Challenge Journal of
PERIOPERATIVE MEDICINE

Vol.2 No.2 (2024)

acute pain anesthesiology artificial intelligence decision making erector spinae evaluation evidence-based care fluid management monitoring nerve block pain management perichondral approach perioperative medicine plane blocks postoperative pain reanimation recovery program regional anesthesia remedy risk score simulation models surgery surgical optimization ultrasou ests

ISSN 2980-292X

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Challenge Journal of Perioperative Medicine

Research Article

Perioperative complications in patients undergoing urological surgery with spinal anesthesia: A prospective, observational study

Dilan Akyurt [a,*], Hija Yazıcıoğlu [b], Candan Haytural [c], Berna Demir [d], Ayşegül Özgök [b]

[a] Department of Anesthesiology and Reanimation, Samsun Training and Research Hospital, Samsun University, Samsun, Türkiye
[b] Department of Anesthesiology and Reanimation, Ankara City Hospital, Ankara, Türkiye
[c] Department of Anesthesiology and Reanimation, Anatolia Hospital, Antalya, Türkiye
[d] Department of Anesthesiology and Reanimation, Erciyes University, Kayseri, Türkiye

ABSTRACT

Background: Spinal anesthesia is widely used as the primary anesthesia method in urological surgeries, and this prospective observational study aimed to evaluate the associated complications.

Materials and Method: Demographic data, procedures, and spinal anesthesia-related complications (e.g., hypotension, bradycardia, and headache) of patients who underwent urological surgery with spinal anesthesia were recorded perioperatively. Patients were questioned about complications on the 5th and 14th postoperative days.

Results: Mean arterial pressure decreases in those administered intraoperative hyperbaric bupivacaine were higher at the 5th (p=0.010), 10th (p=0.003), and 15th minute (p=0.001) than in those administered levobupivacaine and lidocaine. In patients administered crystalloid and colloid solutions, an increase in hypotension was observed at the intraoperative 10th minute (systolic arterial pressure (SAP): p=0.008, diastolic arterial pressure (DAP): p=0.011) and 15th minute (SAP: p=0.017). Postdural puncture headache (PDPH) occurred on days 1 and 2 in 7 patients and resolved within 3 days. Two patients reported leg pain and one patient reported gluteal numbness with bupivacaine. A majority of the patients (83%) stated that they would prefer spinal anesthesia if they were to have surgery again.

Conclusions: Identifying perioperative complications in urological surgeries performed under spinal anesthesia helps in effective management and has implications for clinical practice.

ARTICLE INFO

Article history:
Received 19 March 2024
Revised 24 April 2024
Accepted 12 May 2024

Keywords:
Spinal anesthesia
Urological surgery
Complications
Local anesthetics

1. Introduction

The utilization of anesthesia in surgical procedures is an area that is perpetually developing. The fundamental principles and objectives of these advancements revolve around the preferences of the patient, their comfort, ensuring safety, and achieving effective outcomes in surgical procedures. Spinal anesthesia is crucial, particularly in urological procedures, and its significance in this setting remains unchanged [1].

Factors such as hemodynamic stability, patient satisfaction, reduction in opioid use and postoperative analgesic needs, early discharge, and decreased costs determine the role of spinal anesthesia in urological surgeries [2–4]. Furthermore, some articles suggest a decrease in lymphatic flow in metastatic lymph nodes during oncological urological procedures, as well as a lower rate of tumor recurrence following noninvasive bladder tumor surgery conducted under spinal anesthesia [5,6].

* *Corresponding author*. E-mail address: dilanakyurt@gmail.com (D. Akyurt)
ISSN: 2980-292X / DOI: https://doi.org/10.20528/cjpm.2024.02.001

Despite the various advantages of spinal anesthesia, it also has undeniable disadvantages. Some contraindications for the procedure include the patient's refusal, coagulopathy, severe hypovolemia, or local infection in the procedure area. Disadvantages include providing a limited surgical duration depending on the local anesthetic agent and insufficient muscle relaxation for some surgeries [7]. Hypotension and bradycardia are the most common complications, occurring in 15-30% of cases. Possible risks include post-dural puncture headache, cauda equina syndrome, diplopia, hearing loss, anterior spinal artery syndrome, Horner syndrome, arachnoiditis, meningitis, and epidural abscess [1].

This study aimed to investigate and evaluate the perioperative complications of spinal anesthesia in patients undergoing urological surgery.

2. Materials and Method

Following local ethics committee approval (TYHEK:2010-98), the study was carried out at a tertiary hospital between August 1st, 2010, and May 31st, 2011. Patients aged between 20 and 80 years, classified as American Society of Anesthesiologists (ASA) grade I-II, were included in the study. Exclusion criteria encompassed contraindications to spinal anesthesia (including infection at the injection site, lack of consent, coagulopathy or other bleeding diathesis, severe hypovolemia, increased intracranial pressure), respiratory failure, history of allergies, opioid addiction, and refusal to provide consent for study participation.

A pre-anesthetic evaluation was performed the day before, an informed consent form was obtained, and the spinal anesthesia technique was explained. The quantity of hydration administered, and the specific fluid utilized in the preoperative unit on the morning of the surgery were documented.

In the operating room, following the application of standard ASA monitoring, which included three-channel electrocardiography, non-invasive blood pressure monitoring, and peripheral oxygen saturation measurement, patients were positioned, and spinal anesthesia was administered. The preferred local anesthetic and its volume, along with the type and thickness of the spinal needle used, were documented for each block. The sensory block was evaluated using the bilateral Pinprick Test along the mid-clavicular line, the motor block was assessed using the modified Bromage Scale (0: No paralysis, 1: Can only move the knee and feet, cannot lift the leg straight, 2: Cannot bend the knee, can only move the foot, 3: Cannot move the foot joint or thumb, complete paralysis) [8].

Surgery was initiated once sensory blockade was achieved at the T10 level. Any administration of perioperative sedation was documented. Baseline values for all patients were recorded prior to the administration of spinal anesthesia. Subsequent measurements of heart rate (HR), systolic arterial blood pressure (SBP), diastolic arterial blood pressure (DAB), mean arterial blood pressure (MAP), peripheral oxygen saturation (SpO2), and respiratory rate (RR) were documented at the 5th minute post-spinal injection, as well as intraoperatively at the 5th, 10th, 15th, 30th, 45th, and 60th minutes, and postoperatively in the recovery unit at the 5th, 10th, 15th, 30th, 60th, and 90th minutes. Hypotension was defined as a decrease in mean arterial pressure of 20% or more during the perioperative period and was initially treated with a crystalloid infusion (15-20 ml/kg/h IV 0.9% NaCl) [9]. If hypotension persisted, 5 ml./kg. /h. iv. colloid infusion was employed, and 5-10 mg of ephedrine was administered intravenously. If the heart rate was less than 50 beats per minute, 0.5 mg of atropine was administered intravenously.

In the recovery unit, patients were evaluated for the time the block disappeared, headache, back and waist pain, nausea, itching, double vision, blurred vision, tinnitus, and hearing loss. The questions were repeated on the first day in the ward, and complaints of inability to urinate after the urinary catheter was removed were also assessed. The patients' discharge times were recorded, and the questions were repeated in person or by phone on the 5th and 14th postoperative days.

3. Statistical Methods

SPSS 15.0 for Windows was utilized to conduct the statistical analyses (Chicago, Illinois). Descriptive statistics were calculated using percentages to represent categorical data and mean±standard deviation to analyze continuous data. For categorical data, comparisons between groups were conducted using the Chi-square and Fisher's Exact tests. For continuous data, the Mann Whitney U test was utilized to compare two groups, while the Kruskal Wallis test was employed to compare more than two groups. When a significant p value was obtained from the Kruskal-Wallis test, pairwise group comparisons were conducted using the Mann Whitney U test with Bonferroni correction. $p<0.05$ was considered as statistical significance.

4. Results

107 patients were recruited, with 7 excluded due to failed spinal anesthesia, resulting in 100 patients being included for evaluation. The study's flow chart is presented in Fig. 1. Table 1 provides a summary of the demographic data and types of surgery for all patients.

No patient was sedated before the procedure; after the sensory block was achieved, 1-2 mg midazolam was administered intravenously in all patients.

In the study, hyperbaric bupivacaine 15.08±2.42 mg (Marcaine® Spinal Heavy 0.5%, AstraZeneca) was administered to 56 patients, levobupivacaine 15 mg (Chirocaine® 5mg/ml, Abbott) was administered to 33 patients, and lidocaine 65.91±6.64 mg (Jetmonal 2%, Adeka) was administered to 11 patients. There was no significant difference among the agents in terms of the time until reaching motor block level Bromage 3 and sensory block level T10 ($p>0.05$) (Table 2).

Seventy-nine patients received 470.25±208.89 ml of 0.09% NaCl (Physiological Serum) 20 minutes before the block, while 19 patients received 689.47±188.90 ml of colloid (Voluven 0.6% HES, Fresenius Kabi). Two patients underwent the procedure without receiving any fluids. A greater reduction in intraoperative MAP was observed in patients administered hyperbaric bupivacaine at the 5th (p=0.010), 10th (p=0.003), and 15th (p=0.001) minutes compared to those administered levobupivacaine (Fig. 2). Regardless of the agents used, the group that received physiological saline experienced a significantly greater reduction in intraoperative SAP (p=0.008) and DAP (p=0.011) at the 10th minute, as well as in MAP at the 15th minute (p=0.017).

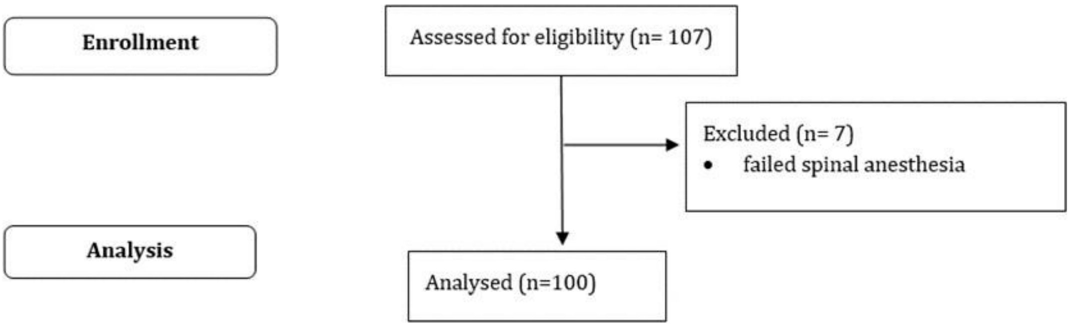

Fig. 1. The flow-chart of the study.

Table 1. Demographic data and type of the surgery.

Demographic data		Mean±SD
Age (year)		61.6±14.16
Weight (kg)		75.37±13.31
Height (m)		1.69±0.07
BMI (kg/m^2)		26.3±3.85
ASA		n
	ASA I	23
	ASA II	77
Comorbidity		
	DM	14
	HT	35
	COPD	9
	CAD	2
	CHF	1
Type of Surgery		n
	TURP	58
	Varicocele	23
	Exploratory cystoscopy	15
	Open prostatectomy	4

ASA: American Society of Anesthesiologists; DM: Diabetes mellitus; HT: Hypertension; COPD: Chronic obstructive pulmonary disease; CAD: Coronary artery disease; CHF: Congestive heart failure; TURP: Transurethral resection of the prostate.

Table 2. Time taken for sensory block to reach T10 and motor block to reach Bromage.

Time* (min)	Hyperbaric Bupivacaine (n:56)	Levobupivacaine (n:33)	Lidocaine (n:11)	p
Sensory block	5.93±2.72 (Mean±SD)	5.16±0.85 (Mean±SD)	5.50±1.85 (Mean±SD)	p>0.05
Bromage 3	6.17±2.80 (Mean±SD)	5.27±1.19 (Mean±SD)	5.50±3.31 (Mean±SD)	p>0.05

*The time to achieve complete sensory and motor blockade was presented as the mean and standard deviation.

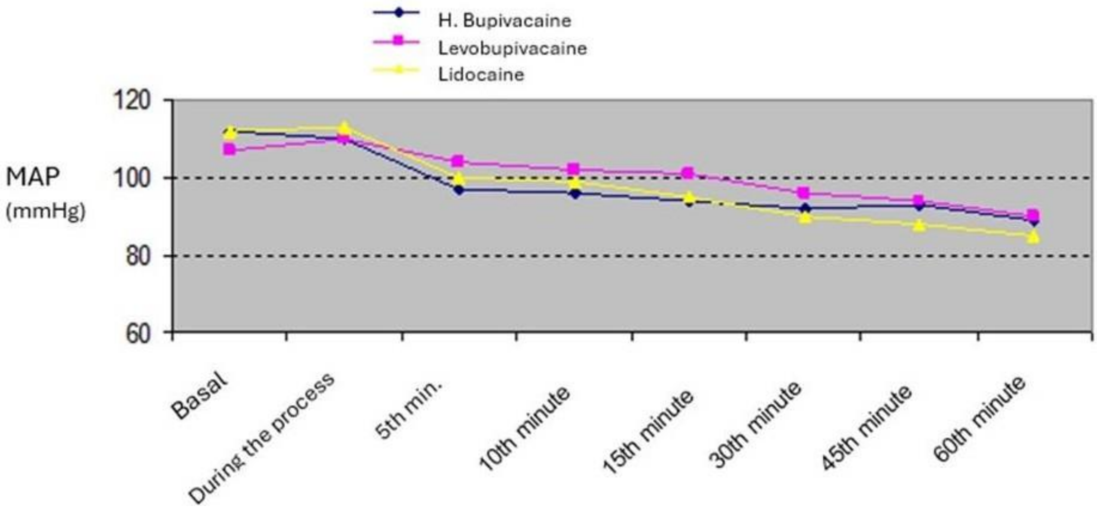

Fig. 2. Comparison of MAP levels for each agent.

When comparing postoperative hypotension among different OAB agents, no statistically significant differences were observed (p>0.05) (Fig. 3). While MAP did not decline below 50 mmHg in any patient, at the 10th minute postoperatively, a reduction of 20% or greater was noted in comparison to the baseline value. No statistically significant difference was observed when postoperative blood pressures were compared between patients who received preoperative crystalloid and colloid, regardless of the local anesthetic agent used (p>0.05).

