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Editorial

What should we do to ameliorate the quality of interfascial plane blocks? Is dual block the answer sought or a waste of effort?

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The use of ultrasound-guided interfascial plane blocks in pain medicine is becoming more common, and it is included in the perioperative analgesia practice of many centers. In the last decade, many new interfascial blocks such as erector spinae plane block (ESPB), serratus anterior block (SAB), rhomboid intercostal block (RIB) have been described, and they have taken their place among the most frequently applied analgesia techniques from thoracic region analgesia. Since paravertebral block is an advanced regional anesthesia technique and its possible complications are unsettling, clinicians prefer interfascial plane blocks. Since these new techniques are not as satisfactory as the PVB they are intended to replace, it is seen that new updates are frequently tried.

First of all, what is dual block, and what do we mean by dual block in this article? The term USG guided dual block was first used in the application of TAP blocks from four different points by Borglum et al. [1]. But in this article we; We will use the term dual block for an entirely different purpose, as it has been used in recent years.

Dual block is the application of local anesthetic (LA) to two different anatomical targets with a single needle insertion, which was aimed to increase the effect of an interfascial plane block introduced for sensory blocking of any anatomical area and to improve the anesthetic quality. We would like to clarify the anatomical targets in these blocks and the expected purpose by giving examples.

- To block the spared cutaneous branches of nerves targeted in a fascial plane block in a more superficial or deeper fascial plane.
- Blocking other nerves involved in the innervation of the area where the fascial plane block is targeted for the sensory block.
- Facilitate LA spread beyond the injection point with a fascial plane block.
- In the event of anatomical variations in the route of a nerve thought to travel in a plane or potential space, ensuring to block both variations.

In some dual block applications, several of these scenarios can be targeted, such as the study by Zengin et al. [2], where superficial and deep serratus blocks were combined. In this combination, the authors' aim was to block the lateral cutaneous branches of the superficial intercostal nerves proximal to the deep injection point, and the thoracodorsal, long thoracic and intercostobrachial branches (or vice versa). However, when examined anatomically, it will be seen that the thoracodorsal nerve and the long thoracic nerves are pure motor nerves. The intercostobrachial nerve is the lateral cutaneous branch of the second intercostal nerve and is involved in the sensory innervation of the axillary region. It is seen that additional blocking of these three nerves will not provide additional benefit in biportal VATS application. If so, we should consider the mechanism presented in scenario 1. By applying high volume LA to the facial plane deep in the serratus muscle -increasing transverse and craniocaudal spread- a wider cutaneous analgesia/anesthesia area is achieved, or by dual injection?

In a case report using block combination (Deep and superficial serratus) in the literature, Maranto et al. [3] reported their successful application to a patient with postmastectomy pain syndrome. When this article is examined, it is seen that the patient also has severe pain in the axillary region, in which case this combination may be considered rational since intercostobrachial nerve blockade is also required in the patient. In another case series dealing with SAP block in postmastectomy pain syndrome [4], they reported that deep SAP block was more effective than superficial. However, it should not be forgotten that the blockage area required to cope with

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acute or chronic pain after breast surgery and the requirements after biportal VATS will be quite different.

Dual injections will perhaps be indispensable in regional anesthesia applications in the near future. However, in the determination of dual injection, the area where the sensory blockade is intended, the nerves innervating that area and the possible routes of these nerves and possible variations in these routes should be taken into account. Dual injections without these considerations will be wasted time rather than being the key to the success of fascial plane blocks.

In this paper, we focused on the thoracic region. Of course, the type of surgery and port entry sites will differ according to the location of the tumor, and the appropriate regional. anesthesia technique should be used in the appropriate patient. Here, we have brought to the attention of the readers some anatomical clues that we want to guide in the planning phase of studies where different combinations will be applied in the future. In our upcoming issues, we will continue to discuss dual blocks created by fascial plan blocks in the abdominal region and other regions. Sometimes the key may be high volume to the anatomically rational plane.

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Author Contributions

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Data Availability

The datasets created and/or analyzed during the current study are not publicly available, but are available from the corresponding author upon reasonable request.

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Research Article

Evaluation of Analgesic Nociceptive Index in intraoperative and postoperative pain management in general anesthesia applied with two different methods

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ABSTRACT

Aim: Effectiveness of analgesic nociceptive index (ANI) monitoring in predicting both intraoperative and postoperative early pain in neurosurgery patients undergoing lumbar spinal surgery. The patients were administered general anesthesia using different anesthesia management techniques.

Method: The study included a total of 60 patients with American Society of Anesthesiologist (ASA) I-III. The patients were randomly divided into two groups of 30 each using the closed envelope method. Group T received total intravenous anesthesia (TIVA) with remifentanil-propofol, while Group D with desflurane-remifentanil. Non-invasive ANI monitoring was applied to patients undergoing lumbar spinal surgery, and ANI, heart rate, systolic/diastolic arterial pressure values were recorded before and after induction, skin incision, major muscle incision, laminectomy, right-left fasciectomy, screw fixation, after extubation and during the postoperative period. Postoperative heart rate, ANI value, mean arterial pressure values, and visual analog scale (VAS) values were measured.

Results: No statistically significant difference was found in terms of the demographic data of the patients. According to the groups, no statistically significant difference was found between the ANI and VAS measurements of the cases at the postoperative 5th minute (P=0.261), postop 10th minute (P=0.379), postop 15th minute (P=0.673), postop 30th minute (P=0.784) and postop 60 minute (p =0.750).

Conclusions: In our study on lumbar spine surgery, we could not detect any significant relationship between ANI monitoring and VAS values in the early postoperative period. There was no difference in ANI and VAS with either anaesthetic technique. In light of the results of our study, we believe that more studies are needed on the use of ANI monitoring in the early postoperative period.

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1. Introduction

The role of anesthesia and anesthesiologist in lumbar spinal surgery is very important not only in the intraoperative period but also in the entire perioperative period and postoperative rehabilitation to discharge. In addition to providing appropriate anesthesia during surgery, the anesthesiologist is especially responsible for providing adequate pain control in the postoperative period to maintain the normal respiratory and cardiovascular functions of the patient [1]. Postoperative pain is a type of acute pain that begins with surgical trauma and gradually decreases as tissues heal. Applicable and acceptable pain management after surgery is an important factor that accelerates recovery and shortens hospital stays [2]. Postoperative pain is affected by many factors including the location, type, duration, incision type and size of the surgery, the patient's approach to pain, physical and mental status, preoperative preparation of the patient, type of anesthesia, pain treatment before and after surgery, previous pain experiences, presence of preoperative pain, incidence of surgical complications, quality of postoperative care and environmental factors [3]. While the importance of starting pain management in the preoperative period is emphasized, the anesthesia method used in the intraoperative period and the drugs used are important components of postoperative pain management [4]. For anesthesiologists, adequate suppression of the sympathetic response is considered a requirement for good anesthesia. Since methods that can measure this suppression may serve as a guide for the maintenance of anesthesia, studies on this subject have gained momentum in recent years. Analgesia Nociception Index (ANI), which measures the tone of the parasympathetic autonomic nervous system during anesthesia and shows the nociception-analgesia balance and thus the adequacy of analgesia in the perioperative period, has emerged as a parameter in recent years [8,9]. ANI is a numerical value ranging from 0 to 100. Below 30 indicates severe pain, between 30-50 indicates moderate pain, and between 50-70 indicates adequate analgesia [5].

In this study; we aimed to compare the importance of analgesic nociceptive index (ANI) monitoring in predicting both intraoperative and postoperative early pain in neurosurgery patients who underwent general anesthesia with different anesthesia management and in patients who underwent lumbar spine surgery, where there are almost no similar studies in the literature.

2. Material and Method

Our study was designed as a prospective randomized controlled study and approved by the Harran University Faculty of Medicine Clinical Research Ethics Committee (dated 04.01.2021 and Session no. 01, and Ethics Committee Decision Approval no. 20). We conducted the study in accordance with the Declaration of Helsinki. The study comprised of 60 patients between the ages of 18-65 years, with American Society of Anesthesiologist (ASA) I-III Classification and diagnosed with spinal stenosis. These patients were scheduled to undergo elective L4-5 Lumbar spinal stabilization under general anesthesia, after obtaining written and verbal informed consent.

2.1. Inclusion criteria of patients in the study

Our study included patients between the ages of 18-65 who were evaluated preoperatively and classified in the ASA I, II, III risk group. Pregnant and breastfeeding patients, patients with uncontrolled hypertension and diabetes were not included in the study. Patients with significant cardiac pathology, in sinus rhythm, who had not received intraoperative administration of epinephrine, phenylephrine, atropine, B-blockers, and clonidine, and who had no significant preoperative chronic pain, no autonomic nervous system disorders, and no psychiatric disorders were included. Additionally, patients who were cooperative and oriented, had no intubation difficulties, and agreed to participate in the study were included.

2.2. Study groups

The patients were randomized into 2 groups with equal numbers by closed envelope method before surgery. A total of 60 patients were included in the study. Two different anesthesia management techniques were used; one was total intravenous anesthesia (TIVA) and the other was inhalation anesthesia (desflurane). Patients were divided into two groups of 30 patients each by closed envelope method; group T was total intravenous anesthesia (propofol/remifentanil) and group D was inhaled anesthesia (desflurane/remifentanil).

2.3. Monitoring

The patients included in the study were brought to the operating room without premedication and routine monitoring including Electrocardiography (ECG), heart rate (HR), Noninvasive blood pressure (NIBP), Mean Arterıal Pressure (MAP) peripheral oxygen saturation (SpO_2), End Tidal Carbon dioxide (ETCO2), was performed. In addition to standard anesthesia monitoring, Bispectral index (BIS) monitoring was used in all patients of both groups before induction. In 60 patients undergoing spinal stabilization, an ANI pallet was placed noninvasively 2 cm below the xiphoid process of the sternum and an ECG pallet was placed in the region corresponding to the V5 chest lead. ANI values were recorded before and after induction, skin incision, incision of major muscles, laminectomy, right-left fasciectomy, screw topping, extubation and postoperative period. ANI V1 monitor (Mdoloris Medical Systems) was used for ANI.

2.4. Anesthesia practices and data collection

All patients included in the study underwent standard anesthesia induction. Anesthesia induction was achieved with intravenous (IV) propofol 2-3 mg/kg, IV fentanyl 2 mcg/kg and IV rocuronium bromide 0.6 mg/kg using the same induction agents. After adequate depth of anesthesia and muscle relaxation were achieved, the patients were intubated by the same anesthesiologist.

Anesthesia maintenance was provided with desflurane with a minimum alveolar concentration (MAC) of 1 in Group D. In Group T, propofol infusion was started at a dose of 12 mg.kg'1 and decreased to 9 mg.kg'1 after 20 minutes, 6 mg.kg'1 after 40 minutes and 4 mg.kg'1 after 60 minutes. Propofol was administered with 0.05-0.3 mcg/kg/min IV remifentanil infusion. The depth of anesthesia was adjusted according to the BIS value after induction. The BIS value was titrated to be in the range of 40-60. During anesthesia maintenance, oxygen-dry air mixture was given to all patients at a rate of 4L.min'1 at a rate of 50% O_2.

Among the parameters we examined, HR, NIBP and ANI values were measured before anesthesia, before induction, after induction and during the operation for 5 minutes in the first 30 minutes and 30 minutes after 30 minutes at 30 minute intervals. HR, NIBP and ANI values were recorded after skin incision, major muscle incision, laminectomy, right-left fasciectomy, screw fixation and discectomy.

In hypotensive anesthesia, a range of 50-65 mmHg was targeted in patients without hypertension and a range of MAP values of up to 30% of the baseline MAP value was targeted in patients with hypertension. Increases in MAP were controlled by increasing the remifentanil dose between 25-100%.

