for arthroscopic procedures.[24] Intra-articular local anesthetic administration is generally carried out by the physician at the end of the surgery just before the wound is closed. The joint space, subacromial space, or both are filled with 20–50 ml of local anesthetic, followed by catheter insertion.[25] We administered a 20 cc 0.5% bupivacaine injection peroperative intra-articularly in our study. In clinical research, researchers stated that a single dose of bupivacaine administered intra-articularly decreased postoperative pain scores in the early postoperative course. They also stated that it did not affect the need for analgesics or patient satisfaction.[26]

On the other hand, in a recent study, concerns were expressed about the probability of iatrogenic chondrolysis related to intra-articular local anesthetic.[27] Joint infiltration at the end of the process is an alternative method for pain management. Though intra-articular injection of morphine has been detected to be useful in the knee.[28] Scoggin et al.[26] reported no beneficial effects of intra-articular and/or subacromial morphine after arthroscopic shoulder surgical procedure. The positive impacts of intra-articular morphine use in the knee were thought to be due to tourniquets. However, bupivacaine seems to have a superior influence when applied intra-articularly through the shoulder joint than morphine. Singelyn et al.[29] detected that a significant analgesic effect was not provided by a single dose of intra-articular bupivacaine in comparison with the peripheral nerve blocks. This procedure was clarified by diluting the local anesthetic with irrigation fluid. Barber and Herbert examined 50 cases who underwent arthroscopic surgery procedure for rotator cuff tears, superior labral anterior and posterior lesions, and subacromial impingement syndrome and detected that a subacromial or intra-articular injection of 0.5% bupivacaine was efficient.[30]

Harvey et al.[31] declared similar outcomes with the utilization of ropivacaine in 24 cases who experienced subacromial decompression. In a study comparing single-dose intra-articular local anesthetic administration, interscalene block, interscalene catheter, and local anesthetic infusion methods, researchers reported that VAS values were lower in interscalene block and continuous interscalene catheter groups.[29] In a clinical study, researchers stated that a single dose of bupivacaine administered intra-articularly decreased postoperative pain scores in the early postoperative course and also stated that it did not affect the need for analgesics or patient satisfaction.[26] Lee et al.[32] and Nisar et al.[33] declared

that ISBPB blocks reduced VAS scores in the postoperative 12 h, but this effect did not extend up to 24. When the VAS values were compared in terms of VAS 0, VAS1, VAS4, VAS 6, and VAS 12 values, they were lower in the ISBPB group ($p<0.001$*) in our study. There was no numerical differentiation among the VAS 24 and VAS 36 values. We believe that preoperative interscalene block application is effective in lowering early period values. In their studies of ISBPB performed under ultrasound guidance, Ghodki et al.[34] showed that postoperative pain improved significantly with an ISBPB plexus block. A numerically significance was detected among the postoperative DBP mmHg, HR, beats/min, LA, and ISBPB groups of the participants included in our study ($p<0.05$; **Table 3**). We believe that this is due to the effect of the preoperative interscalene block. Additionally, VAS values were lower than in the LA group in the later hours of the ISBPB. The limitations of our study are the small number of patients and unequal groups.

CONCLUSION

ISBPB was advantageous in all aspects, with its superiorities over intra-articular local anesthetic administered in our study. Developing technologies and the increase in the experience of anesthetists in using USG in peripheral nerve blocks allow ISBPB to be performed safely. When compared in terms of VAS values, it was found to be significantly lower in the ISBPB group. Finally, ISBPB is brought to the fore by the concern of intra-articular local anesthetics causing chondrolysis.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Malatya Clinical Research Ethics Committee (Date: 05.09.2021, Decision No: 2021/68).

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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