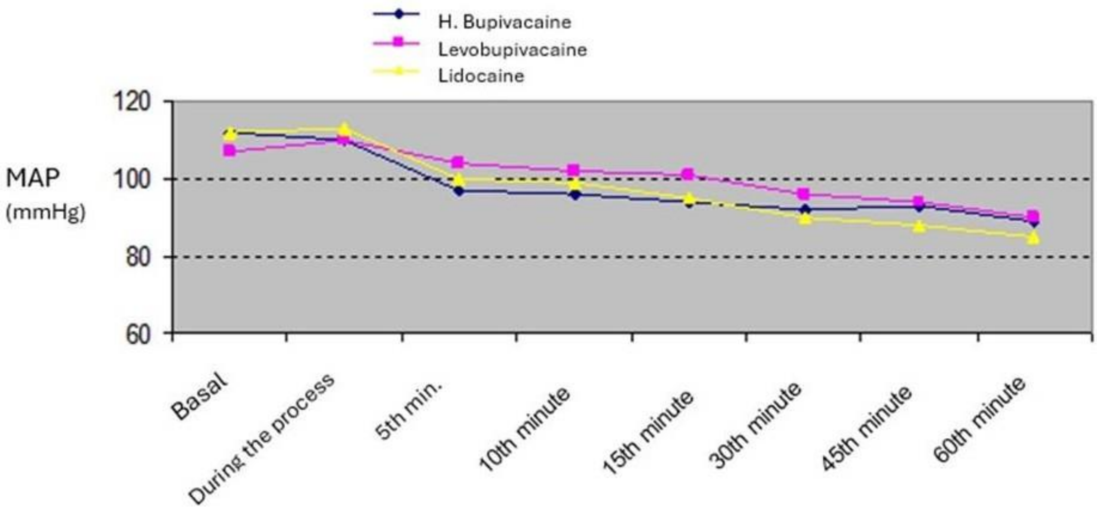

Fig. 3. Comparison of postoperative MAP levels per agent.

In seven patients, the onset of post-dural puncture headache (PDPH) was observed on the first day, while in another seven patients, it manifested on the second day. He recovered completely within three days following adequate hydration, analgesic administration, and bed rest. All patients were mobilized eight hours after the operation. PDPH was observed in individuals with an average age of 52.73±13.95 years. A 25 G Quincke spinal needle was used in 40 patients and a 22 G Quincke spinal needle was used in 60 patients. No correlation was observed between the needle gauge and the incidence of PDPH (p > 0.05).

Following the surgery, one patient experienced discomfort in their right leg starting from the first day, while another experienced pain in their left leg. Both patients experienced complete alleviation of pain by the seventh day. One patient experienced numbness in the gluteal region from the 5th to the 16th day but did not develop incontinence. Bupivacaine was administered as the agent for neuraxial blockade in all three patients, with the surgical procedure being transurethral resection of the prostate (TURP) performed in the lithotomy position.

Eleven of the forty-five patients with a prior surgical history underwent spinal anesthesia, one patient experienced postoperative low back pain, and one patient had unsuccessful spinal anesthesia. Throughout the investigation, neuraxial blocks administered to these patients did not result in any complications. The mean stay of patients in the intensive care unit was 150.6 ± 199.44 minutes, and the mean time to discharge was 2.85 ± 1.54 days. Eighty-three percent of the patients who participated in the study expressed a preference for spinal anesthesia as a form of anesthesia during a subsequent operation.

5. Discussion

This study evaluates the clinical results of various local anesthetic drugs, the use of different needle measurements, and the management of intraoperative fluids in male patients undergoing urological surgery with spinal anesthesia. Comparison of the findings with existing information in the literature provides perspective on the effectiveness and safety of spinal anesthesia.

The selection of local anesthetic agents during surgery is crucial for ensuring effectiveness and safety. Our study found no significant differences in the time required to achieve sensory and motor blockade when using different local anesthetic agents, such as hyperbaric bupivacaine and isobaric levobupivacaine. These findings are consistent with existing literature on the subject [10].

Hypotension is a frequently observed adverse effect following spinal anesthesia, with a prevalence as high as 74%, particularly in cases of cesarean section [11]. Strategies employed to avoid hypotension or lessen its occurrence and intensity involve the administration of intravenous fluids, vasopressor medications, and 5- hydroxytryptamine 3 (5HT3) receptor antagonists [12]. Preloading refers to administering fluids before spinal anesthesia, while co-loading refers to administering fluids during surgery [13]. The suitable liquids for application include crystalloids and colloids. While some studies suggest the simultaneous administration of crystalloids and prior administration of colloids, there is currently no conclusive agreement among experts [14,15]. In our study, 79 patients were given an average of 470 ml of crystalloid preoperatively, and 19 patients were given an average of 689 ml of colloid. When patients receiving crystalloid or colloid solutions were compared, SBP at the 10th minute ($p=0.008$), MAP at the 10th minute ($p=0.011$), and SBP at the 15th minute ($p=0.017$) indicated more hypotension in the crystalloid group. No significant difference was found in postoperative measurements. While the faster absorption and distribution of crystalloids may lead to significant hypotension in the intraoperative period, the longer effect of colloids may cause this difference to disappear in the postoperative period.

In their study on patients undergoing hip fracture surgery, Vives et al. [16] found no hemodynamic differences between intrathecal levobupivacaine and bupivacaine. However, Pehlivan et al. [17] reported that bupivacaine had a greater impact on QT intervals. Consequently, levobupivacaine was deemed more effective than bupivacaine, particularly in patients with cardiac conditions, and it can be used safely. In our investigation, we observed a more significant reduction in mean arterial pressure in patients who were administered hyperbaric bupivacaine at the 5th, 10th, and 15th minutes compared to those who were administered levobupivacaine ($p<0.05$). The disparities seen among agents can be attributed to the fact that levobupivacaine exhibits a lower incidence of cardiovascular adverse effects compared to bupivacaine.

The prevalence of headache following dural puncture ranges from 3.5% to 33%. The most efficient method to reduce the occurrence of PDPH is to utilize an atraumatic needle with a non-sharp tip [18]. While some studies suggest that using small-diameter needles can be preventive [19,20], Arevalo-Rodriguez I et al. [21] found no statistically significant relationship between needle diameter and the development of PDPH. In this study, we utilized 25 G. Quincke spinal needles in 40 patients and 22 G. Quincke spinal needles in 60 patients. The occurrence of PDPH overall was found to be 14%. While patients using a 22 G. spinal needle showed increased levels of PDPH, the difference was not statistically significant. We believe this distinction can be effectively illustrated in studies involving a larger cohort of patients.

Transient neurological symptoms (TNS) refer to temporary symptoms that include sensory impairment in the back, hips, one or both lower extremities, radiating pain, headaches, reduced muscle strength, and difficulty in urination. These symptoms can occur even when there is no complete loss of sensation or motor function following spinal anesthesia. TNS generally resolves on its own after 10 days. The term 'Transient neurological toxicity' was initially used, but later changed to 'Transient neurological symptom' [22]. While lidocaine is commonly associated with TNS [23], a new study comparing lidocaine, mepivacaine, and bupivacaine found no difference in terms of GNS development [24]. Ten individuals in our study experienced paravertebral low back pain following spinal anesthesia, although this pain disappeared on its own. There was no notable disparity observed in the frequency of TNS between the administration of lidocaine and its usage as a local anesthetic agent in these patients. Leg pain resolved by the 7th day in two patients, but one patient experienced numbness in the gluteal region from the 5th to the 16th day, without any incontinence. Bupivacaine was administered to these three individuals.

Our study's limitations warrant consideration. General validity may be limited by the fact that this is a single- center study, and patients were selected from a homogeneous population. Further research may be guided by a more thorough examination of other clinical criteria that were examined in our study, such as the requirement for postoperative analgesia or long-term results. Due to the observational nature of the study, parameters such as needle type, length, type, and volume of local anesthetic were not standardized and were left to the practitioner's discretion. This may have influenced our results. Another limitation of our study is that we did not conduct a power analysis or determine the sample size, as our study followed a prospective observational cohort design. The sample size was chosen based on similar studies in the literature [25]. Nevertheless, given recent studies, the sample size in our study may appear relatively small. There is a necessity for prospective comparative studies incorporating more comprehensive, standardized protocols. The findings from our study could serve as preliminary data for such endeavors.

6. Conclusions

This study on urological surgery patients found no significant difference between hyperbaric bupivacaine and isobaric levobupivacaine in terms of sensory and motor block durations. Crystalloid solutions caused more intraoperative hypotension than colloid solutions. Hyperbaric bupivacaine caused a greater decrease in mean arterial pressure at 5, 10, and 15 minutes compared to levobupivacaine. The overall occurrence of PDPH was 14% and there was no significant difference between needle sizes. Paravertebral low back pain and transient neurological symptoms were mild and resolved spontaneously. More research with larger samples is needed to confirm these findings.

Acknowledgements

None declared.

Funding

The authors received no financial support for the research, authorship, and/or publication of this manuscript.

Conflict of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this manuscript.

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 local ethics committee approval (TYHEK:2010-98). All methods were performed in accordance with relevant guidelines and regulations.

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Challenge Journal of Perioperative Medicine

Research Article

Comparison of dexmedetomidine dosing strategies based on Bispectral Index (BIS) and Ramsay Sedation Scale (RSS) in patients undergoing infraumbilical surgeries under spinal anesthesia: A prospective comparative study

Suna Kara Gormus [a,*], Tulay Cardakoz [b], Kamil Toker [c]

[a] *Department of Anesthesiology and Reanimation, Samsun Training and Research Hospital, Samsun University, Samsun, Türkiye*
[b] *Department of Anesthesiology and Reanimation, Kocaeli University, Kocaeli, Türkiye*
[c] *Department of Anesthesiology and Reanimation, BHT Clinic İstanbul Tema Hospital, İstanbul, Türkiye*

ABSTRACT

Objectives and Aim: This study aimed to evaluate the impact of dexmedetomidine infusion dosage adjustment strategies guided by BIS and RSS on total consumption in patients undergoing infraumbilical surgeries under spinal anesthesia.

Materials and Method: Eighty patients aged between 18-70 years, classified as American Society of Anesthesiologists (ASA) I and II, who underwent orthopaedic, urological, and plastic surgery under spinal anesthesia were included. Patients received spinal anesthesia in the lateral position through the L3-4 interval using a median approach. Following the observation of free flow of cerebrospinal fluid, spinal anesthesia was induced with 10 mg (2 ml of 5% hyperbaric bupivacaine) bupivacaine and 25 µg of intrathecal fentanyl. When the sensory block reached the T10 level, all patients were administered a dexmedetomidine loading dose of 1 µg/kg IV over 10 min for sedation, and the maintenance drug infusion dose was titrated to maintain BIS values between 60-80 in the first group and RSS at 3-4 in the second group. Throughout the surgery, hemodynamic variables (heart rate and blood pressure), respiratory parameters (respiratory rate), SpO2, sedation scores (BIS and RSS), and drug infusion doses and perioperative complications were recorded. Drug infusion was stopped 5 min before the end of surgery, and the duration of surgery, anesthesia, and total drug consumption were recorded. Statistical analyses were performed, and a p-value of less than 0.05 was considered statistically significant.

Results: Desired sedation was achieved by dexmedetomidine administration. A decrease in BIS values and an increase in RSS were observed with the loading dose. In both groups, the heart rate and systolic and diastolic blood pressures were significantly lower at all measurement times than the control values. There was no significant difference in the mean blood pressure between groups B and R (p>0.05). The average blood pressure for B group was 92 ± 14.12 mmHg, while the average blood pressure for R group was 90 ± 12.73 mmHg. There was no statistically significant difference between the two groups in terms of dexmedetomidine infusion doses required to achieve the desired sedation and total drug consumption 110 ± 20 (µg) in B group and 111 ± 22 µg in R group (p>0.05).

Conclusions: Dexmedetomidine provides a targeted level of sedation in patients undergoing spinal anesthesia without causing significant respiratory depression. Monitoring sedation depth using the BIS did not change the total drug consumption.

ARTICLE INFO

Article history:
Received 27 March 2024
Revised 28 April 2024
Accepted 26 May 2024

Keywords:
Spinal anesthesia
Dexmedetomidine
Bispectral Index
Drug consumption
Sedation monitoring

* *Corresponding author*. E-mail address: sunakaragormusmd@gmail.com (S. Kara Gormus)
ISSN: 2980-292X / DOI: https://doi.org/10.20528/cjpm.2024.02.002

1. Introduction

Regional anesthesia is pivotal in modern surgery, providing key advantages such as maintaining spontaneous breathing, protective reflexes, and extended postoperative pain relief [1]. To maximize these benefits and optimize surgical conditions, sedation is used to ease anxiety and ensure patient comfort. Conscious sedation, the preferred method, reduces awareness while preserving sensory and motor functions, allowing patients to follow commands without remembering the procedure [1]. Striking the perfect balance between analgesia and sedation, particularly during spinal anesthesia, is crucial, as it profoundly influences postoperative outcomes.

Sedation, as a complement to regional anesthesia, not only enhances patient experience by reducing anxiety and ensuring comfort but also contributes to the smooth conduct of the surgery [2]. Among the array of sedatives primarily functioning as γ-aminobutyric acid (GABA) receptor agonists, dexmedetomidine stands out as the preferred choice. Unlike typical sedatives, it operates as an α2 adrenoceptor agonist, delivering sedative, analgesic, and sympatholytic benefits without causing the respiratory depression that is often a concern with other agents [3]. Tailoring sedation to diverse patient needs and surgical conditions is challenging. Clinically, sedation depth is assessed through clinical observations and objective measures like Bispectral Index (BIS) monitoring, which empirically evaluates hypnotic states.

Although dexmedetomidine offers numerous advantages, its impact on hemodynamics and potential to reduce the consumption of other anesthetic drugs warrant thorough investigation to inform clinical practice [4]. Previous research has highlighted the ability of dexmedetomidine to diminish neuroendocrine and hemodynamic responses to surgery and to reduce the required dosages of co-administered anesthetics, notably during procedures under BIS-guided sedation [5]. Bavullu et al. compared dexmedetomidine and midazolam for sedation during percutaneous drainage of hepatic hydatid cysts and found dexmedetomidine to be effective and well tolerated. Abdullayev et al. demonstrated its efficacy in reducing fentanyl-induced cough, further supporting its versatile application in clinical settings [6,7]. This underscores the necessity for a more comprehensive understanding of the impact of BIS-guided sedation with dexmedetomidine on overall drug consumption, especially within the context of spinal anesthesia, an area that remains relatively underexplored.

In this study, we examined the effects of BIS-monitored sedation with dexmedetomidine on the total consumption of anesthetic agents during spinal anesthesia. By scrutinizing this relationship, we aimed to elucidate the potential for refined sedative practices that promise enhanced patient safety, expedited recovery, and optimized resource utilization.

2. Materials and Method

2.1. Study design

This prospective, randomized, controlled study received approval from the ethical committee of Kocaeli University Faculty of Medicine (Approval code: 29.09.2011 KAEK 10/7). The research, conducted in the Department of Anesthesiology at Kocaeli University Hospital, spanned from November 2011 to May 2012. The study's adherence to the principles of the Declaration of Helsinki was ensured, and written informed consent was obtained from all participants. The CONSORT checklist for the study is available in Fig. 1.