2.5. Surgical procedures

All surgeries were performed by the same surgical team. By making a classical midline incision, anatomical layers were passed and the facet joints were reached. Transpedicular screws were placed under scope guidance, preserving the adjacent facet joints. The screws were joined with the help of rods. Decompression and foraminotomies were performed based on imaging and patients' symptoms.

2.6. Postoperative follow-up

All patients participating in the study were administered analgesia with IV paracetamol 1 g/100 mL and IV tramadol 100 mg 30 minutes before the end of the surgery. HR, NIBP and ANI were measured at 5, 10, 15, 30, 60, 90, and 120 minutes after extubation. In addition, all patients were given detailed information about VAS in the preoperative period and their postoperative pain levels and VAS values were questioned and recorded at the 5th, 10th, 15th, 30th, 60th, 90th, and 120th minutes.

2.7. Statistical method

Statistical analysis and evaluation of the study were conducted using the NCSS (NumberCruncher Statistical System) 2020 statistical software (NCSS LLC, Kaysville, Utah, USA). Quantitative variables were reported using mean, standard deviation, minimum, and maximum, while qualitative variables were reported using descriptive statistical techniques such as frequencies and percentages. To assess data suitability to a normal distribution, the Shapiro-Wilks test and boxplot graphs were applied. Mann Whitney-U test was used to evaluate two quantitative groups with normal distribution. Student t-test (for normal data) was used to compare numerical data between two groups, while the Chi-square test was done to observe the relationship between categorical data. Spearman's correlation analysis was used to identify the relationships between variables. The results were evaluated at 95% confidence interval and significance at a p-value of less than 0.05. Sample size was calculated based on published ANI studies to detect a stimulus-induced difference of 15%, with an alpha-error of 0.05 and 90% power [9,11].

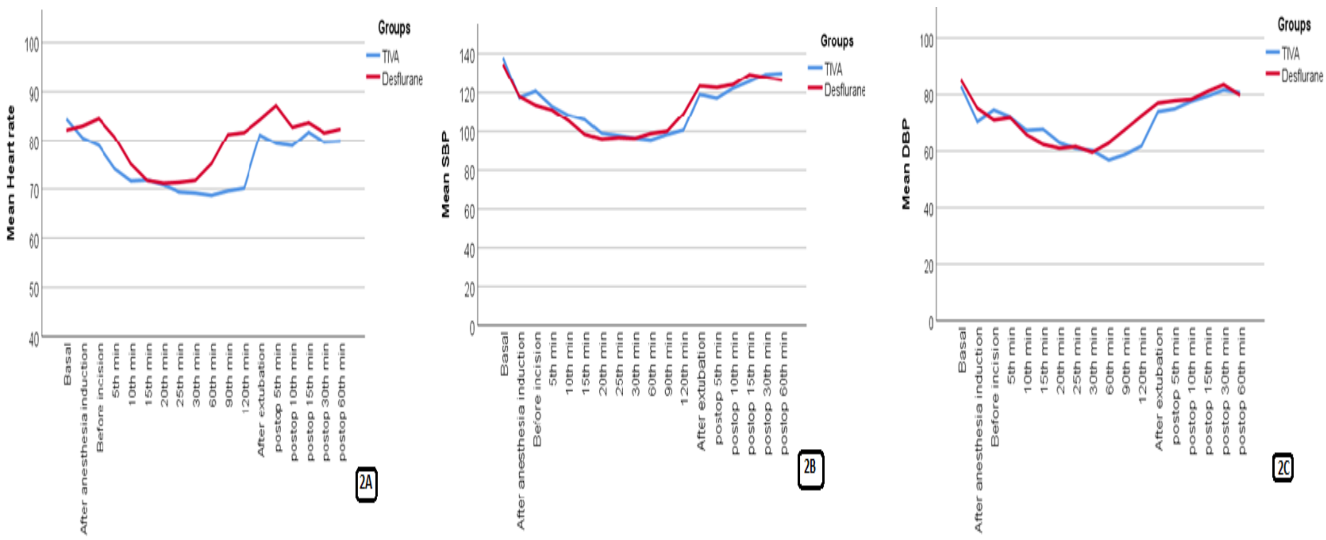
3. Results

A total of 60 patients between the ages of 27 and 64 were included in the study. Demographic data is provided in Table 1 and Fig. 1 shows the Consort Diagram.

Table 1. Distributions of descriptive features.

		Group T	Group D	*p* values
Age (years)		47.23 ± 10.04	46.73 ± 8.78	0.838*
BMI (kg/m²)		27.73 ± 3.28	28.67 ± 3.76	0.307*
Gender	female	17	19	0.598^0
	male	13	11	
ASA	ASA 1	12	8	0.273^0
	ASA 2	18	22	
Comorbidity	yes	9	14	0.184^0

The data are presented as mean ± standard deviation or number.
BMI: Body Mass Index. ASA: American Society of Anesthesiologists.
^{0}Chi-square test. *Student t test.



SBP: Systolic Blood Pressure DBP: Diastolic Blood Pressure TİVA: Total intravenous anesthesia 2A:Heart Rate Values 2B: SBP Values 2C: DBP Values

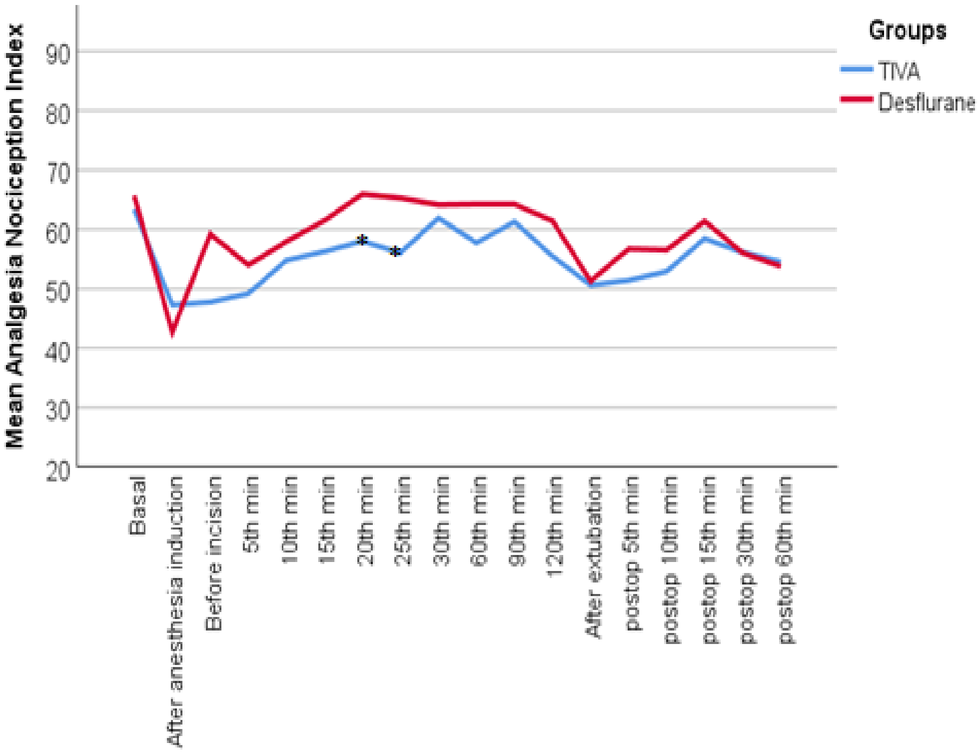
Fig. 1. The mean Heart Rate, SBP and DBP values for perioperative and postoperative period.

Heart rate measurements during surgery were significantly higher in Group D compared to other group at 90th and 120th minutes, during skin incision, and incision of major muscles (p: 0.005, p: 0.005, p: 0.005, p: 0.010, p: 0.008, respectively). However, there was no significant difference in systolic blood pressure measurements between the groups. Diastolic blood pressure measurements were significantly higher in Group D at 60th, 90th, and 120th minutes (p: 0.026, p: 0.010, p: 0.004, respectively).

During surgery, ANI values were significantly higher in Group D than in the TIVA group at 20th minute and 25th minute (p: 0.040, p: 0.025 respectively). No significant differences were found between the groups at other time intervals (Fig. 2).

There was no statistically significant difference (p>0.05) between the ANI measurements of the subjects during extubation, postoperative 5, 10, 15,30 or 60 minutes between the groups (Table 2).

There was no statistically significant difference (p>0.05) between the VAS measurements of the subjects during extubation postoperative 5, 10, 15, 30 or 60 minutes between the groups (Table 3).



ANI: Analgesia Nociception Index TİVA: Total intravenous anesthesia

Fig. 2. The ANI values for perioperative and postoperative period.

Table 2. Comparison of ANI measurements by groups.

ANI		Group T (*n*=30)	Group D (*n*=30)	*p* values
Extubation	Mean±SD	50.6±16.42	51.27±19.58	[a]0.836
Postop 5th min	Mean±SD	51.4±14.89	56.70±19.62	[a]0.261
Postop 10th min	Mean±SD	52.9±18.19	56.53±18.93	[a]0.379
Postop 15th min	Mean±SD	58.43±15.81	61.37±19.73	[a]0.673
Postop 30th min	Mean±SD	56.13±14.28	56.03±16.88	[a]0.784
Postop 60th min	Mean±SD	54.53±14.06	53.77±15.19	[a]0.750

[a]MannWhitney-U Test

Table 3. Comparison of VAS measurements by groups.

VAS		Group T (*n*=30)	Group D (*n*=30)	*p* values
Postop 5th min	Mean±SD	4.00±1.34	3.97±0.96	[a]0.830
Postop 10th min	Mean±SD	4.73±1.36	4.77±0.97	[a]0.700
Postop 15th min	Mean±SD	5.17±1.46	5.23±1.07	[a]0.659
Postop 30th min	Mean±SD	5.93±1.51	5.80±1.19	[a]0.849
Postop 60th min	Mean±SD	6.37±1.25	6.23±1.10	[a]0.721

[a]MannWhitney-U Test

When the postop 5th minute VAS measurements of both groups were classified according to the value of 3, there was no statistically significant difference between the postop 5th minute ANI measurements ($p>0.05$). In all cases, there was no statistically significant difference between postop 5th minute ANI measurements when classified according to VAS 3 value ($p>0.05$).

In Group T, there was no statistically significant difference between the postop 5th minute ANI measurements when the postop 5th minute VAS measurements were classified according to the value of 5 ($p>0.05$). In Group D, there were no cases with a VAS value above 5. In all cases, when classified according to VAS value 5, there was no statistically significant difference between postop 5th minute ANI measurements ($p>0.05$).

There was no statistically significant correlation between postop 5th min VAS measurements and ANI measurements ($p>0.05$).

4. Discussion

Our study was designed as a combination of these two studies and compared desflurane/remifentanil with propofol/remifentil anesthesia management in patients undergoing lumbar spinal surgery. Although desflurane initially produced slightly higher ANI data than TIVA, this difference was not statistically significant. We were unable to find a correlation between VAS and ANI values in patients under anesthesia.

The most basic expectation in the administration of anesthesia is to maintain hemodynamic stability, prevent metabolic and endocrine responses, and avoid side effects with low-dose drug use during the administration of anesthesia, maintenance and postoperative period. The anesthetic technique and agent to be selected are of great importance in meeting these expectations. The different effects of general anesthetics on nociceptive pathways may affect the development of postoperative pain. Inhalational and intravenous are the two major methods of administering general anaesthesia. Volatile Induction and Maintain Anesthesia (VIMA) and TIVA are the prominent methods in general anesthesia management. The effects of these anesthesia methods on postoperative pain have always been wondered and studies have been conducted [6].

There have been a limited number of randomized controlled trials comparing inhalation anesthesia with TIVA using propofol, in terms of postoperative acute pain scores or opioid consumption. Overall, there is a relative lack of clinical evidence in this area, partly due to the absence of objective methods of pain assessment. Although postoperative VAS and Numerical Rating Scale (NRS) are mostly used to measure pain, intraoperative measurements are less reliable. Our study is the first to explore VAS and analgesic nociceptive index parameters in the literature.