The study included eighty patients aged 18–70 years who were scheduled for infraumbilical orthopaedic, urological, and plastic surgeries under spinal anesthesia were included in the study. Plastic surgeries included lower limb debridement, and infraumbilical reconstructive surgeries following trauma. Patients were selected from American Society of Anesthesiologists (ASA) risk classification groups I and II. Exclusion criteria encompassed patients with a history of acute or chronic opioid use, coagulation test abnormalities, warfarin use, lumbar vertebral anomaly, those under 18 years of age, advanced lung diseases, severe valvular heart disease or heart failure, neurological diseases, local or systemic infections, known allergy to dexmedetomidine, and those receiving α2 receptor agonist treatment. Patients who received general anesthesia due to an unsuccessful block, partial block, or block level not reaching T10 were excluded from the study.

2.2. Grouping and randomisation

After obtaining written informed consent the patients were randomly divided into two groups of 40 each using the closed envelope method. Group B for Bispectral Index (BIS) monitoring and Group R for Ramsay Sedation Scale (RSS) monitoring. The maintenance dose of dexmedetomidine was titrated between 0.2-0.7 µg/kg/hr to maintain a BIS value between 60-80 for Group B, and an RSS score of 3-4 for Group R.

2.3. Interventions

A 20G IV cannula was inserted into the back of each patient's hand in the preoperative waiting room. A crystalloid solution infusion at a rate of 10 ml/kg was then started 30 minutes before surgery.İn the operating room all patients baseline measurements of systolic, diastolic, and mean arterial blood pressure (SBP, DBP, and MAP), heart rate (HR), peripheral oxygen saturation (SpO2), and respiratory rate (RR) were recorded preoperatively. Patients in Group B were monitored using BIS (Aspect A-2000, Aspect Medical Systems, USA). After adhering to aseptic rules, cleaning, and draping the skin, information about each step of the procedure was given to all patients, and spinal anesthesia was performed using a median approach from the L3-4 or L4-5 interval after inject ing 2 ml of 2% lidocaine (Jetocaine. 20mg/2 ml. Biosel Pharmaceuticals, Istanbul) subcutaneously. A 25G (Braun) spinal needle was inserted into the same interval to access the subarachnoid space and 10 mg of bupivacaine (Marcaine heavy, 15 mg/5 ml. AstraZeneca Pharmaceuticals, Istanbul) and 25μg fentanyl (Fentanyl, Ireland). Patients were positioned supine with the head elevated at 15°. Once the block level reached T10 in the pin-prick test, the surgical procedure initiated. All the patients received a bolus of 1 μg/kg dexmedetomidine (Precedex. 200 μg/ 2 ml, USA) for 10 min, followed by continuous infusion at a rate of 0.6 μg/kg/hr. The maintenance dose of dexmedetomidine was titrated between 0.2-0.7 μg/kg/hr to maintain a BIS value between 60-80 for Group B, and an RSS score of 3-4 for Group R. In both groups, hemodynamic parameters (SBP, DBP, MAP, and HR), RR, SpO2, sedation values (BIS and RSS), and adjusted dexmedetomidine infusion doses according to the level of sedation were recorded every 5 min for the first 30 min, and then every 10 min until the end of surgery. Drug infusion was stopped 5 min before the end of surgery in both groups.

The total amount of dexmedetomidine used was recorded. Perioperative complications such as nausea, vomiting, hypotension, bradycardia and hypoxia documented.

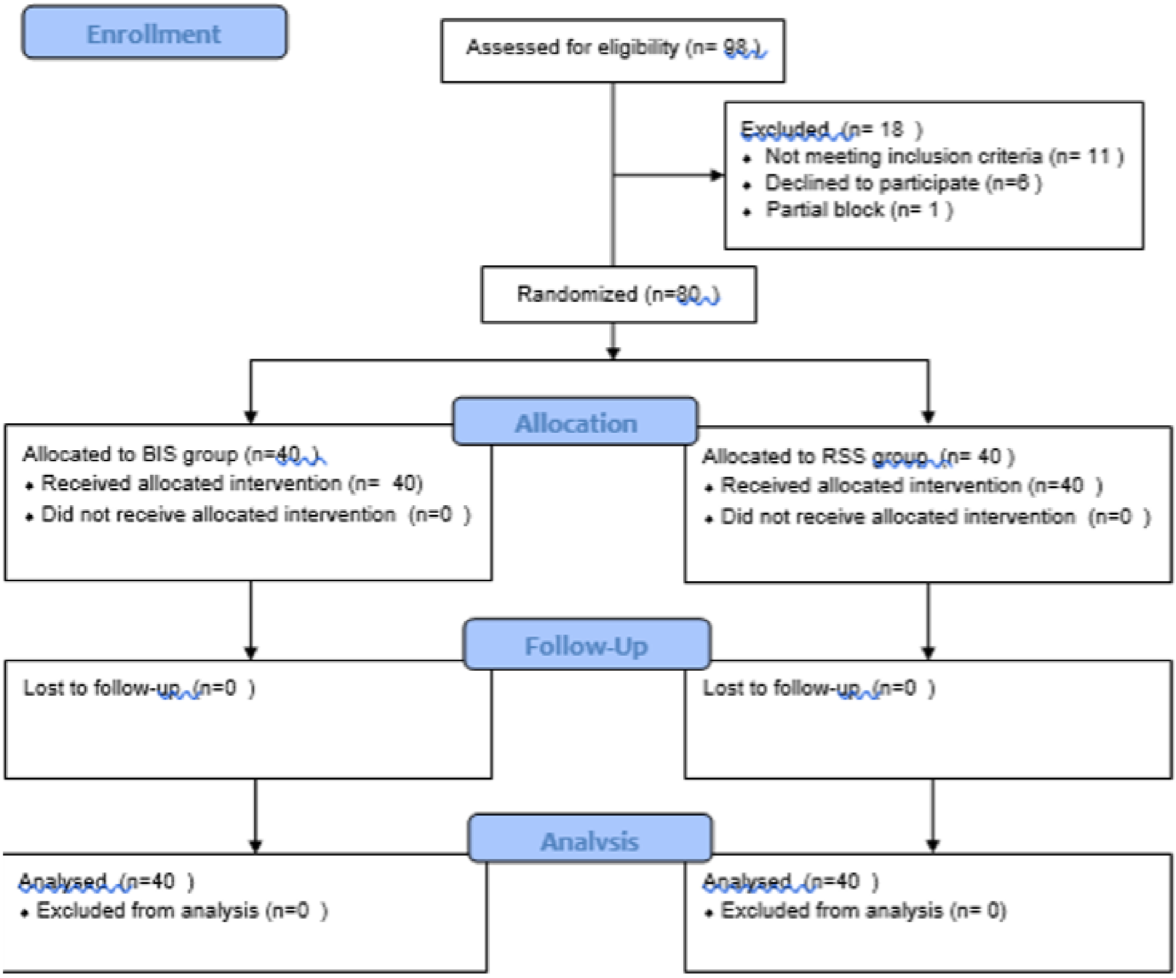

Fig. 1. Flow chart of the study.

2.4. Outcomes measurements

The primary outcome of this study was total consumption of dexmedetomidine.

Secondary outcomes included:

- The level of sedation achieved: Measured by BIS and RSS
- Hemodynamic stability: Heart rate and blood pressure
- Respiratory parameters: Respiratory rate and SpO2
- Incidence of perioperative complications such as nausea, vomiting, hypotension (a decrease in MAP below 60 mmHg or Systolic Arterial Blood Pressure (SAB) < 90 mmHg, or a reduction of more than 20% from the initial SBP, DBP, and MAP values), bradycardia (HR less than 50 beats per minute), and hypoxia (SpO2 < 90%) were defined.

2.5. Sample size and statistical analysis

Based on a similar study in the literature, a sample size of 40 patients per group was determined through power analysis, indicating that this number would be sufficient to detect a clinically significant difference in sedative drug consumption with a power of 80% and a significance level of 0.05 [8].

Statistical evaluation was performed using SPSS (version 16.0; IBM Corp., Armonk NY,, USA). The conformity of data within each group to a normal distribution was determined using the Shapiro-Wilk test. Continuous variables were compared between groups using the Student's t-test for variables following a normal distribution and the Mann-Whitney U test for those that did not. Comparisons of SBP, HR, MAP, and DBP within the same group against control values were assessed using the Wilcoxon test. Throughout all tests, a p-value of less than 0.05 was considered statistically significant.

3. Results

In total, 98 patients were assessed for eligibility. Of these, 18 patients were excluded for various reasons, including not meeting the inclusion criteria (11 patients), declining to participate (6 patients), and other reasons (1 patient). The remaining 80 patients were randomized into two groups, with 40 patients each allocated to the BIS and 40 patients to the RSS monitoring groups as visually represented in the CONSORT Flow diagram (Fig. 1). Both groups received allocated interventions. None of the patients in either group failed to receive any intervention. Follow-up was completed without loss or discontinuation in either group. Consequently, 40 patients in each group were included in the final analysis.

The surgical procedures performed on the study participants were well distributed between the two groups. In Group B (consisting of 40 patients), 24 underwent urological surgeries, while both plastic and orthopaedic surgeries were performed in 8 patients each. Similarly, in Group R (40 patients), 25 underwent urological surgeries, 9 underwent plastic surgeries, and 6 underwent orthopaedic surgeries.

The demographic characteristics and surgical and sedation durations of the 80 enrolled patients did not differ significantly between groups ($p>0.05$). The average infusion dose required to achieve the targeted level of sedation in Group B was 0.44 ± 0.15 μg/kg/h, in Group R it was slightly lower at 0.39 ± 0.14 μg/kg/h; however, not statistically significant ($p>0.05$). The total drug consumption was also similar between the groups ($p>0.05$) (Table 1).

Intragroup comparisons revealed a significant decrease in heart rate (Fig. 2). SBP and DBP (Fig. 3) at various measurement times compared to control values ($p<0.05$). No significant differences were detected between the groups at the same time points ($p>0.05$).

Table 1. Demographic and intraoperative characteristics of patients undergoing sedation.

Variable	Group B (n=40)	Group R (n=40)	p-value
Age (years)	47.77 ± 15.38	44.57 ± 15.31	0.35
BMI (kg/m^2)	26.67 ± 4.45	27.30 ± 4.35	0.52
Gender (F/M)	10/30	11/29	0.18
Drug infusion duration (min)	58.5 ± 11.8	60.3 ± 15.1	0.53
Surgical duration (min)	68.5 ± 11.8	70.38 ± 15.1	0.90
Drug quantity consumed (μg)	110 ± 20	111 ± 22	0.80

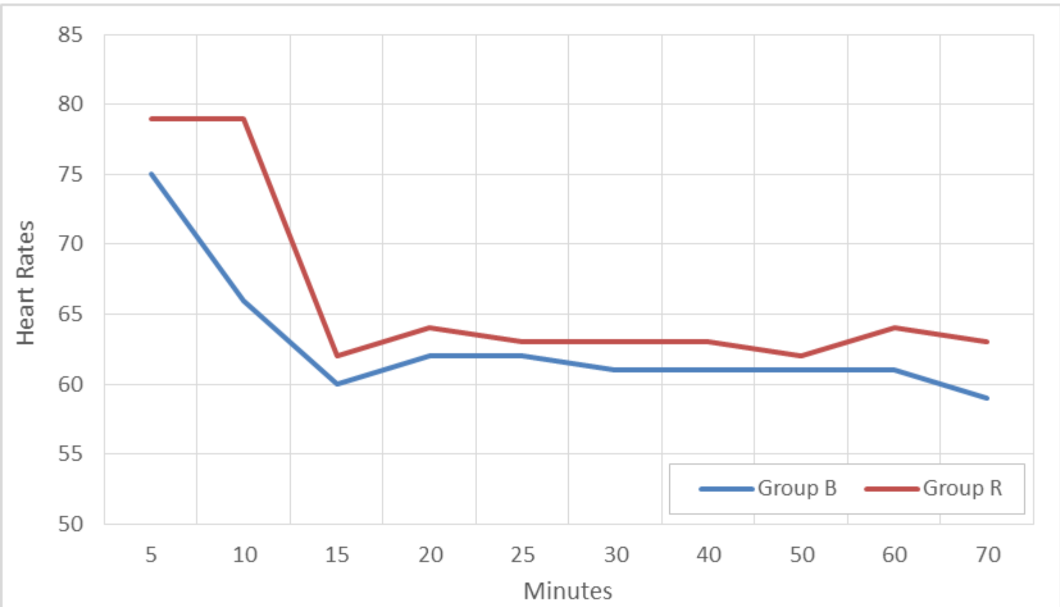

Fig. 2. Comparative heart rates in Group B and Group R throughout anesthesia.

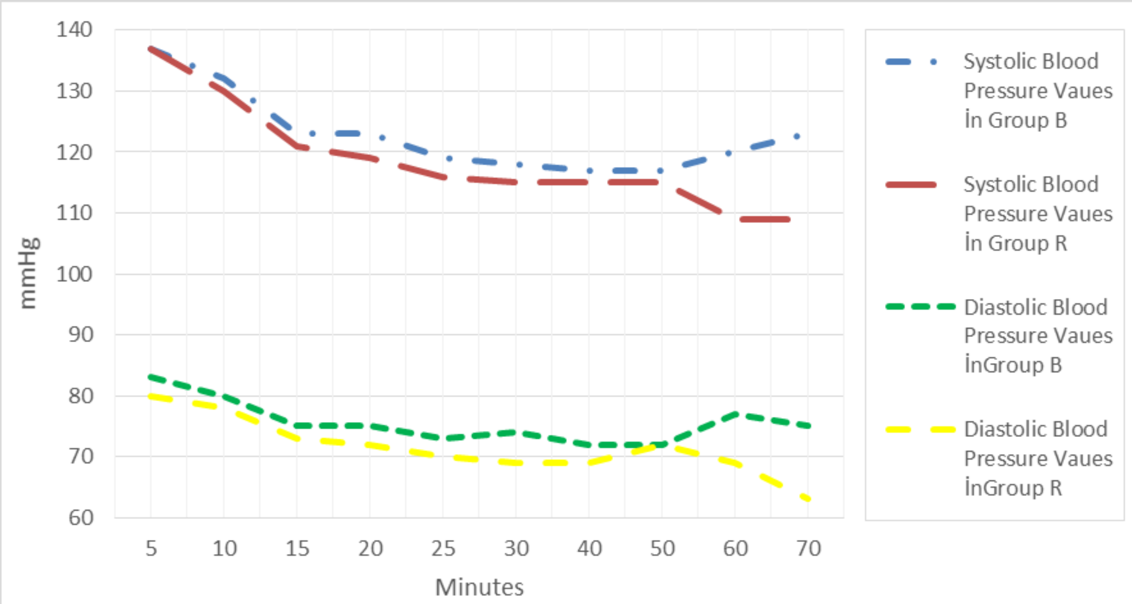

Fig. 3. Comparative distribution of systolic and diastolic blood pressure values in Group B and Group R throughout anesthesia.

Throughout anesthesia, the RR per minute did not demonstrate any significant variation within or between the groups (p>0.05). Although there was a statistically significant difference in the SpO2 values between the groups at 15.minute (p=0.03), 30. minute (p=0.03), and 40. minute (p=0.04), no clinically significant difference was detected. In both groups, desaturation was not observed during the operation or anesthesia period.