It is important for anesthesiologists to ensure that the patient's sympathetic response is adequately suppressed during anesthesia. In recent years, a new parameter called ANI has emerged which measures the tone of the parasympathetic autonomic nervous system. This parameter helps to determine the balance between nociception and analgesia during the peroperative period, and can be used to assess the adequacy of analgesia [8]. ANI has been used both intraoperatively and postoperatively in studies involving various surgical cases and different results have been obtained. In bariatric and breast surgery, ANI guidance resulted in a reduction in intraoperative opioid consumption, but no postoperative benefit was proven in these studies [9,10]. In another study, it was reported that during laparoscopic cholecystectomy, intraoperative opioid dose was not reduced with ANI guidance and no postoperative benefit was proven [11]. In our study, we used VAS and ANI parameters for both intraoperative and postoperative analgesia and anesthesia management in patients we received with two different anesthesia methods. We detected a significant difference in the ANİ in Group D compared to Group T at the intraoperative 20th and 25th minutes. However, no significance in this sense could be detected in other time periods. The fact that the significant time intervals coincided especially with the moment of fasciotomy suggests that more extensive research should be conducted on this subject, even though no significant difference was detected in other time intervals.

However, there is no consensus on which anesthetic agent will improve the correlation of the ANI with subjective pain measures, probably because studies compare different types of anesthetics as well as their respective heterogeneity [12]. In a study involving 200 patients anesthetized with a halogenated agent or propofol/remifentanil, Boselli et al. showed that the performance of the ANI in detecting moderate to severe pain was very good for patients anesthetized with a halogenated anesthetic [13]. In contrast, other authors have reported poor performance of the ANI for postoperative pain assessment in patients anesthetized with a halogenated agent [14,15]. In our study, we detected the only significant difference in group D. In this sense, our study is parallel to these studies in the literature.

As with any surgical procedure, there will be severe post-operative pain, especially after lumbar spinal surgery. Many factors are involved in the development of this pain. One of them is the postoperative inflammatory response of the tissue and the long-term use of automatic retractor systems attached to the paravertebral muscles during lumbar spinal surgery. As a result of prolonged paravertebral muscle retraction, edema and inflammation are observed in the paravertebral muscles [16]. In a study conducted in this type of surgery, the effects of anesthesia management on intraoperative and postoperative pain were compared between propofol-remifentanil and sevoflurane-remifentanil anesthesia with the help of ANI in terms of its importance in early postoperative pain prediction. While there was no difference between mean ANI at all measurement times in both groups, ANI measurements after perioperative analgesic drug administration were significantly higher than baseline values in both groups. They found a correlation between ANI and VAS mean values after anesthesia [17]. In another study close to ours, the effect of intraoperative propofol-based total intravenous anesthesia on postoperative pain in lumbar spinal surgery was compared with desflurane anesthesia, but ANI monitoring was not performed in this study. In conclusion, the study showed that patients using TIVA reported significantly less pain than patients receiving desflurane-based inhalation anesthesia; this was reflected in lower mean NRS pain scores on day 1 and less fentanyl consumption on postoperative day 2. They also showed that TIVA-propofol anesthesia provided a more effective effect in relieving pain with a decrease in opioid consumption during the first 2 days after surgery [18]. Our study was designed as a combination of these two studies and compared desflurane/remifentanil with propofol/remifentil anesthesia management in patients undergoing lumbar spinal surgery and performed intraoperative and postoperative follow-up with ANI. As a result of our study, heart rate measurements were significantly higher in the desflurane group at 90th and 120th minutes intraoperatively, during skin incision and incision of major muscles, and diastolic blood pressure measurements were significantly higher in the desflurane group at 60th, 90th, and 120th minutes. Although we say that the patient was in pain at the moments when these values were significantly higher, the ANI value did not parallel this. In the measurements of ANI values between groups, it was found to be significantly higher in the desflurane group than in the TIVA group during intraoperative 20th minute, 25th minute and fasciectomy, but it does not agree with the hemodynamic parameters in this time period. The ANI values drop with Induction of anaesthesia to between 30-50 from a baseline of 70. We attribute this decrease to the pain caused by the anesthesia drugs we use during induction and the response of hemodynamics during intubation. Apart from this, there was no difference in the ANI values at the 5th postoperative minute and the correlation with the VAS when analyzed in detail.

It is important to note several limitations of this study. Firstly, this was a single-center observational study and the results may not be applicable to all types of surgery. Secondly, patients with arrhythmias who were taking medications that affect heart rate variability (such as ephedrine, phenylephrine, atropine, neostigmine or beta-blockers) or chronic analgesics were excluded, and their effects are unknown. Finally, we were unable to perform blood sample analysis of propofol and remifentanil plasma levels in our patients. We adjusted propofol and remifentanil dosing targets based on target BIS and previous doses of propofol.

5. Conclusions

Similar analgesia can be achieved with both remifentanil-propofol and desflurane- remifentanil administration in spinal stabilization surgeries. Based on the data collected in this study, we could not detect a correlation between VAS and ANI values in patients under the influence of anesthetic agents. We recommend that more studies be conducted to contribute to the literature on this subject.

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Conflict of Interest

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Author Contributions

All of the authors made substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data; were involved in drafting the manuscript or revising it critically for important intellectual content; and gave final approval of the version to be published.

Data Availability

The datasets created and/or analyzed during the current study are not publicly available, but are available from the corresponding author upon reasonable request.

Ethics Approval and Consent to Participate

This study was approved by the ethics committee of Harran University Faculty of Medicine Clinical Research Ethics Committee (dated 04.01.2021 and Session no. 01, and Ethics Committee Decision Approval no. 20). All methods were performed in accordance with relevant guidelines and regulations.

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Research Article

Comparison of the analgesic effects of different bupivacaine concentrations in continuous femoral block after total knee arthroplasty surgery

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ABSTRACT

Aim: In regional anesthesia practice, anesthesists' goal must be to use the lowest effective concentration of local anesthetics to provide sufficient pain relief while minimizing side effects and complications. This study was designed to compare the analgesic efficacy of two different concentrations of bupivacaine (0.125% and 0.1%) in continuous femoral block for postoperative analgesia.

Method: In this study, fifty patients were enrolled, all of whom underwent femoral nerve block catheterization. The block procedure involved the administration of 30ml of bupivacaine solution at a concentration of 0.25%. Following a thirty-minute interval post-block application, patients underwent knee surgery under general anesthesia. During the closure of subcutaneous tissues, an additional 10ml of bupivacaine solution was injected through the catheter. Two groups were formed based on the concentration of the solution administered: Group(0.125%) received bupivacaine at a concentration of 0.125%, while Group(0.1%) received it at a concentration of 0.1%. Subsequently, upon arrival at the postoperative care unit, infusion through the catheter commenced at a rate of 10ml/h-1, maintaining the same concentrations for both groups. In addition to the nerve block, all patients were provided with intravenous Patient Controlled Analgesia (PCA) devices containing morphine for pain management. Throughout the postoperative period, sensory and motor block levels, Numerical Rating Scale (NRS) values for static and dynamic pain assessment, total morphine consumption, morphine demand, as well as any observed side effects and complications, were meticulously recorded for analysis.

Results: Postoperatively the NRSstatic values at 24th and 48th hours and NRSdynamic values at the 24th hour were higher in Group(0.1%) and it was statistically significant(p<0,007). And at 48th hour, morphine consumption was significantly higher in Group(0.1%) (*p*<0,05).

Conclusions: In our study, all patients across both experimental groups initially experienced satisfactory analgesia. However, within the 24-hour postoperative period, Group(0.1%) exhibited a decline in the quality of analgesia, necessitating increased utilization of rescue analgesics. This escalation in rescue analgesic use was associated with a higher incidence of adverse effects and reduced patient comfort levels within this group. Consequently, our findings indicate that the 0.125% concentration of bupivacaine yielded superior efficacy compared to the 0.1% concentration in the context of continuous femoral block administration.

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1. Introduction

While being used for achieving surgical anesthesia, regional anesthesia techniques are now commonly preferred for postoperative pain treatment as well. The advancements of pain therapy underscores the preference for central neuroaxial and peripheral nerve block techniques. Following total knee arthroplasty surgery, there happens notable pain, edema, and muscle spasm, with the initial 48 hours being particularly challenging. Effectively managing this pain is crucial for patients to regain muscle strength, enhance joint mobility, and facilitate early mobilization [1].

Postoperative pain therapy utilizes systemic intravenous drugs (opioids, nonsteroidal anti-inflammatory drugs, muscle relaxants, antidepressants, etc…), epidural blockage, and peripheral nerve blockage techniques. Intravenous methods provide sufficient analgesia at rest, but patients in motion may experience pain, and reflex spasm of the quadriceps femoris muscle that cannot be avoided. Hence, regional anesthesia techniques are often preferred. Advances in nerve stimulators, ultrasound-guided nerve locating techniques, and continuous analgesia with catheters have contributed to the successful application of nerve blockages [2-5]. In contemporary clinical practice, while nerve blockades traditionally relied solely on nerve stimulators, ultrasound-guided techniques have gained prominence and preference. This shift is attributable not only to the heightened success rates achieved with reduced procedural duration but also to the enhanced safety profile afforded by ultrasound guidance. Through real-time visualization of both nerves and peripheral tissues, ultrasound guidance ensures greater precision, mitigating the risk of inadvertent intraneural injection-induced nerve damage during the procedure [3].

The principal objective of rehabilitating patients following total knee arthroplasty (TKA) is to attain optimal extension and flexion range of motion within the knee joint. This endeavor is chiefly facilitated by the functionality of the quadriceps femoris muscle, which receives innervation from the femoral nerve.

In the realm of unilateral anesthesia or analgesia, femoral and sciatic nerve blockades stand out as efficacious modalities. Comparative investigations suggest parity in effectiveness between femoral block and epidural blocks for knee surgery. However, femoral block demonstrates a favorable profile with fewer observed side effects and complications, as evidenced by several studies [6-8].

In the context of employing regional anesthesia techniques for postoperative analgesia, local anesthetics, particularly bupivacaine, are predominantly utilized due to their accessibility and efficacy. Bupivacaine offers versatility in achieving desired effects through variations in concentration. Higher concentrations are conducive to achieving anesthesia, while lower concentrations are suitable for analgesia. The reduction of bupivacaine concentration serves to mitigate the incidence of side effects and complications. However, excessive reduction may compromise the efficacy of nerve blockade, leading to inadequate pain management. Hence, it is imperative to select a concentration that optimally balances pain reduction efficacy with minimal side effects and complications.

In this study, our aim was to compare 0.1% and 0.125% concentrations of bupivacaine in terms of analgesia, motor blockage, and side effects.

2. Material and Method

2.1. Study design

After obtaining ethical committee approval (AOEAH-EPKK No: 2007/3) and written informed consents from patients, 50 ASA I-III status participants aged 40 to 77, scheduled for elective total knee arthroplasty surgery between April-September 2007 were included to this study.

Exclusion criteria were, not being suitable for general anesthesia, those with mental retardation, a history of chronic analgesic usage, peripheral neuropathy, coagulation disorders, and local anesthetic allergy.

Before surgery, patients were informed about Numerical Rating Scale (NRS) and the use of Patient Controlled Analgesia (PCA) device.

2.2. Block performing

After all patients were evaluated for sensorial or motor neurologic deficiencies on the side that femoral block was to be applied and recorded as intact, all patients were premedication with 0.07mg/kg intramuscular midazolam before block application. Patients then assumed a supine position. The catheterization site, marked 1cm caudal to the inguinal ligament and 1cm lateral to the femoral arterial pulse, was sterilized, and 2ml of 1% prilocaine solution was subcutaneously infiltrated.