Throughout anesthesia, there was no statistically significant difference between the groups regarding the dexmedetomidine infusion dose required to achieve adequate sedation, and the total amount of drug consumed was found (p>0.05) (Table 2).

Table 2. Comparison of dexmedetomidine infusion doses for Group B and Group R.

Time	Group B (mean± SD)	Group R (mean± SD)	p-value
Inf. dose T5	0.5 ± 0.1	0.5 ± 0.1	0.38
Inf. dose T10	0.5 ± 0.2	0.4 ± 0.1	0.20
Inf. dose T15	0.5 ± 0.2	0.4 ± 0.1	0.12
Inf. dose T20	0.5 ± 0.2	0.4 ± 0.2	0.05
Inf. dose T25	0.5 ± 0.2	0.4 ± 0.2	0.14
Inf. dose T30	0.4 ± 0.2	0.5 ± 0.1	0.56
Inf. dose T40	0.4 ± 0.2	0.3 ± 0.2	0.65
Inf. dose T50	0.3 ± 0.3	0.2 ± 0.2	0.06
Inf. dose T60	0.2 ± 0.3	0.2 ± 0.2	0.56
Inf. dose T70	0.5 ± 0.4	0.2 ± 0.3	0.22
Inf. dose T80	0.5 ± 0.3	0.2 ± 0.2	0.21
Average Inf. Dose (µg-1.kg-1.hr-1)	0.44 ± 0.15	0.39 ± 0.14	0.14
Drug quantity consumed (µg)	110 ± 20	111 ± 22	0.80

µg-1.kg-1.hr-1: The Average drug infusion dose; SD: standard deviation;
Group B: The group monitored with BIS for sedation;
Group R: The group monitored with RSS for sedation; p: Student's t-test.

Complication rates were similar between the two groups. Hypotension was observed in four patients, with two being treated with fluid therapy and the other two receiving intravenous ephedrine in Group B. Hypotension occurred in three patients, where the blood pressure of one patient was normalized with fluid therapy, and two patients were administered intravenous ephedrine in Group R. Bradycardia developed in 11 patients in Group B and in 10 patients in Group R, with heart rates returning to normal levels after intravenous atropine administration. Nausea was observed in 3 patients from each group, which resolved without the need for any medication. No significant difference was found in the amounts of atropine and ephedrine used between the two groups (p>0.05).

4. Discussion

Our study demonstrated that the use of BIS monitoring in patients undergoing spinal anesthesia with dexmedetomidine did not significantly alter the total drug consumption compared with traditional RSS monitoring.

Dexmedetomidine is a preferred sedative in anesthesia practices due to its short half-life, analgesic properties, and minimal respiratory suppression. Dexmedetomidine is considered a potential sedative option due to its favorable sedative profile. Nonetheless, its application is constrained by its propensity to reduce heart rate and arterial blood pressure, which is of particular concern given cardiac complications such as bradyarrhythmias [9]. In our study, dexmedetomidine decreased heart rate and cardiac output in a dose-dependent manner, which is consistent with the findings of Başar et al. [10] and Shehabi et al. [11]. It is important to note that a study by Beloel et al. reported five cases of severe bradycardia in patients receiving dexmedetomidine, which led to the premature termination of their trial. In our study, although bradycardia was observed, it was managed effectively with atropine and did not lead to premature termination. This highlights the need for careful monitoring and management of hemodynamic parameters when using dexmedetomidine, particularly in patients with underlying cardiovascular conditions [12]. Dexmedetomidine's hypotensive effects have been exploited to blunt the sympathetic response during general anesthesia and facilitate controlled hypotension perioperatively [10,13]. Similar to our study, Wang et al. [14] added evidence supporting the hemodynamic stability provided by dexmedetomidine, which is beneficial for reducing surgical bleeding and providing a better operative field.

Dexmedetomidine’s profile as a sedative is notably marked by its low risk of respiratory depression, a finding our study corroborates. In agreement with these observations, our research suggests that dexmedetomidine does not significantly impair respiratory function [15]. Conversely, Shehabi et al. observed an elevated incidence of adverse events in a cohort receiving dexmedetomidine compared to those receiving standard care in a large-scale study evaluating early sedation effects in critically ill patients [16]. Although we reported no respiratory symptoms, we observed minor and self-closing side effects (nausea) after dexmedetomidine administration.

The influence of BIS monitoring on anesthetic usage has been the subject of extensive studies [17]. It was observed that dexmedetomidine could decrease the need for propofol and remifentanil when using bispectral index-guided closed-loop anesthesia for monitoring [18]. Turkmen et al. reported that the Richmond Agitation-Sedation Scale (RASS) levels were in substantial agreement with BIS readings during dexmedetomidine-induced sedation in mechanically ventilated critically ill patients [19]. BIS monitoring of dexmedetomidine use has been reported to benefit from reducing agent consumption during mechanical ventilation in critically ill patients [14]. Importantly, the dosage of dexmedetomidine used was not affected by this monitoring method. In our investigation, applying BIS to oversee sedation levels did not lead to a notable change in overall sedative consumption compared to RSS. These results are consistent with those of Luginbüh et al. [20], who also reported no significant impact on the time taken for patients to emerge from sedation, although BIS monitoring was associated with reduced anesthetic requirements.

BIS monitoring has been extensively studied since 1996, some studies have suggested its utility in preventing both over and under-sedation [18]. Our research indicates that in patients undergoing spinal anesthesia with dexmedetomidine sedation, BIS monitoring did not significantly affect total drug consumption or reduce perioperative complications or recovery time. This underscores the need for a nuanced approach to monitoring and titration of sedation, integrating clinical judgment with objective measures such as BIS. Future research should continue to explore the multifaceted dynamics of sedation management to enhance patient safety and optimize anesthesia practices.

The interpretation of the findings of this study has several limitations. First, the investigation was conducted with a relatively small sample size, which may not provide a broad representation of the population undergoing spinal anesthesia. This limits the generalizability of our results, and further studies with larger cohorts are necessary to validate our findings. Another limitation is the single-center nature of the study, which introduces potential biases related to specific anesthetic practices and patient populations. Multi-center studies would be beneficial to confirm the applicability of these results across different clinical settings and patient demographics. Additionally, while BIS monitoring has proven to be a useful tool for assessing sedation depth, it is not without its challenges. The accuracy of BIS monitoring can be affected by various factors, including electrical interference and patient movement, which were not controlled for in this study. Hence, the reliability of BIS readings as the sole indicator of sedation depth is questionable. Our study did not include patients with significant comorbidities, such as ASA classification III or above. This selection criterion excluded a segment of the patient population that might respond differently to dexmedetomidine, thereby limiting the scope of the study’s applicability.

The lack of a placebo or control group not receiving BIS monitoring is another limitation that restricts the ability to draw definitive conclusions about the efficacy of BIS monitoring over standard practice or no monitoring at all. Future studies addressing these limitations are necessary to provide a more comprehensive understanding of the impact of BIS monitoring on drug consumption and recovery during sedation with dexmedetomidine during spinal anesthesia.

5. Conclusions

Dexmedetomidine effectively achieves sedation during spinal anesthesia without significant respiratory depression. However, BIS monitoring did not reduce drug consumption compared to RSS monitoring. While BIS monitoring is valuable for sedation assessment, its impact on dexmedetomidine's efficacy in spinal anesthesia appears limited. Clinical decisions should consider both monitoring methods and patient-specific factors. Future research could explore integrating BIS monitoring with other sedatives in various surgical contexts to optimize sedation practices and patient safety.

Acknowledgements

None declared.

Funding

The authors received no financial support for the research, authorship, and/or publication of this manuscript.

Conflict of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this manuscript.

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 Kocaeli University Faculty of Medicine (Approval code: 29.09.2011 KAEK 10/7). All methods were performed in accordance with relevant guidelines and regulations.

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Challenge Journal of Perioperative Medicine 2 (2) (2024) 43–54

Challenge Journal of Perioperative Medicine

Research Article

Analyzing the educational quality of YouTube videos on paravertebral block techniques

Muhammed Halit Satıcı [a,*], Mahmut Sami Tutar [a]

[a] *Department of Anesthesiology and Reanimation, Konya City Hospital, University of Health Sciences, Konya, Türkiye*

ABSTRACT

Aim: People can learn new skills, explore content related to their interests, and get to know different cultures through YouTube videos. It is important to be conscious when using platforms such as YouTube and to take care to obtain information from verified and reliable sources. Students especially watch medical videos on YouTube, which can improve their medical knowledge. Our aim in this study is to evaluate the educational content and quality of paravertebral block videos on YouTube.

Materials and Method: Videos were recorded by typing the term 'paravertebral block ultrasound' into the YouTube search engine. In filtering, sorting was done according to the number of views. 100 videos on the first 5 pages were watched and evaluated. To evaluate the videos on YouTube, we used two different surveys, evaluating the educational content of the videos (Survey 1) and evaluating the quality of the videos (Survey 2).

Results: Our study revealed that only a third of paravertebral block education videos met relevant criteria, with just (33) 18.2% demonstrating both good educational quality and preparation. There was a positive correlation between the video educational quality score and all parameters, with significant differences found for "video duration" and "video preparation quality score" (r=0.506, p=0.003, and r=0.84, p<0.001, respectively). Similarly, the video preparation quality score showed a positive correlation with all parameters, with significant differences found for "number of video likes" and "video duration" (r=0.373, p=0.033, and r=0.413, p=0.017, respectively).

Conclusions: Paravertebral block videos on YouTube are inadequate in terms of educational and preparation quality. According to our analysis, we do not recommend using YouTube videos for educational purposes.

ARTICLE INFO

Article history:
Received 16 April 2024
Revised 26 May 2024
Accepted 29 June 2024

Keywords:
Analgesia
Paravertebral blocks
Regional anesthesia
YouTube videos

1. Introduction

Nowadays, the use of the internet and social media has become an important part of our lives. Internet use and social media use provide us with information on many issues in daily life, including health. Founded in 2005, YouTube offers a wide range of content, allowing its users to obtain information from different perspectives in education, entertainment, news, art, and many other fields [1]. People can learn new skills, explore content related to their interests, and get to know different cultures through YouTube videos. This platform also provides an environment where people can share their experiences, ideas, and talents. While social media tools can provide quick and easy access to medical information, the widespread use of the internet and social media brings with it some problems, such as access to misinformation [2]. It is important to be conscious when

* *Corresponding author*. E-mail address: halit_satici@hotmail.com (M. H. Satıcı)
ISSN: 2980-292X / DOI: https://doi.org/10.20528/cjpm.2024.02.003

using these platforms and to take care to obtain information from verified and reliable sources. Medical videos on YouTube are especially useful for students because they are monitored and can contribute to their medical skills. When watching such videos, viewers need to pay attention to the sources, the expertise of the person who created the video, and whether the content is based on a solid scientific basis. Choosing videos from official medical institutions or well-known medical experts may be a more reliable way to ensure reliability [3–6]. Platforms such as YouTube have great potential for healthcare education and training. Many health-related videos may have poor educational quality, rely on uncertain sources, have security issues, lack vetting of content, and have inaccurate information. This can make it difficult and even misleading for viewers to access accurate and reliable information [7,8].

Although there are very few studies on the evaluation of regional anesthesia procedures on YouTube, there are some studies explaining the problems related to the reliability and quality of the studies [9–11]. Anesthesiologists and assistants are now frequently performing interfascial plane blocks. There are many videos on YouTube about interfascial plane blocks. Studies have investigated the effectiveness of YouTube videos on some of the interfacial plan blocks [9, 12]. Paravertebral block, one of the interfascial plane blocks, is one of the interfascial plane blocks with the highest complication rate and the highest risk of local anesthetic toxicity due to its proximity to the spinal cord, vascular structures, and pleura [13–15]. Our aim in this study is to evaluate the educational content and quality of paravertebral block videos on YouTube.

2. Materials and Method

Animals and human subjects were not used in this study. Therefore, ethics committee approval is not required in this study. Searching for videos on YouTube and recording the URLs was completed by one of the researchers in a single session on October 22, 2023. The videos were searched by typing the term 'paravertebral block ultrasound' into the YouTube search engine. In filtering, sorting was done according to the number of views. Two anesthesiologists with at least five years of clinical experience with interfascial plane blocks watched and evaluated 100 videos on the first five pages of YouTube. To evaluate the videos on YouTube, we used two different surveys, evaluating the educational content of the videos (Survey 1) and evaluating the quality of the videos (Survey 2).

2.1. Inclusion and exclusion criteria

Videos in English; videos with ultrasound guidance; and videos about the paravertebral block were included in the study. The study included only videos in English to ensure standardization because it is the most widely used language. Videos without ultrasound images, irrelevant to the topic, lacking sound, or duplicates were excluded. Additionally, according to similarly study videos, shorter than one minute or longer than 20 minutes were not considered. This is because videos shorter than a minute typically provide insufficient information for evaluation, and longer videos could diminish evaluator objectivity [9,12].

- Survey 1: It consists of 14 questions. It questions the educational content of the videos. We created this survey form with reference to previous studies (Table 1) [9,10,16].
- Survey 2: It consists of 14 questions and evaluates the quality of the preparation of the videos. (Table 2). According to the American National Career Development Association's (NCDA) guide, we created Survey 2 [17].

Anaesthesiologists who evaluated the videos scored each question between 0 and 5. (0-very bad, 1-bad, 2-fair, 3-good, 4-very good, 5-excellent). Each video was scored between 0-70 according to the questions shown in surveys 1 and 2 (0-14: very bad, 15-28: bad, 29-42: fair, 43-56: good, 57-70: very good).

Table 1. Evaluation of the video educational content.

Survey 1: Questions
1 Are the clinical indications for paravertebral block clearly explained?
2 Are anatomical landmarks clearly explained or marked?
3 Has the anatomy of paravertebral block been clearly explained?
4 Has the suspected mechanism of action been clearly explained?
5 Has technical information regarding probe selection and frequency of the ultrasound device been explained?
6 Has ultrasound anatomy been clearly demonstrated and explained?
7 Were the recorded sono-anatomical images and anatomical structures in the recording clear and easy to perceive?
8 Was the ultrasound image of the needle visible and easy to follow?
9 Are instructions regarding depth, alignment and direction of needle movements clearly explained?
10 Has information regarding the spread of local anesthetic been explained?
11 Is information about in-plane or out-of-plane technique given in the video?
12 Has sterile technique been clearly explained or emphasized?
13 Has the information regarding the local anesthetic agent been explained clearly?
14 Have the possible complications associated with this block technique been explained?

Table 2. Quality of the video preparation.