Femoral Block was performed with the nerve stimulator (Stimuplex-DIG©; Braun, Geisingen, Germany) which was set to 1.5mA output, 2Hz frequency, and 0.1ms for nerve location. A 50mm stimulating needle (Pajunk D-78187 set, Geisingen, Germany) was inserted at a 45-degree cephalic angle in the sagittal plane until quadriceps femoris muscle contraction was achieved. After reducing voltage and ensuring contraction at 0.5mA or less, 10ml isotonic saline was administered, and a 20-gauge catheter was placed, leaving 6-8cm in the femoral nerve sheath and secured with a suture. Thirty minutes before surgery, 30ml of 0.25% bupivacaine solution was administered through the catheter after a negative aspiration test.

2.3. Randomization

Patients were randomized into two groups by closed envelope method. Group(0.125%) patients were planned to receive 0.125% bupivacaine, and Group(0.1%) patients were planned to receive 0.1% bupivacaine through the femoral nerve block catheter.

2.4. Evaluation of outcomes

Before surgery, sensorial blockage was assessed in the anterior thigh for the femoral nerve, lateral thigh for the lateral femoral cutaneous nerve, and the knee's medial and posterior regions for the obturator nerve using a cold object. Motor blockage was evaluated by testing resistance to knee extension (femoral nerve) and leg adduction (obturator nerve), noted as present or absent.

2.5. General anesthesia

After standard ASA monitoring (Electrocardiography, Hearth Rate, Non Invasive Blood Pressure, O_2 Saturation, EndtidalCO_2), general anesthesia induction began. Intravenous 1.5µg.kg^{-1} fentanyl, 4-6mg.kg^{-1} thiopental, and 0.1mg.kg^{-1} vecuronium were administered. Anesthesia was maintained with a 40% O2, 60% N2O, and 1.2MAC sevoflurane mixture after tracheal intubation. Intramuscular diclofenac was given post-induction to all patients.

During the operation, hemodynamic parameters were monitored every 5 minutes. A decrease in systolic blood pressure exceeding 30% of the baseline was considered hypotension and treated with 0.9% NaCl infusion, and if necessary, intravenous (iv.) 5-10mg of ephedrine was administered. Heart rates below 50 beats.min^{-1} were considered bradycardia and treated with 0.5mg iv. atropine.

2.6. Postoperative analgesia management and assessments

Towards the end of surgery, during subcutaneous tissue suturing, 10ml of 0.125% bupivacaine solution (Group (0.125%)) or 0.1% bupivacaine solution (Group(0.1%)) were administered via the femoral nerve catheter. In the Post-Anesthesia Care Unit (PACU), elastomeric infusion pumps (Easy pump 270ml, 10ml/hr., B Braun; Boulogne Cedex, France) containing 0.125% or 0.1% bupivacaine solutions, infused at a rate of 10ml/h, were connected to the catheters. All patients had intravenous Patient-Controlled Analgesia (PCA) with 0.5mg.ml^{-1} morphine programmed as a 1mg bolus dose with a 10-minute lockout time. Intramuscular diclofenac was given every 12 hours postoperatively to all patients.

Throughout the study, patients were assessed at 0, 2nd, 6th, 12th, 18th, 24th, and 48th hours for sensorial and motor blockage, total morphine consumption, morphine demand counts, static and dynamic NRS values. Side effects like local anesthetics toxicity, nausea, vomiting, itching, sedation, or complications such as hematoma, skin infection at the catheter entrance, occlusion, or catheter dislocation were recorded.

For thromboembolism prophylaxis, 40mg enoxaparin was subcutaneously administered to all patients 12 hours before surgery. The catheter was removed 48 hours after the operation if 12 hours have passed since the last enoxaparin dose.

2.7. Power analyses and statistical analyses

A pilot study was carried out on five patients in each group. As a result, a power calculation for a trial suggested that 25 patients would be needed in each group with a power of 0.8 and 95% confidence interval.

Statistical analysis employed SPSS 11.5 for Windows, utilizing Chi-square, Mann Whitney U, T test, repeated measures ANOVA tests. Statistical significance was set at $p<0.05$, and Bonferroni correction was applied as necessary. Data was presented as Mean± Standard Deviation, Median (Minimum-Maximum).

3. Results

Age, sex, weight, ASA and surgery durations of the patients in two groups were similar (Table 1).

NRS_{static} values were found to be significantly higher in Group(0.1%) at 24th and 48th hours, while $NRS_{dynamic}$ values were again found to be higher in Group(0.1%) only at 24th hour($p<0.007$)(Table 2).

Although morphine demand counts at 48th hour were not different between two groups, total morphine consumption values at 48th hour were higher in Group(0.1%) and it was found to be statistically significant ($p=0.04$) (Table 3).

Although nausea and vomiting counts were higher in Group(0.1%), the difference was not statistically significant ($p=0.852$, $p=0.091$).

Sedation scores of the patients were similar between groups.

Thirty minutes after femoral nerve block catheter was placed and local anesthetic drug was injected and just before the surgery started, sensorial and motor blockage status was evaluated. There were no significant differences in success of the block between both groups (Table 4).

Table 1. Patient characteristics and operation durations (mean ± SD, median (minimum-maximum)).

	Group(0.125%) (*n*=25)	Group(0.1%) (*n*=25)	*p*
Age (years)	63.3 ± 9.0	63.2 ± 7.4	0.923
Sex (M/F) (*n*)	3 / 22	2 / 23	1.000
Weight (kg)	83.6 ± 15.2	79.96 ± 13.8	0.351
Operation Duration (minutes)	113.0 ± 19.0	114.0 ± 17.7	0.849
ASA I / II / III (*n*)	2 / 11 / 12	2 / 18 / 5	0.102

* $p>0.05$

Table 2. NRS scores (median (minimum-maximum)).

	Group(0.125%) (*n*=25)	Group(0.1%) (*n*=25)	*p*
$NRS_{static\ (0\text{-}10)}$			
0 hour	0 (0-3)	1 (0-3)	190
2 h	0 (0-3)	1 (0-3)	0.265
6 h	1 (0-2)	1 (0-4)	0.388
12 h	0 (0-1)	1 (0-4)	0.160
18 h	0 (0-1)	1 (0-2)	0.095
24 h	0 (0-1)	1 (0-2)	0.001*
48 h	0 (0-1)	0 (0-1)	0.004*
$NRS_{dynamic\ (0\text{-}10)}$			
0 hour	1 (0-3)	1(0-3)	0.302
2 h	1 (0-5)	2(0-4)	0.668
6 h	1 (0-3)	2(0-5)	0.201
12 h	1 (0-3)	1(0-5)	0.325
18 h	1 (0-4)	1(0-5)	0.203
24 h	0 (0-2)	2(0-4)	0.002*
48 h	0 (0-3)	1(0-3)	0.028

NRS_{static}: NRS at rest. $NRS_{dynamic}$: NRS at motion.
* $p<0.007$ Bonferroni correction.

Table 3. Total morphine consumption and morphine demand at 48th hour (median (minimum-maximum)).

	Group(0.125%) (*n*=25)	Group(0.1%) (*n*=25)	*p*
Morphine demand at 48th hour (mg)	63.3 ± 9.0	63.2 ± 7.4	0.923
Total morphine consumption at 48th hour (mg)	3 / 22	2 / 23	1.000

* $p<0.05$

Table 4. Sensorial and motor blockage status 30 minutes after the block application.

	Group(0.125%) (*n*=25)	Group(0.1%) (*n*=25)	*p*
Femoral sensorial	25 (100%)	25 (100%)	-
Lateral cutaneous femoral	25 (100%)	24 (96%)	1
Obturator sensorial	25 (100%)	25 (100%)	-
Femoral motor	23 (92%)	20 (80%)	0.417
Obturator motor	21 (84%)	21 (84%)	1

* $p>0.05$

4. Discussion

After major knee surgeries, patients often endure severe pain linked to the reflex spasm of the quadriceps femoris muscle, highlighting the critical role of adequate analgesia for successful knee rehabilitation. Untreated pain impedes early mobilization and, subsequently, poses risks to surgical success. Peripheral nerve blocks, notably femoral or femoral+sciatic blocks, are preferred for postoperative analgesia due to better tolerance and fewer side effects, making them predominant choices after major knee surgery [6-8]. This study established effective analgesia for knee rehabilitation after total knee arthroplasty using 0.125% and 0.1% concentrations of bupivacaine in continuous femoral block.

The femoral block, with a low failure rate (Table 4), is an easily applicable technique [9,10]. Numerous factors affect the success of femoral nerve block, including the concentration and volume of the local anesthetic [11]. There are various statements in the literature about the optimum drug concentration to be used in femoral block [12,13]. Beebe et al. [14] offers 0.125% bupivacaine at a rate of 5ml.h^{-1} infusion which does not prevent early ambulation of patients. The continuous infusion drug concentration can be lowered, but excessive reduction may compromise block quality and distribution [15]. Whereas high doses and volumes may lead to toxicity, which can be prevented by using the minimum effective dose [16]. No signs of toxicity were observed in our study, and side effects (nausea, vomiting, itching, sedation) from opioids showed no statistically significant difference between the two groups. However, the incidence of nausea and vomiting was higher in group (0.1%), potentially due to increased morphine consumption.

In our study, statistically higher NRS_{static} (24th and 48th hours) and NRS dynamic (24th hour) values were observed in group (0.1%) ($p<0.008$). At 48 hours, group (0.1%) had higher morphine rescue analgesic consumption compared to group (0.125%); (Group (0.125%)=10mg, Group(0.1%)=17mg) ($p<0.05$). While both groups achieved adequate analgesia, the higher morphine consumption in group (0.1%) suggested superior analgesic quality in group (0.125%).

Applying a femoral nerve sheath catheter with a nerve stimulator has a success rate of 80-100% [10,17]. Techniques such as ultrasound or x-ray assistance, as demonstrated by Behera et al. [18], enhance catheter application success. Numerous studies confirm that single-shot or continuous femoral blockage provides adequate analgesia, facilitates rapid rehabilitation, minimizes side effects, and reduces hospitalization time [14,19]. Until recently nerve blockages were being performed mostly with the assistance of nerve stimulators. But with these techniques there were always some risks like vascular puncture, repeated advancements of the needle for finding the nerve and nerve damages caused by intraneural injections. As the ultrasound assistance has begun, visualization of the nerves and peripheral tissues for performing these procedures had increased the success rates, shortened the time for performing the blocks and decreased the complications like vascular puncture or nerve damages [3]. One problem for the anesthesia practitioners is that ultrasound devices may not be easily accessible in daily practice. And whether single or assisted near ultrasound, classical techniques like nerve stimulator usage should be well known and be carefully used if needed.

Catheter usage is limited by the risk of infection. Tobias et al. [20] found that, after 48 hours, bacterial colonization occurred in 30-50% of adductor canal nerve block catheters. While our study did not conduct microbiological investigations, no local infection signs such as fever, erythema, or discharges were observed.

A rare complication of peripheral nerve block is neurologic deficit, occurring at a rate of 0.014-0.04% as O'Flaherty et al. [21] reported. In this study, 1 of 51 patients experienced femoral nerve palsy, resolving completely after 5 months of physiotherapy. The patient was excluded upon re-evaluation, revealing a history of past neuropathy.

To minimize costs and reduce side effects and complications, our goal should be using the minimum effective drug concentration. In our study, both 0.125% and 0.1% concentrations of bupivacaine in continuous femoral block achieved adequate postoperative analgesia. However, with 0.1% concentration, compared to 0.125%, the analgesia quality decreases after 24 hours, leading to increased rescue analgesic (morphine) consumption and more side effects. In conclusion, 0.125% concentration of bupivacaine proved to be the most effective dose with minimal side effects for continuous femoral analgesia.

As previously noted, ultrasonography-assisted techniques have demonstrated enhanced success rates; however, in routine clinical practice, accessibility to such devices may pose a challenge, as was the case in the circumstances under which this study was conducted. Nevertheless, regardless of prevailing limitations, scientific inquiry mandates the systematic evaluation of existing conditions, necessitating the collection of data for future investigative endeavors.

One of the limitations and weaknesses of our study pertained to the unavailability of an ultrasound device, which could have provided visualization of catheter locations and the distribution of local anesthetic solutions, thereby enhancing the accuracy of our assessments. Additionally, there may have been unintended bias in the evaluation of postoperative motor block status. This potential bias stemmed from the differences in the evaluators between preoperative and postoperative assessments. Preoperative assessments were conducted by the block performer, who possessed knowledge of the patients' baseline motor neurological status. In contrast, postoperative evaluations were conducted by night-shift doctors who were not privy to the patients' baseline status. The postoperative presence of dressing and bandaging on the leg might have contributed to this situation as well. Consequently, this discrepancy in evaluators may have introduced variability and potential inaccuracies in the assessment of postoperative motor blocks. Consequently, only preoperative motor block results were deemed statistically reliable and reported.

The mitigation of these limitations and the correction of these deficiencies would greatly contribute to the scientific evaluation of this subject matter. Future studies should endeavor to address these shortcomings by ensuring access to ultrasound technology for enhanced procedural visualization and consistency in the evaluation process across preoperative and postoperative assessments. Such endeavors would bolster the reliability and robustness of findings in this field.

5. Conclusions

In continuous femoral block, both 0.1% and 0.125% concentrations of bupivacaine exhibit efficacy in providing adequate analgesia while maintaining safety. However, the utilization of lower concentrations of bupivacaine correlates with a time-dependent decline in analgesic quality, accompanied by an increased demand for rescue analgesics, leading to heightened occurrence of side effects and diminished patient comfort. Consequently, our findings advocate for the preference of 0.125% concentration of bupivacaine as the more optimal choice for conducting continuous femoral block procedures.

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Conflict of Interest

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Author Contributions

All of the authors made substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data; were involved in drafting the manuscript or revising it critically for important intellectual content; and gave final approval of the version to be published.

Data Availability

The datasets created and/or analyzed during the current study are not publicly available, but are available from the corresponding author upon reasonable request.

Ethics Approval and Consent to Participate

This study was approved by the ethics committee of AOEAH-EPKK No: 2007/3. All methods were performed in accordance with relevant guidelines and regulations.

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Challenge Journal of Perioperative Medicine

Research Article

A comprehensive retrospective analysis of interfascial plane blocks and peripheral nerve blocks at a tertiary research hospital: Single center experience

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ABSTRACT

Aim: This study aimed to analyze regional anesthesia practices at a tertiary research hospital as a single center during a one-year period (January 2022 to January 2023).

Materials: Data on over 2,000 nerve blocks were retrospectively reviewed, including: type of nerve block performed (peripheral nerve vs. fascial plane, location of block (upper vs. lower extremity), purpose of block (anesthesia or analgesia) and outcomes.

Method: Data was analyzed to assess trends in block utilization, identify preferred block types and locations, and compare the use of peripheral nerve blocks versus fascial plane blocks for anesthesia and analgesia. Additionally, the potential opioid-sparing benefits of fascial plane blocks were evaluated.

Results: The analysis revealed a notable shift towards fascial plane blocks (61%) compared to peripheral nerve blocks (39%). Lower extremity blocks were more common (56%), with sciatic, saphenous, and femoral nerve blocks being the most frequently used. In the upper extremity (44%), infraclavicular and interscalene brachial plexus blocks dominated. Interestingly, fascial plane blocks were primarily employed for analgesia, while peripheral nerve blocks served both anesthetic and analgesic purposes. The study identified opioid-sparing advantages associated with fascial plane blocks, highlighting their potential role in multimodal pain management strategies.

Conclusions: Based on these findings, areas for improvement in regional anesthesia practices were identified. Educational programs will be adjusted accordingly. Future research will delve deeper into patient characteristics, block selection rationale, and incorporate patient-reported outcomes alongside opioid consumption and pain scores. This study serves as a foundation for future enhancements in regional anesthesia practices, aiming to optimize patient care and outcomes.

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1. Introduction

Within the realm of anesthesia, a discernible evolution is taking place, marked by the transition from traditional neuraxial techniques to the more sophisticated landscapes of peripheral nerve blocks and fascial plane blocks. This practice shift is underpinned by the confluence of technological strides, particularly in ultrasound, and an enriched comprehension of anatomical nuances [1]. The primary objective is to reduce the general anes-

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thesia complications, especially in high-risk patients, while effectively managing postoperative pain, leading to reduced complications and shorter hospital stays [2]. Thus, peripheral nerve blocks and plane blocks have emerged as integral components not only in surgical anesthesia but also as fundamental elements of multimodal pain management strategies [3]. One of the primary objectives of the multimodal anesthesia strategy is to make it possible to perform anesthesia without the use of opioids. Regional anesthesia is one of the cornerstones of this strategy [4].

As a high-volume surgical centre, our institution often necessitates the judicious application of regional anesthesia for both perioperative care and postoperative analgesia. The primary goal is to enhance patient comfort after surgery, reduce the length of hospital stays, and minimize the range of pain-related problems. This aligns seamlessly with the evolving global trends in modern anesthesia practices.

2. Material and Method

After Atatürk University Faculty of Medicine Clinical Research Ethics Committee approval. We conducted a review of regional anesthesia procedures from January 1, 2022, to January 1, 2023. The primary goal was to thoroughly assess our compliance with current standards, identifying nuanced areas that required refinement and enhancement.

A retrospective evaluation was conducted on the demographic data of the patients, the regional anesthetic method administered to them, and the distribution of regional anesthesia techniques based on surgical branches.

3. Statistical Method

The data are presented descriptively, and statistical analysis was performed with Microsoft Office Excel 365. All the information is stated as descriptive date and showed as bar and pie chart. In pie charts distributions are stated as percentages and in bar charts as the exact number of blocks performed.

4. Results

Distribution of nerve blocks performed, classified as peripheral nerve and fascial plane blocks are provided in Table 1.

Table 1. Distribution of nerve blocks performed, classified as peripheral nerve and fascial plane blocks.

Peripheral Nerve Blocks (*n*=794)		Fascial Plane Blocks (*n*=1257)	
Sciatic N. Block	198	Serratus Plane Block	203
Ankle Block	35	Transversalis Fascia Plane Block	176
Femoral N. Block	41	Suprainguinal Fascia Iliaca Block	122
Lumbar Plexus Block	15	Superficial Cervical Block	113
Saphenous N. Block	143	Transversus Abdominis Plane Block	109
Obturator N. Block	15	Erector Spinae Plane Block	105
Interscalene Block	75	Parasternal Block	78
Supraclavicular Block	27	Quadratus Lumborum Block	78
Infraclavicular Block	198	Transversus Thoracic Muscle Plane Block	73
Axillary Block	47	Paravertebral Block	53
		Pectoralis Nerve Block	49
		Thoracolumbar Interfascial Plane Block	42
		External Oblique Plane Block	42
		Pericapsular Nerve Group (PENG) Block	14

The data obtained from our thorough investigation revealed a significant record of 2051 peripheral nerve blocks and plane blocks conducted over the specified study period. The plane blocks covered a wide range of anatomical regions, such as serratus, pectoral, parasternal, superficial cervical, erector spinae, transverse thoracic, paravertebral, external oblique, transversus abdominis, transversalis fascia, and thoracolumbar interfascial plane blocks. Concurrently, peripheral nerve blocks encompassed a range of procedures, including sciatic, lumbar plexus, obturator, ankle, femoral, interscalene, supraclavicular, costoclavicular, infraclavicular, and axillary nerve blocks.

Based on the data analysed at our clinic, 61% of the regional blocks conducted over the specified time period are fascial plane blocks, while the remaining 39% are peripheral nerve blocks (Fig. 1). The frequent utilisation of fascial plane blocks in various surgical procedures can be attributed to their efficacy as a component of multimodal analgesia, hence surpassing the usage of peripheral nerve blocks. Despite our center's size, the restriction of peripheral nerve blocks to orthopaedic surgery theatres highlights the disparity in usage rates. Nevertheless, the disparity is minimal.

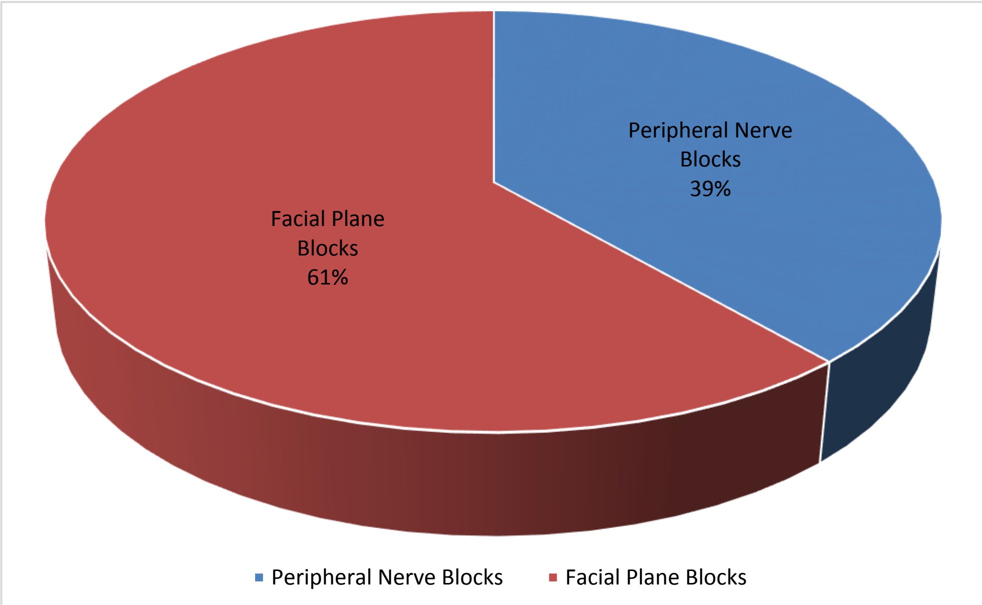

Fig. 1. Distribution of regional anesthetic techniques among peripheral nerve blocks and fascial plane blocks.

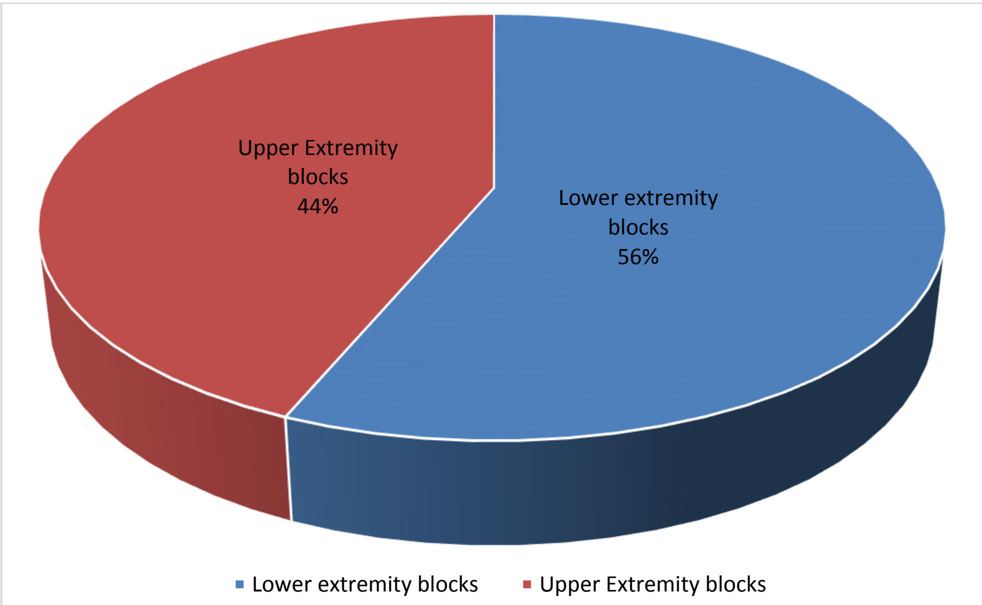

Fig. 2. Regional anesthetic techniques for upper extremities and lower extremities.