Survey 2: Questions
1 Is the purpose of the video clearly stated and explained in the first quarter of the video?
2 Was the title or name of the video appropriate to the purpose of the video?
3 Were the design and content of the video suitable for the intended educational purpose?
4 Have the skills and technique of the procedure been explained using a standard, comparable, “step-by-step” method?
5 Was the information provided in the video useful for viewers to develop/improve their skill base?
6 Was the content of the video appropriate for the health and safety of both the patient and the practitioner?
7 Was the quality of the picture acceptable in terms of colors and clarity?
8 Was the quality of the video audio acceptable? (No sounds should be scored as zero
9 Was the length of the video balanced with the content of the video?
10 Is information on production or release date, producers and references clearly explained?
11 Are the objectives, learning tasks and terminology clearly stated in the video to enable viewers to perform these tasks?
12 Does the video contain additional aids such as stop-and-discuss points, scenarios, and/or summary of the procedure?
13 Has information been provided about a way to evaluate the effectiveness and repeatability of the video?
14 Did the content of the video encourage viewers to move from passive spectators to active practitioners in the implementation of the practice? Technical?

2.2. The following data were recorded for the videos

The relevant URLs of the videos, the duration of the videos, the number of days the videos were available, the number of viewers of the videos, the source of the videos (whether academic or not), the total number of likes of the videos, and the survey 1 and survey 2 scores given to the videos by experts.

2.3. Statistical analyses

IBM-Statistical Package for Social Sciences (IBM-SPSS Inc., Chicago, IL, USA) 22.0 program was used to analyze the data obtained in the study. The suitability of the data for normal distribution was examined with the "Shapiro-Wilk test." Continuous variables were expressed as medians (25–75 percentiles) according to their distribution status, and categorical variables were expressed as numbers and percentages. 'Spearman rho correlation test' was applied in the correlation analysis for continuous variables. The statistical significance level was accepted as $p<0.05$.

3. Results

By typing the word "paravertebral block ultrasound" on the YouTube site, a total of 100 videos appearing on the first 5 pages were evaluated. 67 of these videos were excluded from the study according to the study exclusion criteria. Of these, 11 were irrelevant, 14 contained advertisements, 11 contained no ultrasound, 12 were in a language other than English, 10 were less than a minute or longer than 20 minutes, and 9 were without audio narration. Thus, 33 videos were included in the study (Fig. 1).

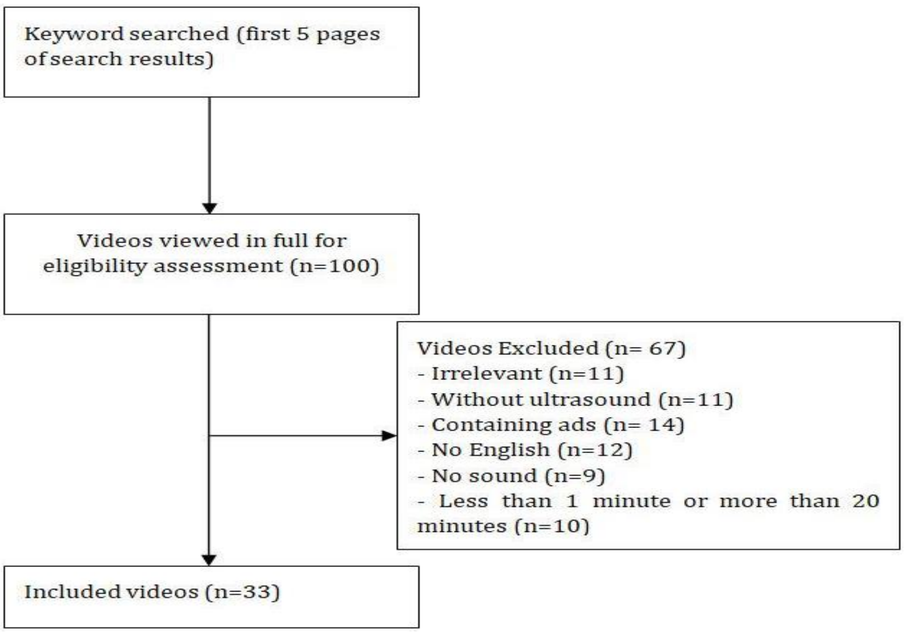

Fig. 1. Flow chart of the study.

When video characteristics are evaluated, "number of video views" is 4096 (1531-25501), "number of video likes" is 64 (18-236) median (25-75 percentile), and "video duration (seconds)" is 752 (500-1753) median (25-75 percentile).

The video educational quality score was 6 (18.2%) as "good" and 5 (15.2%) as "very bad," and the median (25–75 percentile) video educational quality score was 30 [17–40]. The video preparation quality score was 6 (18.2%) as "good" and 9 (27.3%) as "bad," and the median (25–75 percentile) video preparation quality score was 31 [24–38] (Table 3).

The 14 parameters and evaluation scores examined for the video educational quality score are shown separately in Table 4.

The 14 parameters and evaluation scores examined for the video preparation quality score are shown separately in Table 5.

Table 3. Video characteristics and quality score values.

Video characteristic feature		n (%) or median (25-75th percentile)
Video views		4096 (1531-25501)
Number of Video Likes		64 (18-236)
Video duration (seconds)		752 (500-1753)
Video educational quality score		30 (17-40)
Video educational quality score classification	Too bad	5 (15.2%)
	Bad	10 (30.3%)
	It will do	12 (36.4%)
	Good	6 (18.2%)
Video preparation quality score		31 (24-38)
Video preparation quality score classification	Too bad	1 (3%)
	Bad	9 (27.3%)
	It will do	17 (51.5%)
	Good	6 (18.2%)

Table 4. Video educational quality questions (part 1).

Question	Degree	n (%)
Are the clinical indications for paravertebral block clearly explained?	Too bad	7 (21.2%)
	Bad	7 (21.2%)
	It will do	1 (3%)
	Good	2 (6.1%)
	Very good	5 (15.2%)
	Perfect	11 (33.3%)
Are anatomical landmarks clearly explained or marked?	Too bad	1 (3%)
	Bad	3 (9.1%)
	It will do	3 (9.1%)
	Good	7 (21.2%)
	Very good	13 (39.4%)
	Perfect	6 (18.2%)
Has the anatomy of paravertebral block been clearly explained?	Too bad	0 (0%)
	Bad	3 (9.1%)
	It will do	4 (12.1%)
	Good	8 (24.2%)
	Very good	7 (21.2%)
	Perfect	11 (33.3%)

Table 4. Video educational quality questions (part 2).

Has the suspected mechanism of action been clearly explained?	Too bad	3 (9.1%)
	Bad	11 (33.3%)
	It will do	8 (24.2%)
	Good	2 (6.1%)
	Very good	3 (9.1%)
	Perfect	6 (18.2%)
Regarding probe selection and frequency of the ultrasound device been explained?	Too bad	7 (21.2%)
	Bad	9 (27.3%)
	It will do	6 (18.2%)
	Good	8 (24.2%)
	Very good	2 (6.1%)
	Perfect	1 (3%)
Has ultrasound anatomy been clearly demonstrated and explained?	Too bad	1(3%)
	Bad	4 (12.1%)
	It will do	8 (24.2%)
	Good	8 (24.2%)
	Very good	9 (27.3%)
	Perfect	3 (9.1%)
Were the recorded sono-anatomical images and anatomical structures in the recording clear and easy to perceive?	Too bad	3 (9.1%)
	Bad	2 (6.1%)
	It will do	9 (27.3%)
	Good	9 (27.3%)
	Very good	9 (27.3%)
	Perfect	1 (3%)
Was the ultrasound image of the needle visible and easy to follow?	Too bad	9 (27.3%)
	Bad	3 (9.1%)
	It will do	3 (9.1%)
	Good	6 (18.2%)
	Very good	12 (36.4%)
	Perfect	0 (0%)
Are instructions for depth, alignment, and direction of needle movements clearly explained?	Too bad	9 (27.3%)
	Bad	9 (27.3%)
	It will do	8 (24.2%)
	Good	7 (21.2%)
	Very good	0 (0%)
	Perfect	0 (0%)
Has information regarding local anesthetic dissemination been explained?	Too bad	6 (18.2%)
	Bad	12 (36.4%)
	It will do	8 (24.2%)
	Good	4 (12.1%)
	Very good	3 (9.1%)
	Perfect	0 (0%)
Was information given about the in-plane or out-of-plane technique in the video?	Too bad	10 (30.3%)
	Bad	5 (15.2%)
	It will do	6 (18.2%)
	Good	6 (18.2%)
	Very good	4 (12.1%)
	Perfect	2 (6.1%)

Table 4. Video educational quality questions (part 3).

Has sterile technique been clearly explained or emphasized?	Too bad	29 (87.9%)
	Bad	3 (9.1%)
	It will do	0 (0%)
	Good	1 (3%)
	Very good	0 (0%)
	Perfect	0 (0%)
Was the information regarding the local anesthetic agent explained clearly?	Too bad	20 (60.6%)
	Bad	4 (12.1%)
	It will do	3 (9.1%)
	Good	1 (3%)
	Very good	4 (12.1%)
	Perfect	1 (3%)
Have possible complications related to this block technique been explained?	Too bad	7 (21.2%)
	Bad	8 (24.2%)
	It will do	3 (9.1%)
	Good	8 (24.2%)
	Very good	3 (9.1%)
	Perfect	4 (12.1%)

Table 5. Video preparation quality questions (part 1).

Question	Degree	n (%)
Is the purpose of the video clearly stated and explained in the first quarter of the video?	Too bad	2 (6.1%)
	Bad	6 (18.2%)
	It will do	8 (24.2%)
	Good	10 (30.3%)
	Very good	7 (21.2%)
	Perfect	0 (0%)
Was the title or name of the video appropriate to the purpose of the video?	Too bad	1 (3%)
	Bad	0 (0%)
	It will do	3 (9.1%)
	Good	5 (15.2%)
	Very good	18 (54.5%)
	Perfect	6 (18.2%)
Were the design and content of the video suitable for the intended educational purpose?	Too bad	0 (0%)
	Bad	1 (3%)
	It will do	7 (21.2%)
	Good	11 (33.3%)
	Very good	11 (33.3%)
	Perfect	3 (9.1%)
Have the skills and technique of the procedure been explained using a standard, comparable, “step-by-step” method?	Too bad	3 (9.1%)
	Bad	11 (33.3%)
	It will do	6 (18.2%)
	Good	8 (24.2%)
	Very good	5 (15.2%)
	Perfect	0 (0%)

Table 5. Video preparation quality questions (part 2).

Was the information provided in the video useful for viewers to develop/improve their skill base?	Too bad	0 (0%)
	Bad	3 (9.1%)
	It will do	8 (24.2%)
	Good	13 (39.4%)
	Very good	7 (21.2%)
	Perfect	2 (6.1%)
Was the content of the video appropriate for the health and safety of both the patient and the practitioner?	Too bad	1 (3%)
	Bad	0 (0%)
	It will do	7 (21.2%)
	Good	13 (39.4%)
	Very good	10 (30.3%)
	Perfect	2 (6.1%)
Was the quality of the picture acceptable in terms of colors and clarity?	Too bad	0 (0%)
	Bad	0 (0%)
	It will do	10 (30.3%)
	Good	15 (45.5%)
	Very good	6 (18.2%)
	Perfect	2 (6.1%)
Was the quality of the video audio acceptable? (No sounds should be scored as zero	Too bad	1 (3%)
	Bad	2 (6.1%)
	It will do	1 (3%)
	Good	7 (21.2%)
	Very good	21 (63.6%)
	Perfect	1 (3%)
Was the length of the video balanced with the content of the video?	Too bad	0 (0%)
	Bad	3 (9.1%)
	It will do	7 (21.2%)
	Good	13 (39.4%)
	Very good	10 (30.3%)
	Perfect	0 (0%)
Is information about the production or release date, producers and references clearly explained?	Too bad	19 (57.6%)
	Bad	7 (21.2%)
	It will do	1 (3%)
	Good	5 (15.2%)
	Very good	0 (0%)
	Perfect	1 (3%)
Are the objectives, learning tasks, and terminology clearly stated in the video to enable viewers to accomplish these tasks?	Too bad	10 (30.3%)
	Bad	11 (33.3%)
	It will do	5 (15.2%)
	Good	5 (15.2%)
	Very good	1 (3%)
	Perfect	1 (3%)
Does the video include additional aids such as stop-and-discuss points, scenarios, and/or summary of the procedure?	Too bad	18 (54.5%)
	Bad	5 (15.2%)
	It will do	7 (21.2%)
	Good	1 (3%)
	Very good	2 (6.1%)
	Perfect	0 (0%)

Table 5. Video preparation quality questions (part 3).

Was information provided about a way to evaluate the effectiveness and repeatability of the video?	Too bad	32 (97%)
	Bad	1 (3%)
	It will do	0 (0%)
	Good	0 (0%)
	Very good	0 (0%)
	Perfect	0 (0%)
Did the content of the video encourage viewers to shift from passive spectator to active practitioner in the implementation of the practice? Technical?	Too bad	4 (12.1%)
	Bad	6 (18.2%)
	It will do	7 (21.2%)
	Good	6 (18.2%)
	Very good	9 (27.3%)
	Perfect	1 (3%)

When looking at the relationship between the video educational quality score, video characteristics, and video preparation quality score; there was a positive correlation between the video educational quality score and all parameters. While this correlation was not statistically significant for "number of video views" and "number of video likes" (r=0.155, p=0.388, and r=0.314, p=0.075, respectively), there was a statistically significant difference for “video duration (duration)” and “video preparation quality score” (r=0.506, p=0.003, and r= 0.84, p<0.001, respectively) (Figs. 2 and 3).

When looking at the relationship between video preparation quality score and video characteristics; there was a positive correlation between the video preparation quality score and all parameters. While this correlation was not statistically significant for "number of video views" (r=0.3, p=0.09), there was a statistically significant difference for “number of video likes” and “video duration (second)” (r=0.373, p=0.033, and r=0.413, p=0.017, respectively) (Figs. 4 and 5).