Upon examination of peripheral nerve blocks, it is evident that the majority of these blocks mostly involve lower extremity blocks. The incidence of lower extremity blocks is 56%, while the rate of upper extremity blocks is 44% (Fig. 2). The distribution frequency determines the inclusion of sciatic nerve, saphenous nerve, and femoral nerve blocks in the category of lower extremity blocks (Fig. 3a). When analyzing the upper extremity blocks, it becomes apparent that the infraclavicular brachial plexus block is the most frequently executed, with the interscalene brachial plexus block being the second most common (Fig. 3b). Upon analyzing the blocks executed in both the upper and lower extremities, a notable distinction arises in terms of their intended function, revealing that these blocks are predominantly carried out for the goal of anesthesia (Fig. 4).

5. Discussion

Fascial plane blocks, which are prioritized for their opioid-sparing effects as part of multimodal analgesia, are an integral component of our standard analgesic strategy in our clinic [5]. It has been seen that implementing plane blocks, along with non-steroidal analgesics and patient-controlled analgesia [PCA], in the management of postoperative pain following major surgery, leads to a decrease in opioid usage [6]. Upon closer examination of fascial plane blocks, it becomes evident that the Transversus Thoracic Muscle Plane Block [TTMP] is particularly favoured for alleviating sternotomy pain in cardiac surgery [7]. On the other hand, the paravertebral block is commonly chosen as an alternative to thoracic epidural in thoracic surgery cases [8]. In oncological breast surgery cases, the PECS block is frequently selected (9). The literature data also supports the utilisation of these blocks in these specific orientations. Furthermore, it is known that the preferences for specific surgical plans are altered when there are port site infiltrations in laparoscopic surgeries. The external oblique plane block appears to be the best method, particularly for laparoscopic gallbladder surgeries.

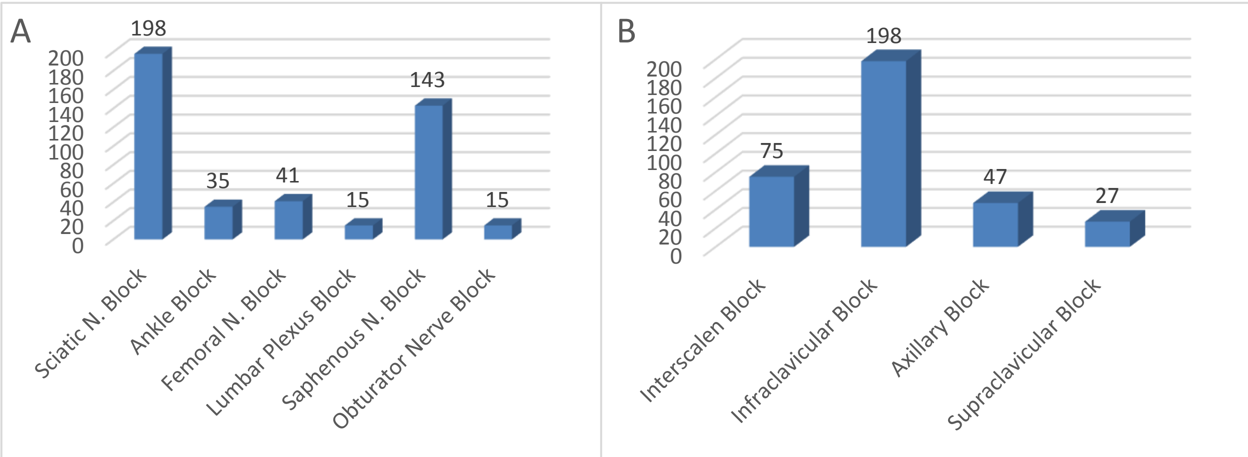

Fig. 3. Distribution of regional anesthesia methods according to blocks in the lower and upper extremities: (a) Lower extremity regional techniques; (b) Upper extremity regional techniques.

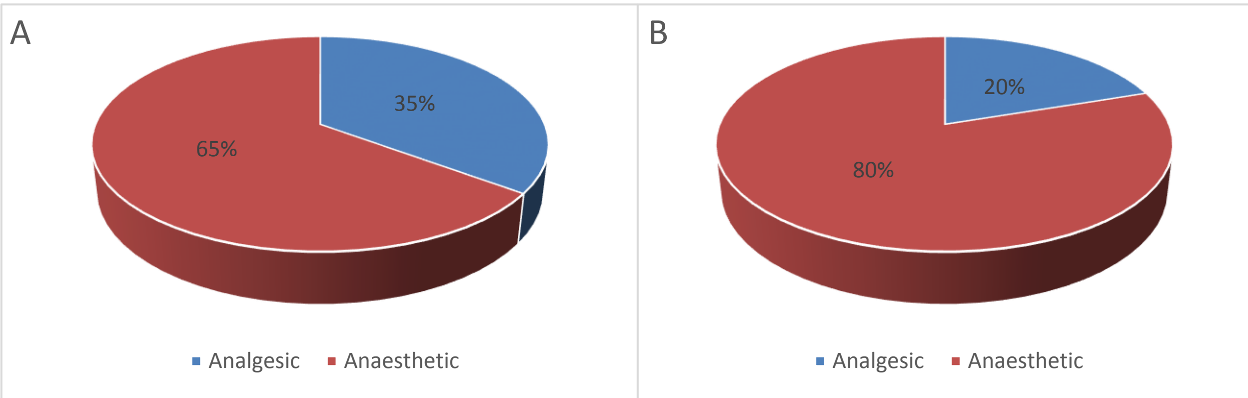

Fig. 4. Distribution of regional anesthesia methods as anaesthetic and analgesic according to blocks in the lower and upper extremities: a) Distribution for lower extremity regional anesthetic techniques; b) Distribution for upper extremity regional anesthetic techniques.

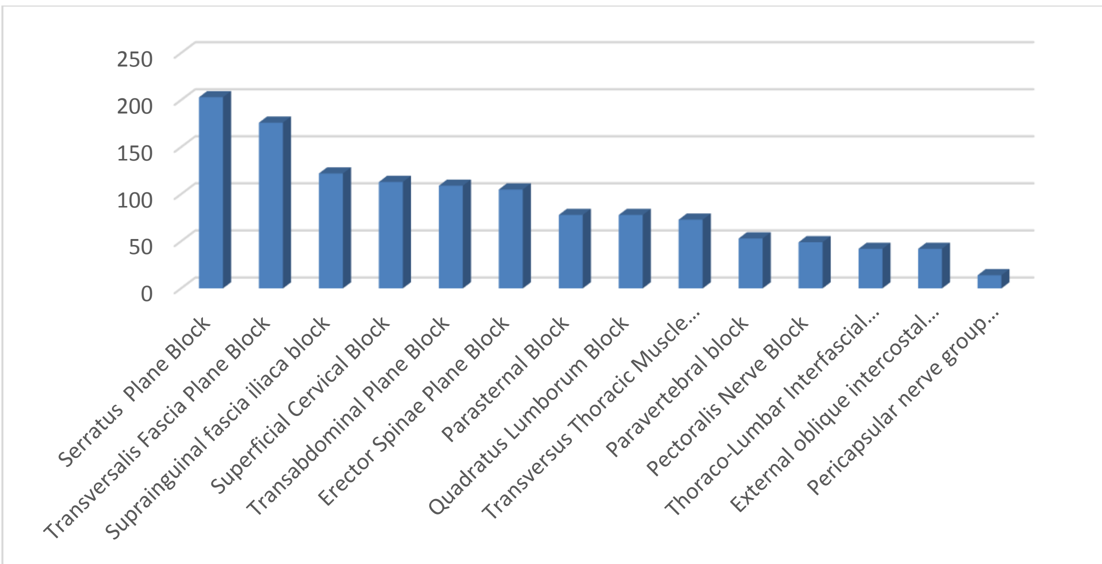

Fig. 5. Distribution of fascial plane blocks.

Upon analyzing the fascial plane blocks, it becomes evident that nearly all of them are designed for analgesic purposes. The constant emergence of novel techniques in fascial plane blocks, along with their potential for further advancement, poses challenges in keeping up with the latest literature. However, an article published in 2020 introduced the concept of "Plane A" blocks, specifically highlighting the erector spinae plane block for the thorax as a prominent example [10,11]. This technique gained widespread popularity and found application as an anaesthetic technique. Its usage has also become prevalent. At our clinic, we utilise the serratus anterior plane block, specifically the erector spinae plane (ESP) block, for targeted procedures as a means of providing anaesthesia.

The strategic use of regional anesthesia techniques not only enhances the patient experience but also aligns with a broader paradigm shift towards patient-centred care. Effective pain treatment beyond the immediate perioperative period has a positive impact on postoperative outcomes, leading to shortened recovery durations and an overall improvement in the patient's quality of life [12].

Although our institution performs a significant number of regional anesthetic treatments each year, this first comprehensive examination of statistical data will prompt us to make adjustments to our educational and training programs. By thoroughly examining the detailed complexities of our practice, we want to enhance our protocols and promote a constant cycle of progress in providing regional anesthetic treatments.

This retrospective analysis acts as a catalyst for future research. The extensive dataset collected during this analysis could be further examined to study trends and patterns in patient characteristics, coexisting medical conditions, and how they influence the selection and effectiveness of particular regional anesthetic methods. These efforts not only enhance the knowledge within the institution but also benefit the broader scientific community by expanding our comprehension of regional anesthesia in various patient groups.

Additionally, incorporating patient-reported outcomes and satisfaction questionnaires in future analyses can offer valuable insights into the comprehensive effects of regional anesthetic on the patient's experience. Gaining insight into the viewpoints, choices, and contentment levels of patients can provide valuable information for developing customized strategies in anesthetic care, promoting a patient-focused model that extends beyond clinical effectiveness.

6. Conclusions

When the findings of the study are analyzed, it appears that it is feasible to assert that our medical facility adheres to the most recent regional anesthesia techniques as well as the requirements that are currently in place in our nation.

Our study has some limitations because it is based on retrospective screening data. Since the patients' postoperative opioid consumption amounts and visual analog scores were not among the scanned data, these data could not be included. Although there is a pain team in our clinic and these data are recorded and patient follow-ups are carried out, previous data recording inadequacies caused that limitation.

To summarize, our retrospective analysis offers a comprehensive overview of the complex network of regional anesthesia procedures at Atatürk University Research Hospital. In our ongoing exploration of the ever-changing field of anesthesia, this reflective analysis acts as a guide for future enhancements, highlighting the intricate relationship between clinical practice, education, and the quest for exceptional patient care.

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Conflict of Interest

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Author Contributions

All of the authors made substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data; were involved in drafting the manuscript or revising it critically for important intellectual content; and gave final approval of the version to be published.

Data Availability

The datasets created and/or analyzed during the current study are not publicly available, but are available from the corresponding author upon reasonable request.

Ethics Approval and Consent to Participate

This study was approved by the ethics committee of Atatürk University Faculty of Medicine Clinical Research Ethics Committee. All methods were performed in accordance with relevant guidelines and regulations.

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Challenge Journal of Perioperative Medicine

Review

Herbal treatments used by patients before surgery: A literature review example

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ABSTRACT

Aim: Herbs, which hold significant historical significance in medicine and have been utilized for centuries to manage and prevent illnesses, interact with medications. This interaction extends to anesthetics and drugs administered during surgical procedures. Identifying these herbal remedies and discontinuing their use at appropriate intervals is crucial. This study aimed to identify publications examining the utilization of herbal medicine by presurgical patients through the PubMed database.