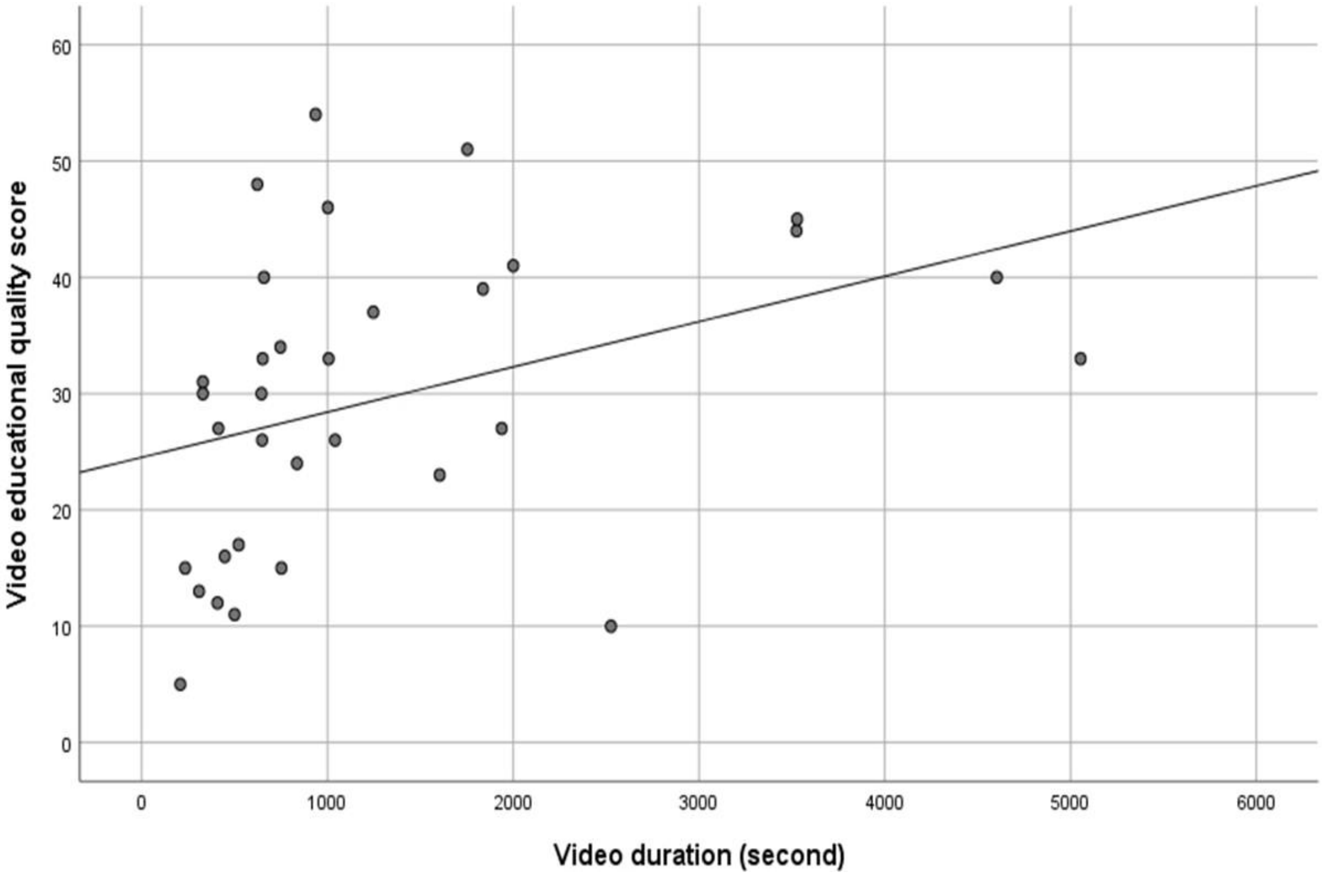

Fig. 2. Relationship between video educational quality score and video duration.

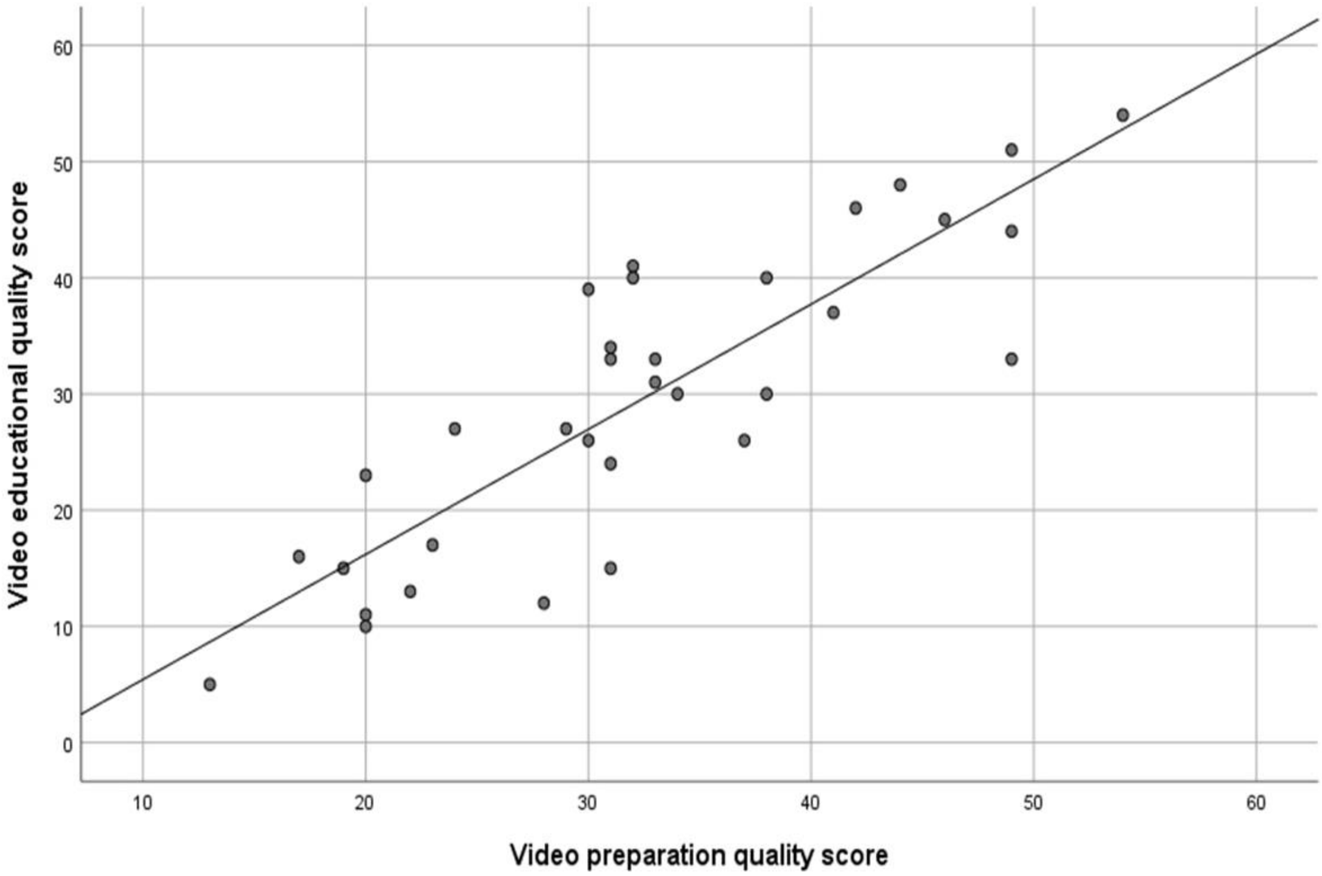

Fig. 3. Relationship between video educational quality score and video preparation quality score.

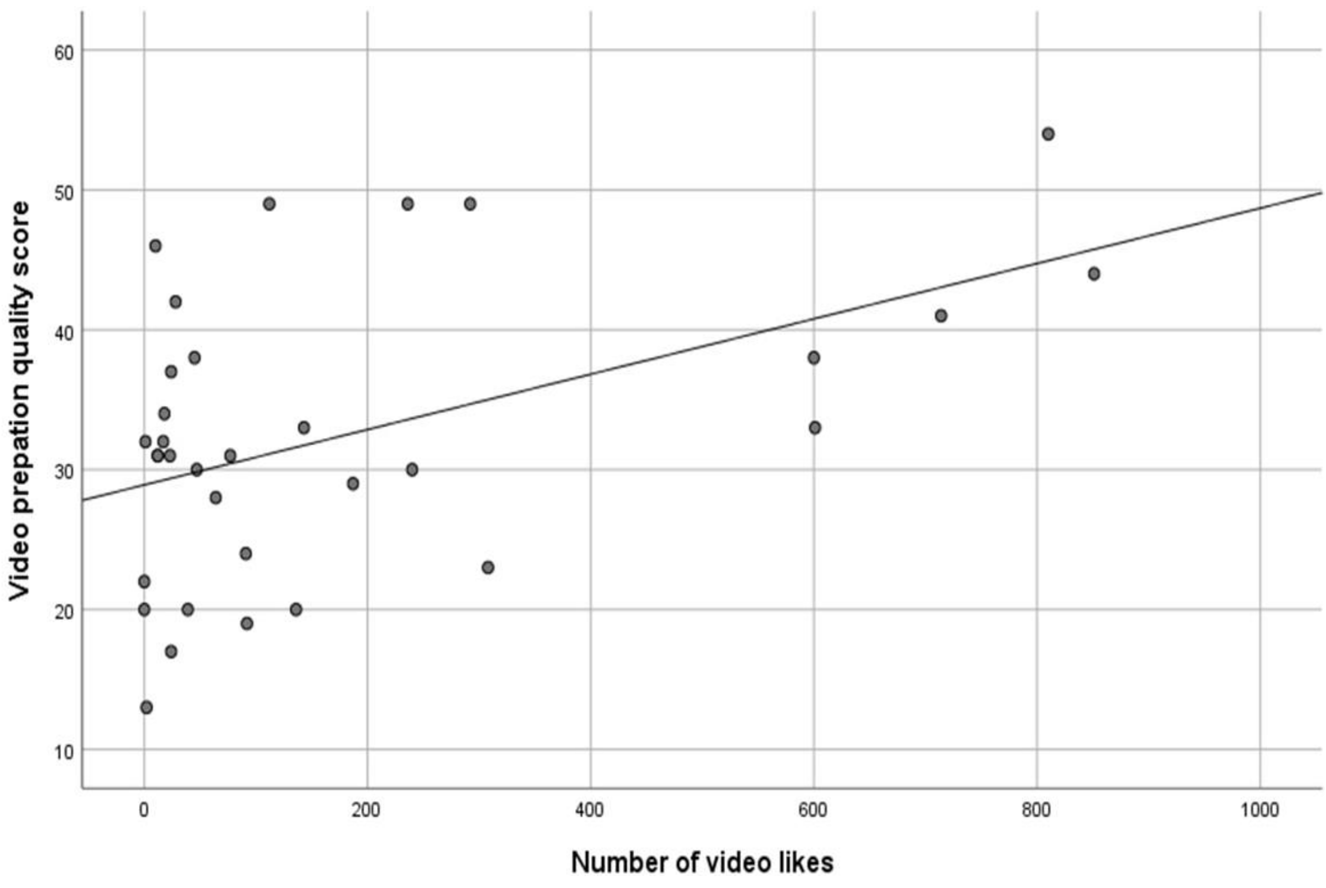

Fig. 4. Relationship between video preparation quality score and number of video likes.

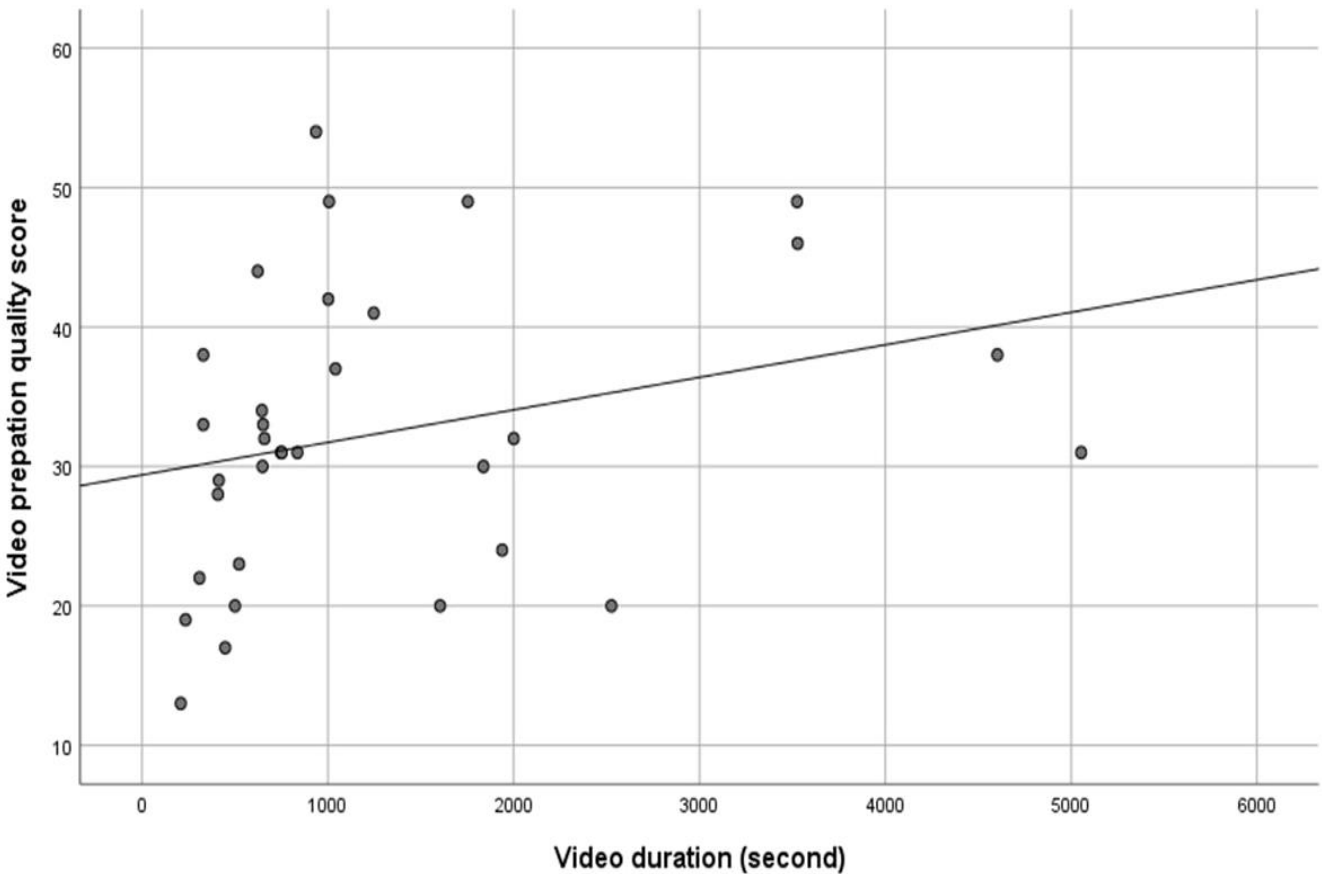

Fig. 5. Relationship between video preparation quality score and video duration.

4. Discussion

In our research conducted by using the descriptive term 'paravertebral block ultrasound', we found that only 33% of the videos met the appropriate criteria for paravertebral block education. Among these videos, merely 6 (18.2%) demonstrated good educational quality, and the same 6 (18.2%) were also well-prepared. Physicians generally watch and apply visually educational videos on video platforms such as YouTube, in addition to textbooks, to contribute to their education. Therefore, it is important to examine the videos on these video platforms. Some studies have evaluated educational videos on YouTube [16]. There are also studies evaluating videos about interfascial plane blocks [9,12].

Our study is the first to examine and evaluate the quality of paravertebral block videos on YouTube. The paravertebral block is a block usually performed in thoracic surgeries that has a risk of pneumothorax due to its proximity to the pleura, a risk of intravascular injection due to its proximity to vascular structures, a risk of spreading to the cerebrospinal fluid (CSF) due to its proximity to the spinal cord, and a high risk of local anesthetic toxicity [15,18,19]. These reasons led us to evaluate the quality of paravertebral block videos on YouTube. Most of the studies have reported that the content and preparation of the videos on YouTube are poor and contain incorrect information that may endanger human health [20,21].

In our study, there were no videos that received perfect scores in either of the surveys we conducted. There are only 6 videos that received good scores in surveys 1 and 2. While there are 15 videos with bad and very bad scores in Survey 1, there are 9 videos with bad and very bad scores in Survey 2. From the 12th question in Survey 1 (Was the sterile technique clearly explained or emphasized?) 29 videos received very poor scores. From the 13th question in Survey 1 (Was the information about the local anesthetic substance clearly explained?), 20 videos received very bad scores. From the 10th question in Survey 2 (Is information about the production or release date, producers, and references clearly explained?) 19 videos received very bad scores. From the 12th question in Survey 2 (Does the video contain additional aids such as stop and discuss points, scenarios, and/or summary information about the procedure?) 18 videos received very poor scores. From question 13 in Survey 2 (Was information provided about a way to evaluate the effectiveness and repeatability of the video?) 32 videos received very poor scores.

The videos on YouTube that we evaluated were inadequate in terms of education and preparation quality. Producers who create videos must comply with production standards and create accurate and high-quality content, and platforms must improve their content quality monitoring processes. Our work may be an incentive for content providers to provide feedback and create better content. Some studies similar to ours have reported that the quality of medical procedures in YouTube videos is low [10,16]. Our study shows that video quality is generally low. We could not see any officially false information in our study. However, the quality of some videos was so low that they could be misunderstood by physicians who do not have enough knowledge about regional anesthesia and are just starting to practice, especially due to low-quality ultrasound images, insufficient information content, weak or missing audio comments, very poor sterility, and inadequate technique.

We found a significant correlation between the duration of the videos and the quality of the videos, and we also found a significant correlation between survey 1 and survey 2. As the educational content of the videos increases, the quality of their preparation also increases. We found a significant correlation between the number of likes and the quality of the videos, but, similar to other studies, we did not find a significant correlation between the number of views of the videos and the quality of the educational content of the videos [10,22]. This shows, as in other studies, that a similar number of viewers can watch low-quality videos and high-quality videos, and that the increase in the number of likes may mislead us. What should happen is that as the number of views increases, the video quality increases. However, our analysis shows that physicians who want to access information from videos on YouTube can access low and high-quality videos at the same rate and may be exposed to incorrect information.

4.1. Limitations

We were able to review a limited number of videos. We reviewed videos on a specific topic, paravertebral block, and most videos did not meet the inclusion criteria. If we analyzed more videos, the result would be different. In addition, we only analyzed the videos on YouTube. We know that there are video-sharing platforms other than YouTube that contain educational videos. The subjective nature of video evaluation by two anesthesiologists may introduce bias. The study would benefit from a larger and more diverse group of evaluators.

5. Conclusions

Paravertebral block, included in the final stages of anesthesiology speciality training programs, is a complex and experienced regional procedure. It is not possible to learn such a complex and advanced process with videos alone; therefore, a clinical approach and experience are required. Although many physicians use social media platforms for learning purposes and clinical experience, our study shows that these platforms must provide more educational value for the paravertebral block. For these reasons, we recommend that anesthesia societies inspect these videos and prepare them according to the guidelines.

Acknowledgements
None declared.

Funding
The authors received no financial support for the research, authorship, and/or publication of this manuscript.

Conflict of Interest
The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this manuscript.

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
None declared.

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Challenge Journal of Perioperative Medicine

Case Report

Anaphylaxis following unfractionated heparin administration: How safe is this drug in the treatment of thromboembolism?

Kıvanç Öncü [a,*], Yasir İlyas [b]

[a] Department of Anaesthesiology and Reanimation, Sinop Atatürk State Hospital, Sinop, Türkiye
[b] Department of Anaesthesiology and Reanimation, Fatih State Hospital, Trabzon, Türkiye

ABSTRACT

Heparin, a naturally occurring polysaccharide belonging to the glycosaminoglycans (GAG) family, is ubiquitously found in mast cells. Unfractionated heparin is the least processed form of natural GAG, purified from animal tissue. In a 67-year-old female patient diagnosed with hypertension and asthma, who suffered a femoral fracture due to a fall, intravenous heparin sodium was administered for thromboembolic treatment in the postoperative period following closed reduction. Subsequently, respiratory distress, loss of consciousness, and cardiac arrest occured following profound hypotension. The patient, whose clinical findings were evaluated as anaphylaxis, was successfully resuscitated with prompt intervention. Despite immune-mediated reactions and Heparin-Induced Thrombocytopenia (HIT) being commonly encountered side effects in clinical practice, it is crucial for all healthcare professionals to recognize that widely used anticoagulant agents such as heparin sodium can lead to fatal complications.

ARTICLE INFO

Article history:
Received 2 March 2024
Revised 3 May 2024
Accepted 18 May 2024

Keywords:
Femoral fracture
Anaphylaxis
Thromboembolism
Unfractionated heparin

1. Introduction

Heparin has found widespread application as an anticoagulant for patients with thromboembolic disorders, those undergoing hemodialysis, as well as individuals undergoing cardiac and arterial surgeries. While bleeding represents the most prevalent side effect, immune-mediated reactions such as thrombocytopenia, skin necrosis, and eczema are also frequently observed [1]. Acute hypersensitivity reactions such as urticaria, angioedema, and bronchospasm, as well as anaphylaxis due to heparin, are seldom reported [2,3].

Anaphylaxis incidents have been documented in the literature, particularly following repeated exposure to heparin sodium sourced from bovine intestines. This case report is presented as unique due to the anaphylaxis episode occurring upon initial exposure to heparin sodium derived from porcine intestines. The current case report was meticulously prepared following the CARE case report guidelines. Informed consent was obtained from the patient for this case presentation in accordance with the Declaration of Helsinki.

2. Case Report

A 67-year-old female patient, with a body mass index (BMI) of 34 (161 cm tall and weighs 89 kg), presented to the Orthopedics department for consultation. She had a medical history of hypertension and asthma. The consultation was regarding a closed reduction procedure, necessitated by the inability to palpate distal peripheral pulses in her left lower extremity. This condition followed a knee prosthesis dislocation resulting from a fall during ambulation.

Upon review of the patient's medical records, it was noted that she did not regularly use medication for asthma. Furthermore, there was no documented history

* *Corresponding author*. E-mail address: dr.kivanc.oncu@gmail.com (K. Öncü)
ISSN: 2980-292X / DOI: https://doi.org/10.20528/cjpm.2024.02.004

of immune-mediated diseases or drug allergies in either the patient or her family. A thorough evaluation of the respiratory system, including lung auscultation, revealed no pathological findings. The patient's peripheral oxygen saturation was measured as 94% while breathing room air, and arterial blood gas values were within normal limits. An electrocardiogram performed in the emergency department indicated sinus rhythm, and subsequent monitoring showed the patient to be normotensive and maintaining a normal heart rate. Based on the blood tests taken in the emergency department, the patient's hematocrit level, electrolyte values, and coagulation parameters were within normal limits.

Following a preoperative assessment, a successful closed reduction procedure was performed under sedoanalgesia (by administering 2 mg midazolam and 50 mcg fentanly) in the operating theatre without complications. The patient, whose postoperative Numeric Rating Scale (NRS) score was evaluated as 1–2 during the postoperative period, was planned to receive an analgesic regimen consisting of 1 gram of paracetamol three times a day. Subsequent postoperative evaluation via contrast-enhanced computed tomography of the lower extremity revealed a 2.5 cm segmental thromboembolism in the proximal left tibialis posterior artery. Consequently, consultation with the Cardiovascular Surgery Department led to the initiation of intravenous unfractionated heparin (UFH) therapy at a dose of 5000 IU (Poliparin®, Polifarma, İstanbul/Türkiye).

Approximately 5 minutes after the commencement of heparin infusion, the patient experienced severe respiratory distress and wheezing consistent with laryngeal edema. Additionally, there was a loss of consciousness (Glasgow Coma Score decreased from 15 to 7) and profound hypotension (systolic arterial pressure was measured as 64/36 mmHg). Subsequently, ventricular tachycardia from sinus rhythm was observed. Based on these findings, a diagnosis of anaphylactic shock was considered. Cardiac arrest due to asystole occurred roughly 1 minute after the onset of shock symptoms and clinical intervention, occurring simultaneously. Immediate interventions included administration of 1 mg adrenaline and 80 mg prednisolone via 20 G peripheral venous access, along with oxygen support using a bag valve mask. Cardiopulmonary resuscitation was initiated, leading to the restoration of spontaneous rhythm after 2–3 minutes. Following that, there was no requirement for an additional adrenaline bolus or positive inotrope.

Although initially considered for intubation, the patient exhibited rapid improvement in consciousness and vital signs. There were no signs of laryngeal edema, and the patient showed full cooperation with normal vital parameters. Consequently, the decision to proceed with intubation was deferred. Subsequent electrocardiography revealed atrial fibrillation, which was managed with amiodarone infusion according to protocol.

Further evaluation via echocardiography post-anaphylaxis revealed multiple cardiac abnormalities including sclerotic aortic valve, ascending aortic dilatation, aortic insufficiency, mitral and tricuspid insufficiency, left atrial dilatation, left ventricular hypertrophy, and diastolic dysfunction, with an ejection fraction of 65%. Consultation with the Immunology department confirmed the diagnosis of acute anaphylaxis to UFH based on clinical evaluation and exclusion of alternative causes. Given the risk of re-anaphylaxis with allergy testing due to ongoing low molecular weight heparin use, testing was not recommended at that time. Instead, a plan for future testing during a period of heparin abstinence was proposed. The decision was made to discontinue UFH therapy and initiate treatment with fondaparinux (7.5 mg subcutaneously once a day) to manage thrombophlebitis The patient was monitored in the intensive care unit for two days to ensure airway safety and monitor for late signs of anaphylaxis. No complications were observed during this period. Subsequently, due to the absence of indications for continued intensive care, the patient was discharged to the Orthopedics service without complication.

3. Discussion

As detailed in the case presentation, the patient's unexpected reaction to unfractionated heparin was promptly and effectively managed with intervention. This drug is commonly utilized in various surgical procedures for different medical indications in our clinic. The timely intervention averted potentially severe consequences. Heparin, a medication with broad indications across various medical specialties and global utilization, exhibits a side effect spectrum encompassing simple hypersensitivity responses to potentially fatal anaphylactoid reactions [1–3].

The rationale behind initiating intravenous unfractionated heparin therapy instead of other alternatives like low molecular weight heparin (LMWH) products or non-vitamin K antagonist oral anticoagulants (NOACs) based on several factors including immediate anticoagulation (rapid onset of aciton), reversible anticoagulation (shorter half-life), monitoring (monitoring of activated partial thromboplastin time (aPTT) to adjust the dose and maintain therapeutic levels) and renal impairment [4].

Anaphylactic symptoms and anaphylactic shock represent serious, swiftly progressing, and potentially lethal systemic reactions that manifest subsequent to exposure to a triggering agent The diagnosis of anaphylaxis is established based on clinical criteria, emphasizing the urgency to promptly initiate treatment in life-threatening situations. Adrenaline stands as the primary pharmacological intervention for anaphylaxis, and there are no absolute contraindications to its administration. Swift intravenous administration of adrenaline in anaphylaxis treatment is crucial to avert the onset of profound hypotension, which can lead to fatal outcomes [5].

Commercial UFH is derived from porcine intestinal mucosa or bovine lung. It comprises a blend of polysaccharides with substantial protein-binding affinity, typically sized between 10 to 20 kDa, and exhibits notable allergenic potential. The precise pathophysiology underlying heparin-induced anaphylactoid reactions remains incompletely understood; nevertheless, their potential for mortality underscores the paramount importance of prompt and efficacious intervention [2]. It is somewhat remarkable that the number of reported cases of anaphylaxis attributed to heparin is relatively low, with most documented instances dating back several decades [1]. Bernstein [6] has reported the first documentation of anaphylaxis to heparin sodium. It involved a 71- year-old woman who had received heparin after a heart attack but experienced anaphylaxis when given heparin again due to thrombophlebitis. Bernstein reviewed 32 cases of heparin sensitivity, where seven showed anaphylaxis after heparin use. One case showed hypersensitivity to bovine heparin without skin reactions but with antibodies against bovine heparin [7]. Another report documented anaphylactic shock from porcine heparin during heart valve surgery [8].

Heparin-induced anaphylactic and anaphylactoid reactions, especially those linked to oversulfated chondroitin sulfate (OSCS) contamination in the drug, have gained increased attention in recent decades. A critical moment came in 2007 when a surge in anaphylactic reactions tied to unfractionated heparin (UFH) was noted [4]. This discovery followed the FDA receiving 574 reports via the Adverse Event Reporting System related to heparin use. Among these, 94 resulted in deaths, and 68 showed symptoms of allergic reactions like nausea, dyspnea, or hypotension [2,9] These reactions were due to OSCS contamination in specific batches of UFH made in China, which led to a global recall of heparin in 2008.

Heparin-induced thrombocytopenia (HIT) is an immune-driven response caused by platelet-activating IgG antibodies binding to complexes of platelet factor 4 (PF4) and heparin [8]. This reaction can lead to acute cardiovascular collapse, particularly with repeated heparin use [10,11].

The administration of heparin to individuals with heparin-induced antibodies can lead to life-threatening pulmonary or cardiac events. In the medical history of the patient described in our case report, there was no prior use of heparin, heparin-derived medications, or other anticoagulant drugs. Historically, hypersensitivity reactions to heparin were often attributed to impurities. However, this specific case highlights that anaphylactoid reactions triggered by heparin can arise from the substance itself, even in the absence of HIT. Therefore, we propose that the anaphylactic reaction observed in this case occurred due to the acute anaphylaxis process rather than the mediators resulting from previous sensitization. Clinicians research ways to predict hypersensitivity reactions to heparin before administering it due to the high mortality risks involved [12]. Some of them suggest using intradermal skin tests to assess the likelihood of a patient developing such a reaction to heparin or other drugs. A positive result in these tests indicates a higher risk of a severe reaction, helping clinicians consider alternative medications and potentially reducing morbidity and mortality. However, these tests are not widely available in hospitals, emphasizing the need for more research to develop reliable predictive tests and better understand the mechanisms behind heparin-induced reactions [2].

One limitation of this case is the absence of allergy and immunological tests, such as serum tryptase, which is elevated after anaphylaxis and used to confirm the diagnosis in patients with suspected anaphylaxis. This omission makes the diagnosis of anaphylactic shock uncertain. The differential diagnosis includes the possibility of vasovagal shock or cardiac arrest following ventricular fibrillation, given the patient's severe cardiac abnormalities. Additionally, a pulmonary embolism could not be initially ruled out and was considered; however, the patient's subsequent improvement suggests this was less likely. While anaphylaxis remains the most compelling and likely diagnosis to account for the patient's clinical presentation, it cannot be unequivocally confirmed as correct due to the outlined reasons.