Method: Literature published between 2000 and 2023 was scrutinized using the keywords "herbal medicine, presurgical patients" in the PubMed database for this study.

Results: Among the studies, 56.2% constituted research articles and were thus included in the study. Those conducted within the last decade accounted for 22.2% of our sample. The majority of the studies were conducted in the United States (44.4%). The most frequently used herbs among the publications included in the sample were Echinacea (Echinacea) (*n*=5), Ginseng (Panax), Ginkgo biloba (*n*=3), Perforate St John's-wort (*n*=3), and Garlic (Allium sativum) (*n*=3).

Conclusions: Insights into preoperative herbal use are pivotal. It is well-established that herbs interact with anesthetic medications. The findings of this review indicate a paucity of literature on this subject globally. Therefore, there is a demand for more rigorous, experimental studies to raise awareness among healthcare professionals.

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1. Introduction

For centuries, humans have utilized their interactions with nature and their accumulated experiences to treat and prevent illnesses. As a result, traditional treatment methods, alongside folk medicine, have emerged. These healing approaches, which persist to this day, are referred to by the World Health Organization (WHO) as traditional, complementary, and integrative medicine (TCIM), encompassing "a broad set of health care practices that are not part of that country's own tradition or conventional medicine and are not fully integrated into the dominant health system" [2]. Herbal medicines, a component of these traditional treatment methods, are defined by the WHO as "medicinal herbs, herbal materials, herbal preparations, and herbal products containing herbs parts or other herbs materials or combinations thereof, as active ingredients" [2]. It is estimated that herbal medicine usage globally ranges from 65% to 80%, making it the primary healthcare choice among people [3]. The increasing preference for these herbal remedies can be attributed to several factors, including their accessibility, affordability, and natural origin [4,5].

In modern medicine, herbs also play a prominent role as the main ingredients in drug manufacturing. Many well-known medications, such as atropine (from Atropa belladonna, Solanaceae), quinine (from Cinchona officinalis, Rubiaceae), digoxin (from Digitalis purpurea,

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Plantaginaceae), codeine (from Papaver somniferum, Papaveraceae), and aspirin (from Salix alba, Salicaceae), have herbal origins [6]. Although herbal medicines are often considered natural, factors such as frequency of use, dosage, and timing can render them harmful. Lack of knowledge about the toxicological and pharmacological effects of the substances used and the interactions between drugs and herbs can lead to adverse effects in users [7]. Like all medical treatments, herbal medicines can interact with anesthetic agents or medications used before surgical procedures, potentially leading to undesirable outcomes in patients. The American Society of Anesthesiologists recommends discontinuing all herbal medicines 2-3 weeks before surgery [8]. Increasing awareness among healthcare professionals is crucial in this regard, and studies like this one contribute to raising that awareness. Therefore, the aim of this study is to identify publications on patients' use of herbal treatments before surgical operations through the PubMed database.

2. Materials and Method

This study was conducted in the format of literature review using the PubMed database, an international database in the field of biomedicine, between 01.02.2024 and 05.02.2024. PubMed, an openly accessible database, was established in 1996 in the United States and primarily focuses on health and biomedicine, containing over 36 million citations and abstracts [9]. Searches were conducted using the keywords "herbal medicine, presurgical patients" on the PubMed database. Additional keywords were not selected as the focus was solely on research involving patients who were undergoing anesthesia and using herbal medicines. No specific date range was selected, and all studies related to the topic within the period from 2000 to 2023 were included. Survey studies questioning herbal medicine use before surgery (across all age groups and surgical patients) were included, while case reports, reviews, systematic analyses, and similar studies were excluded. Ethical approval was not obtained for this study.

3. Results

As a result of the searches, a total of 16 studies published between 2000 and 2023 were identified.Upon examination, it was found that a total of 9 studies met the inclusion criteria. The other 7 studies werereviews, systematic analyses, or studies focusing on the effects of herbs on diseases (Fig. 1).

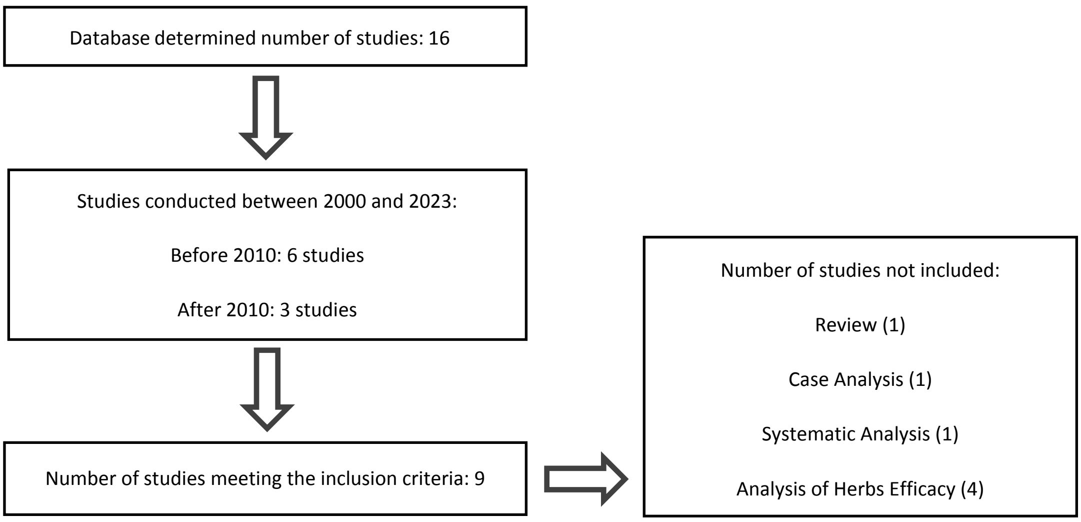

Fig. 1. Study selection process.

Between 2000 and 2012, 77.7% (n=7) of the studies were conducted, while this percentage decreased to 33.3% (*n*=2) for the years 2018-2023. All studies were in the form of surveys, questioning whether surgical patients used any herbal products. Most of the studies took place in the USA, accounting for 44.4% (*n*=4). Other countries had one study each, including Türkiye, France, China, Taiwan, and Nigeria (Table 1).

According to study results upon reviewing the 9 included studies, it was observed that the most frequently mentioned herbs were Echinacea (Echinacea) (*n*=5), Ginseng (Panax) (*n*=4), Ginkgo biloba (*n*=3), St. John's Wort (Perforate St John's-wort) (*n*=3), and Garlic (Allium sativum) (*n*=3) (Table 2).

Table 1. Location and year of the studies.

Study	Year	Location
Tsen et al. [10]	2000	USA
Leung et al. [11]	2001	USA
Hepner et al. [12]	2002	USA
Baillard et al. [13]	2006	France
Lee et al. [14]	2006	China
Heller et al. [15]	2006	USA
Onyeka et al. [16]	2012	Nigeria
Yılmaz and Çiftçi [17]	2018	Türkiye
Yeh et al. [18]	2023	Taiwan

Table 2. Herbs and publications.

Echinacea (Echinacea)	Ginseng (Panax)	Ginkgo biloba	St. John's Wort (Hypericum perforatum)	Garlic (Allium sativum)
Tsen et al. [10]	Tsen et al. [10]	Tsen et al. [10]	Tsen et al. [10]	Tsen et al. [10]
Baillard et al. [13]	Baillard et al. [13]	Baillard et al. [13]	Baillard et al. [13]	Heller et al. [13]
Hepner et al. [13]	Leung et al. [13]	Yılmaz and Çiftçi [13]	Hepner et al. [13]	Yılmaz and Çiftçi [13]
Leung et al. [13]	Heller et al. [13]			
Heller et al. [13]				

The information regarding the timing, location, herbal usage, and specific herbs featured in the studies included in the research is summarized in Table 3. Notably, all of these studies center around surgical patients, including diverse groups such as pregnant individuals and those undergoing plastic surgery.

Table 3. Case summaries of the study.

Study	Year	Location	Patient type	Patient number	Method	Herbal medicine usage rate	Herbs
Tsen et al. [10]	2000	USA	All surgical patients	3106	Survey study	22.0%	Echinacea, Ginkgo Biloba, St. John's Wort, Garlic, Ginseng
Leung et al. [11]	2001	USA	All surgical patients	2560	Survey study	39.2%	Echinacea, Ginseng
Hepner et al. [12]	2002	USA	Pregnant women expected to give birth within 20 weeks	734	Survey study	7.1%	Echinacea, St John's Wort, Ephedra
Baillard et al. [13]	2006	France	All surgical patients	1057	Survey study	20.0%	Valerian, Ginkgo Biloba, Ginseng, St John's Wort, Echinacea
Lee et al. [14]	2006	Chinese	All surgical patients	601	Survey study	85.0%	The herbs are used in soups and mixtures.
Heller et al. [15]	2006	USA	Plastic surgery patients	100	Survey study	55.0%	Echinacea, Garlic, Ginseng, Ginger
Onyeka et al. [16]	2012	Nigeria	Day surgery patients	60	Survey study	40.0%	Local herbs are being used.
Yılmaz and Çiftçi [17]	2018	Türkiye	All surgical patients	600	Survey study	14.0%	Garlic, Swedish bitters, green tea, Ginkgo Biloba, horsetail, and plane tree leaves are being used.
Yeh et al. [18]	2023	Taiwan	All surgical patients	1428	Survey study	50.9%	Traditional Chinese herbs

4. Discussion

This study, focusing on the use of herbal medicine by patients before surgery, was conducted between 01.01.2024 and 05.02.2024 using the PubMed database. Screening was carried out using keywords, and as a result, a total of 16 studies were identified. Among these, 7 studies (43.8%) were excluded from the analysis due to being reviews, case analyses, systematic analyses, or analyses of herbal efficacy. A total of 9 studies (56.2%) were included for further examination. These studies were evaluated based on the year of publication, country, field, number of patients, and the herbal drugs identified (Table 3). Additionally, based on the reviewed articles, the most frequently mentioned herbs were identified as Echinacea (Asteraceae), Ginseng (Panax), Ginkgo biloba, St. John's Wort (Hypericum perforatum), and Garlic (Allium sativum) (Table 2). The interactions of these herbs with anesthetic agents were considered significant. The traditional uses and anesthetic effects of these herbs were reviewed accordingly.

Echinacea (Asteraceae) has been integrated into traditional treatment methods for centuries and has been used to treat ailments such as the common cold, bronchitis, and upper respiratory tract infections [19]. It is recommended that this herb, which is used to boost the immune system, should not be used at least two weeks before surgery [20]. Although conclusive evidence is lacking, concerns about hepatotoxicity exist. Therefore, it is emphasized that caution should be exercised in the use of echinacea in surgeries, especially in patients with impaired liver function [21].

Ginseng (Panax) has been used for therapeutic purposes for thousands of years in Korea, China, and Japan, with the belief that it can heal the entire body. In traditional Chinese medicine, it has been regarded as a medicinal herbs that nourishes five vital organs-spleen, lungs, heart, kidneys, and liver-calms the mind, regulates mental activities, improves vision, and, when used regularly, extends lifespan [22]. People have also used this legendary herbs as an aphrodisiac, rejuvenator, and energy booster [23]. It is recommended that ginseng be discontinued at least 7 days before surgery [20] due to its potential to increase bleeding and cause hypoglycemia [20,24,25].

Ginkgo biloba, another important herb in traditional Chinese medicine, is used to treat blood-related disorders, enhance memory, and keep the mind sharp. Ginkgo leaf extract is also used in modern medicine for its therapeutic effects in regulating cerebral blood flow, protecting against free radicals, and delaying the progression of dementia and diabetes [26]. Due to its antiplatelet pharmacological effects, this herb is recommended to be discontinued at least 36 hours before surgery due to the risk of bleeding [20].

St. John's Wort (Perforate St John's-wort); dating back to ancient Greece, it has been used for mental health issues such as anxiety and depression, as well as for wound and burn treatment [27,28]. The St. John's Wort herbs, commonly used in antidepressant therapy, poses a risk of blocking the reuptake of dopamine, norepinephrine, and serotonin, thus it is recommended to discontinue its use at least 5 days before surgery [20,21,29].

Garlic (Allium sativum); historically, it has been used for respiratory tract ailments, gastrointestinal issues, hypertension, diabetes, leprosy, warts, and pain relief [30]. Due to its pharmacological effects on hypertension, hyperlipidemia, and atherosclerosis, garlic is recommended to be discontinued at least 7 days before surgery due to concerns about increased bleeding risk [20,31].

According to the review results it becomes evident that Echinacea, Ephedra, Garlic, Ginkgo biloba, Ginseng, Kava, St. John's Wort, and Valerian are among the herbs that exhibit the most significant interactions with anesthetic agents. These herbs, widely utilized as herbal remedies, raise concerns during the perioperative period due to their potential effects [14]. Recommendations exist for discontinuing herbal use 2-3 weeks before surgery [14,32]. Studies have raised concerns about the use of these herbs. According to a case report by Gravas et al. [33], excessive consumption of garlic resulted in renal hematoma following extracorporeal shock wave lithotripsy (SWL) in an elderly patient with nephrolithiasis. Additionally, studies have shown associations between bleeding risk and herbs containing Ginkgo biloba, chondroitin-glucosamine, melatonin, turmeric, blueberry, chamomile, fenugreek, milk thistle, and peppermint, with recommendations for discontinuation of these herbs at least two weeks before surgery [34]. Herbal treatments not only pose risks of bleeding but also concerns about sedative effects of chamomile taken for diabetes, interactions of St. John's Wort used for depression with other medications before surgery. These examples can be expanded upon [35]. In light of this information, it is important to inquire whether patients use herbal remedies before surgery. Recent studies have shown different herbal remedy uses among patients. In a study conducted in Türkiye by Civraz et al. [36], it was found that black seed and green tea were commonly used. In the literature, studies investigating the use of herbal mixtures in traditional Chinese medicine or regional herbs can also be observed [14,16,18].

The reviews were conducted solely through PubMed. Due to the exclusion of other databases, a comprehensive conclusion cannot be reached. Additionally, this study focused only on the plants used before surgery, hence screening was carried out using only two keywords. Information regarding plant usage within studies related to traditional treatment methods is not included in this study.

5. Conclusions

As a result a total of 16 studies were identified. As 7 of these studies (43.8%) were reviews, case analyses, systematic analyses, or analyses of herbs efficacy, they were not included in the review. A total of 9 studies (56.2%) were included in the review. When all studies are examined, it becomes evident that theuse of herbal medicine by patients before surgery is crucial for ensuring a comfortable surgical experience. This is because herbs can interact with medications, potentially leading to complications. Therefore, there is a need for research to identify these medicinal herbs. However, the existing literature is inadequate, and new studies are limited. This study addresses a significant gap in summarizing preoperative herbal use, providing guidance for physicians, healthcare providers, and researchers.

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Author Contributions

All of the authors made substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data; were involved in drafting the manuscript or revising it critically for important intellectual content; and gave final approval of the version to be published.

Data Availability

The datasets created and/or analyzed during the current study are not publicly available, but are available from the corresponding author upon reasonable request.

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Case Report

Suprainguinal fascia iliaca plane block for surgical anesthesia of thigh: A case report for excision of a giant mass

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ABSTRACT

Suprainguinal plane block was defined by Hebbard in 2009 for postoperative analgesia purposes. It is aimed to block the femoral nerve, lateral femoral cutanaeus nerve and obturator nerve. In this case, we presented the successful surgical management of suprainguinal block in excision of a mass in the thigh. During the surgery, which lasted 80 minutes, additional analgesic was needed only during the femur curettage. Postoperative pain scores were low and the patient was discharged the next day.

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1. Introduction

The suprainguinal fascia iliaca plane block, introduced as an analgesic method in 2009 by Hebbard et al., serves as an alternative to femoral nerve and lumbar plexus blocks for achieving postoperative analgesia in anterior thigh, knee and hip surgeries [1]. The primary goal is to block the femoral, obturator, and lateral femoral cutaneous nerves [2]. Although this block has been applied for postoperative analgesia in many surgeries, there are not enough publications in the literature reporting that it is applied for surgical anesthesia.

This case report focuses on the surgical removal of a liposarcoma from the thigh, using a suprainguinal fascia iliaca block to produce surgical anesthesia.

2. Case Report

A Written consent was obtained from the patient for the publication of this article. A 45-year-old male with no systemic diseases presented with a mass measuring 17x10 x4 cm in the diaphyseal region of the thigh. Fig. 1(a) shows the anterior 2/3 of the femur intraoperative surgical area, Fig. 1(b) for the excised mass, Fig. 1(c) for the sonoanatomical image, and Fig. 1(d) for the MRI image of the mass. The patient did not accept general anesthesia or neuraxial anesthesia. Considering the mass location, dermatome, myotome and osteotomes, we decided to perform a suprainguinal block since the mass is located in an area that includes the innervation of the femoral nerve, LFCN and obtoratory nerve. The ultrasound transducer was prepared aseptically, and the skin was sterilized. The linear ultrasound transducer was positioned along the inguinal ligament and moved inferomedially until the bow-tie sign formed by the sartorius, iliacus, and abdominal muscles was visualized. Fig. 1(c) shows the deep circumflex iliac artery was identified, and subsequently, a 100 mm needle was advanced caudally to cranially until reaching the fascia iliaca, creating a space where the needle could be advanced cranially using hydro dissection to separate the fascia iliaca from the

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iliacus muscle. Cranial spread of local anesthetic (25 ml 0.5% bupivacaine, 25 ml 2% lidocaine, 1/200.000 adrenaline, 10 ml isotonic; totally 60 ml) was observed until the point where the iliacus muscle separated from the abdominal muscles. Approximately 20 minutes later, adequate anesthesia of the sensory dermatomes of the femoral nerve, obturator nerve and lateral femoral cutaneous nerve was confirmed by cold testing. The motor block was assessed using the Bromage score, recorded as 2. The surgical procedure started 30 minutes after the block procedure. 2 mg midazolam was administered to reduce anxiety and increase patient compliance. Propofol infusion (50 mcg/kg/h) was continued throughout the surgery. Pain response at the incision site and during the surgery was assessed with hemodynamic parameters. Ketamine (0.35 mg/kg) was administered during femur curettage in response to pain. The procedure had a duration of approximately 80 minutes. Postoperatively, the regimen includes IV paracetamol every 6 h. After the surgery, pain assessment was made with VAS score. The maximum Visual Analog Scale (VAS) score in the postoperative period did not exceed 3 within 24 hours. The patient was discharged smoothly the following day, no complications were observed.

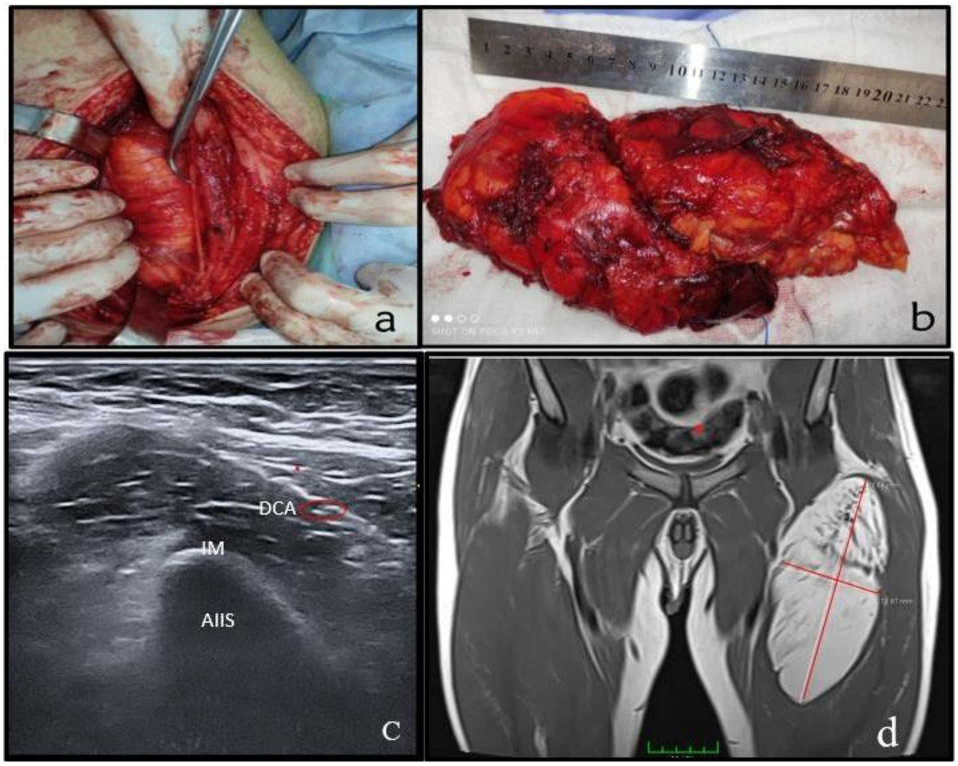

Fig. 1. (a) Anterior 2/3 of the femur intraoperative surgical area; (b)Excised mass; (c) Sonoanatomical image; (d) MRI image of the mass.

3. Discussion

Ultrasound-guided peripheral nerve blocks have gained popularity because of their decreased risk of complications, ability to provide excellent pain relief, and reduced need for opioids. Compared to neuraxial anesthesia, these blocks diminish motor deficits, promoting early ambulation and enhancing patient satisfaction. Nevertheless, clinicians should be cautious of the possible motor block, especially when initiating ambulation during the early hours after surgery. Moreover, targeted anesthetic approaches can be achieved by selectively blocking the extremity undergoing surgery [3].

Interfascial plane blocks aim to deliver local anesthetic to a potential area to affect one or more nerves in a fascial plane [4]. Plan blocks can be used for surgical anesthesia due to their ease of application and wide range of indications. Reports stating that it is used for surgical anesthesia, especially in abdominal, thoracic and extremity surgeries, have taken their place in the literature [5–7].

Suprainguinal fascia iliaca block (SIFIB), known as a technique that precisely targets specific components of the lumbar plexus, provides an anterior and more superficial approach to the lumbar plexus by blocking the obturator nerve together with the femoral nerve and lateral femoral cutaneous nerve. However, there is controversy about the effect of local anesthetic on the obturator nerve.

The preference of SIFIB can be attributed to its understanding of its superiority over traditional fascia iliac blocks and its ease of application. Due to its relatively superficial structure, SIFIB minimizes the risk of nerve or vascular injury during needle insertion. Additionally, one of the advantages of this block is that it can be applied in the supine position of the patient while maintaining a safe distance from important circulatory structures. These properties enable SIFIB to be used as a safe method of primary anesthesia with a relatively large amount of local anesthetic.

The literature highlights the use of the suprainguinal fascia iliac plane block (SIFIB) for postoperative analgesia in hip and knee surgeries as an integral part of an important multimodal analgesic strategy. Additionally, there are studies showing the use of SIFIB as the main anesthesia method in certain patients. Azizoğlu et al. [8] reported that surgical anesthesia was successfully achieved in a high-risk patient with femur fracture; He explained that SIFIB is used together with sciatic nerve block for this purpose. Soulioti et al. [9] reported the use of SIFIB for surgical anesthesia in a patient undergoing emergency femoral thrombectomy.

4. Conclusions

Although this technique is a suitable alternative to traditional anesthesia methods, especially in high-risk patients, debate continues regarding the total volume of local anesthesia injected during application [10, 11]. Further randomized clinical studies, as well as cadaveric and radiological examinations, are mandatory to determine the effectiveness of suprainguinal block.

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Data Availability
The datasets created and/or analyzed during the current study are not publicly available, but are available from the corresponding author upon reasonable request.

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