4. Conclusions

Heparin, renowned for its widespread usage and diverse therapeutic indications, occupies a crucial role in clinical practice through its unfractionated and synthetic forms. While historically associated with anaphylaxis due to certain preservatives, contemporary knowledge underscores its predominant link to HIT and other immune-mediated responses rather than anaphylactic reactions. The case discussed here contributes to the expanding literature on this rare reaction, emphasizing the imperative for further research aimed at enhancing our understanding of its underlying mechanisms. We advocate for heightened vigilance among healthcare professionals regarding heparin as a potential trigger for anaphylactic reactions.

Acknowledgements

The summary of the current case report was presented as an oral presentation at the Turkish Anesthesiology and Reanimation Association Congress (TARK2023, 2-5 November 2023, Antalya, Türkiye).

Funding

The authors received no financial support for the research, authorship, and/or publication of this manuscript.

Conflict of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this manuscript.

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

None declared.

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Challenge Journal of Perioperative Medicine

Case Report

Perioperative ventricular dysrhythmia management in ranula cyst excision surgery

Merve Yaman [a,*], Tayfun Aydın [b], Osman Pala [c]

[a] Department of Anesthesiology and Reanimation, Kütahya Evliya Çelebi Research Hospital, Kütahya, Türkiye
[b] Department of Anesthesiology and Reanimation, Kütahya University of Health Sciences, Kütahya, Türkiye
[c] Department of Otorhinolaryngology, Kütahya Evliya Çelebi Research Hospital, Kütahya, Türkiye

ABSTRACT

Ranula cyst is one of the most common pathologies of the sublingual salivary gland. It is formed as a result of damage to the gland ducts and is a retention cyst filled with mucus. Methods such as drainage, excision or cryosurgery are used in the treatment. During surgical treatment, it may cause various dysrhythmias due to its anatomical relationship with the vagus nerve. In this study, we aimed to present our response to arrhythmias seen during ranula cyst excision and resistant to IV administration with local lidocaine administration.

ARTICLE INFO

Article history:
Received 16 April 2024
Revised 24 May 2024
Accepted 7 June 2024

Keywords:
Lidocaine
Ventricular arrhythmia
Ranula
Vagus

1. Introduction

The sublingual glands are the smallest of the major salivary glands. The most common pathology is the ranula [1]. A ranula cyst is a mucus-filled retention cyst formed due to damage to the ducts of the sublingual salivary gland, located at the anterior part of the floor of the mouth. It can extend from the base of the skull to the mediastinum [2]. Clinically, it can be sublingual or sublingual plunging (cervical). Those that reach the cervical region by passing the mylohyoid muscle are called plunging ranula, and cases where oral and cervical ranula coexist are called sublingual plunging ranula. The most common type is sublingual ranula. Treatment methods include drainage, excision, and cryosurgery [2,3].

Lidocaine is a medium-duration and fast-onset amide group local anesthetic. In addition to its local anesthetic effect, lidocaine is a Class IB antiarrhythmic that significantly shortens the action potential duration in Purkinje fibers and ventricular myocardium, although it does not alter it in atrial myocardium. It is one of the first-choice drugs in treating ventricular tachyarrhythmias [4]. It is also known that lidocaine, when administered intravenously during surgery, can effectively block sodium channels in the myocardium against ischemia-reperfusion injury [5].

Although ranula cysts are mostly simple mucus-filled cysts, their surgical treatment poses risks, such as the involvement of the vagus nerve. The nervus vagus is the longest cranial nerve. After exiting the jugular foramen, it travels between the internal carotid artery and the internal jugular vein in the neck, proceeding past the larynx, esophagus, and trachea to reach the gastrointestinal organs. It plays a crucial role in the autonomic control circuit of the central nervous system with the brainstem. The vagus provides a wide range of afferent and efferent

* *Corresponding author*. E-mail address: drmerveyaman@hotmail.com (M. Yaman)
ISSN: 2980-292X / DOI: https://doi.org/10.20528/cjpm.2024.02.005

innervation for the internal organs [6–8]. During its course in the neck, the nervus vagus gives off the superior laryngeal nerve and the cervical cardiac branches, forming the cardiac plexus [9]. It also establishes a close connective tissue relationship with the hypoglossal nerve at its inferior ganglion, where they exchange fibers [10].

In our case report, the patient had a preoperative diagnosis of supraventricular tachycardia (SVT). We think that this situation may be related to surgical manipulation as well as the local effect of the existing ranula cyst. Our aim was to emphasize the response of the patient with ranula cyst to the antiarrhythmic effect of lidocaine applied locally during the operation.

2. Case Report

A 28-year-old male patient with known SVT, who was on metoprolol and had a BMI of 26.23; presented to the otorhinolaryngology clinic with the complaint of slowly growing swelling at the floor of the mouth. As a result of the examination and investigations, he was diagnosed with a sublingual ranula cyst (Fig. 1), and surgery was planned. The patient was evaluated as ASA class II according to the American Society of Anaesthesiologists classification.

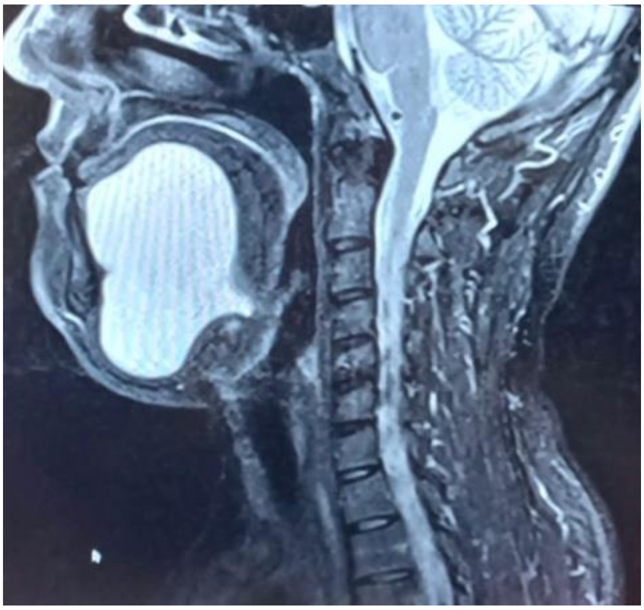

Fig. 1. Radiological image of the ranula cyst.

In the operating room, standard non-invasive monitoring was applied. Blood pressure: 130/60 mmHg, pulse: 95/min, SpO2: 96% on room air. The patient's vital values were stable, but ventricular extrasystoles (VES) were intermittently observed on the ECG. Following preoxygenation, 1 mg/kg of IV lidocaine was administered. Induction was initiated in patient with no dysrhythmia. Propofol 2 mg/kg, fentanyl 1.5 mg/kg, and rocuronium bromide 0.6 mg/kg were administered intravenously. Nasal intubation was performed. For anesthesia maintenance, sevoflurane and remifentanil infusion at 0.6 mcg/kg/min were added. During surgery (Fig. 2), recurrent VES episodes were noted, leading to three additional IV lidocaine administrations.

Fig. 2. Surgical area.

During the dissection of the ranula cyst, as dysrhythmias increased. Then the surgical team requested the local administration of lidocaine at a dosage of 1 mg/kg. Dissection continued after a few minutes of waiting (Fig. 3). No further VES episodes were observed for the remainder of the operation, which lasted about an hour. The patient was extubated after administering analgesics and antiemetics. No dysrhythmia episodes were observed in the first 24 hours postoperatively. The patient was referred to the cardiology clinic for VES management.

Fig. 3. Excised mass.

3. Discussion

The nervus vagus is the longest cranial nerve. Its anatomy and physiology are complex. It affects numerous organ systems of the body, such as the heart, tongue, pharynx and gastrointestinal tract [6]. Literature shows that intraoperative manipulation of the vagal nerve can cause cardiac and circulatory fluctuations in patients, resulting in dysrhythmias and low blood pressure. Additionally, involvement of the inferior laryngeal nerve, a branch of the vagus, can lead to symptoms such as hoarseness, dysphagia, airway obstruction, and dyspnea [11–13].

The parapharyngeal space at the base of the skull is bounded by the ramus of the mandible, parotid gland, vertebral column, and parapharyngeal wall. This space contains cranial nerves IX, X, XI, and XII, along with cervical sympathetic nerves, major blood vessels, lymph nodes, and chemoreceptive tissues [12]. Therefore, surgical procedures in this area may damage these structures.

Ranula cysts are mostly simple mucus-filled cysts and the nervus vagus may be affected in surgical treatment. Dangerous sudden dysrhythmias (VES, bradycardia, etc.) may occur during removal of tissues such as ranula cysts. Therefore, careful monitoring and cooperation between the anaesthetist and the surgeon is essential. Our literature review revealed publications indicating the occurrence of perioperative dysrhythmias during the excision of masses such as schwannomas but lacking guidelines on treatment approaches when encountering such situations.

Ye et al. [11] reported marked intraoperative dysrhythmia during cervical vagal nerve schwannoma excision, which was resistant to IV lidocaine. They suggested that the damage to the cervical vagus nerve during schwannoma excision might interfere with heart rate control, leading to dysrhythmias. In our case, the hypoglossal and lingual nerves were seen and manipulated during the excision. Anatomically, these nerves are closely related to the course of the vagus nerve in the neck [10]. We believe this close relationship contributed to the dysrhythmia observed in our case.

4. Conclusions

In our case, we demonstrated that the antiarrhythmic effect of lidocaine can also be achieved through local application. Additionally, we believe that the experience of the anesthesia team and the multidisciplinary approach with the surgical team can reduce the frequency of potential complications. Finally, we think it is important for clinicians to be alert to the potential development of ventricular dysrhythmia during ranula cyst excision. We also emphasise that they should consider alternative treatment modalities to effectively manage this condition.

Acknowledgements

None declared.

Funding

The authors received no financial support for the research, authorship, and/or publication of this manuscript.

Conflict of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this manuscript.

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

None declared.

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Challenge Journal of Perioperative Medicine

Letter to Editor

Block combinations: The answer sought or a waste of effort?

Basak Altiparmak [a,*], Ali İhsan Uysal [b]

[a] *Department of Anesthesiology and Reanimation, Muğla Sıtkı Koçman University, Muğla, Türkiye*

[b] *Department of Anesthesiology and Reanimation, Muğla Sıtkı Koçman University Training and Research Hospital, Muğla, Türkiye*

Dear Editors,

We read your editorial [1] entitled "Is dual block the answer sought or a waste of effort?" with great interest and wanted to extend the concept of "dual blocks" to "block combinations". The term "block combination" is typically used to describe the simultaneous use of at least two different regional analgesia techniques. For example, an interfacial plane block can be combined with a peripheral nerve block, or multiple interfascial plane blocks can be performed during the same session [2]. Clinicians may opt for block combinations for various reasons: to provide broader coverage for postoperative analgesia [3], or to reduce perioperative opioid consumption [4], or even to ensure complete anesthesia in cases where both general and neuraxial anesthesia approaches are contraindicated [2,5]. While the current literature includes numerous successful case presentations demonstrating the effective anesthetic management of particularly fragile patients using block combinations, there is a notable scarcity of reports on failed cases. Are these block combinations as clinically effective as the literature suggests? Is the success of these reported combinations potentially overhyped? Do clinicians openly report instances where block combinations fail? Herein, we aim to share our risky experience with anesthetic management involving a block combination that nearly failed due to an unexpected factor."

A 72 years old, 96 kg woman (with body mass index 37) was scheduled for a lung biopsy. Classified as American Society of Anesthesiologists (ASA) status IV due to obesity, heart failure, and chronic obstructive pulmonary disease, she presented with dyspnea and an inability to lie horizontally on the operating table. Additionally, she was undergoing anticoagulation treatment with clopidogrel and aspirin. Hence, we opted for an interfascial block combination as the sole anesthetic management. Under intravenous (IV) dexmedetomidine sedation, we performed an ultrasound-guided serratus anterior plane block (SAPB) with 20 ml of 0.25% bupivacaine at the T4 level for port entrance, and an erector spinae plane block (ESPB) with 20 ml of 0.25% bupivacaine at the T4-5 level to potentially alleviate visceral pain. We also placed an ESPB catheter at the same level for postoperative analgesia. Block success was confirmed with a pinprick test, and the patient was transferred to the operating room after 20 minutes. All block procedures and the entire operation were performed with the patient in the sitting position. Before the port entrance, IV 100 mcg of fentanyl was administered, and the patient reported her pain as 3/10 on the Numeric Rating Scale (NRS) during the port placement. Initially, during the first 20 minutes of the surgery, the patient remained calm. However, the pleura was thicker than expected, leading to difficulties in performing the biopsy. By the 30th minute of the surgery, the patient began experiencing pain and discomfort. Despite receiving a dexmedetomidine infusion, she started to move in response to each surgical maneuver. Consequently, IV propofol 20 mg was administered. As the duration of the surgical intervention prolonged, bolus doses of ketamine-propofol (ketofol) were administered as needed. During the one-hour operation, the patient intermittently experienced pain rated over 3/10 due to unplanned surgical approaches and challenging maneuvers. She received several ketofol boluses and, as a result, required ventilatory assistance at one point due to respiratory failure. At the conclusion of the operation, she was transferred to the post-anesthesia care unit for complete recovery.

In critical cases, clinicians nowadays often resort to interfascial blocks or combinations thereof to ensure patient safety. However, does relying solely on fascial blocks truly guarantee patient safety? Recently, Coppens et al. [6] addressed similar questions during the 2023 European Society of Regional Anesthesia (ESRA) annual congress. The authors argued that the majority of fascial blocks lack coverage for visceral pain, and there remains uncertainty regarding the efficacy of erector spinae plane block (ESPB) in blocking visceral pain. Furthermore, our understanding of the nature of fascia and the precise mechanisms of action of fascial plane blocks re-

* *Corresponding author*. E-mail address: basak_ugurlu@yahoo.com (B. Altiparmak)
ISSN: 2980-292X / DOI: https://doi.org/10.20528/cjpm.2024.02.006

mains limited [7]. It is now recognized that the distribution of local anesthetics varies across different fascial layers. Due to variations in thickness and the presence of lines and fusions within fasciae, the movement and spread of local anesthetics can be inconsistent [7]. Additionally, it's crucial to acknowledge that local anesthetic systemic toxicity is a potential risk, particularly when performing block combinations in critically ill patients with low serum protein levels.

In conclusion, while we can appreciate the enthusiasm of clinicians for employing block combinations in challenging cases, it's important to recognize that relying solely on these combined regional techniques may compromise patient safety.

Acknowledgements
None declared.

Funding
The authors received no financial support for the research, authorship, and/or publication of this manuscript.

Conflict of Interest
The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this manuscript.

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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