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CASE REPORT

Sacral multifidus plane block for high-risk patients undergoing perianal surgery: two case reports

Yang-Hoon Chung[1], Jihun Yu[1], Bon-Sung Koo[1], Sang-Hyun Kim[1], Jaewoong Jung[1,*]

[1]Department of Anesthesiology and Pain Medicine, Soonchunhyang University Bucheon Hospital, Soonchunhyang University College of Medicine, 14584 Bucheon, Republic of Korea

***Correspondence**
102978@schmc.ac.kr
(Jaewoong Jung)

Abstract

Erector spinae plane block has emerged as an effective analgesic technique. Sacral multifidus plane block (SMPB), a more appropriate term than sacral erector spinae plane block, is used to provide analgesia or anesthesia during various surgeries. However, SMPB has not been reported in high-risk patients. We describe the use of SMPB as an anesthetic technique for high-risk patients requiring anticoagulation or antiplatelet therapy during perianal surgery. SMPB was performed during perianal surgery in two patients: an advanced-age woman with severe aortic stenosis and heart failure and a man with heart failure and a history of sudden cardiac arrest. With the patient in the jackknife position, 10 mL of 0.25% ropivacaine was administered at the S2 and S4 levels after confirming both sacral intermediate crests. After confirming the absence of perineal pain, the surgery was successfully completed under sedation. Neither patient required additional analgesics on the day of surgery. Based on the absence of pain during the perioperative period, SMPB appears to provide effective anesthesia during perianal surgery in high-risk patients. However, further investigations are needed to confirm the mechanism of SMPB.

Keywords

Multimorbidity; Regional anesthesia; Ropivacaine; Dexmedetomidine

1. Introduction

Preoperative evaluation of a patient is crucial for anesthesiologists to determine the appropriate type of anesthesia based on the patient's comorbidities. Patients with cardiovascular disease, such as heart failure, coronary artery disease or valvular heart disease, are at increased perioperative risk of complications and thus require dedicated, careful, multidisciplinary treatment [1]. Although regional anesthesia has benefits over general anesthesia [2], concerns arise regarding the potential for hypotension resulting from sympathetic block [3]. Furthermore, regional anesthesia is associated with a risk of hematoma or hemorrhage in patients on anticoagulant or antiplatelet therapy. Therefore, ensuring optimal anesthesia through the use of peripheral nerve blocks in such cases facilitates surgery, while safeguarding hemodynamic stability.

Erector spinae plane block (ESPB) has emerged as a valuable technique for providing analgesia by administering a local anesthetic beneath the erector spinae muscle at the transverse process of the vertebra [4]. Since Tulgar *et al.* [5] first introduced sacral ESPB in 2019, several studies have highlighted its potential for reducing postoperative pain in various surgeries [6–8]. This suggests that sacral ESPB can block both the dorsal and ventral branches of the sacral nerves, which makes sacral ESPB an alternative antithetic technique. Notably, sacral ESPB has been used as an anesthetic technique in ambulatory anorectal surgery [9], and parasacral reconstructive surgery [10]. However, its use in high-risk patients has not been reported.

We encountered two patients who had severe cardiovascular disease requiring anticoagulation who were scheduled for perianal surgery. To ensure patient safety, we carefully reviewed their medical histories and discussed the potential risks and benefits of each available anesthetic option including general and regional anesthesia. Through this process, the patients were able to make informed decisions and ultimately opted for sacral ESPB. Therefore, we planned bi-level bilateral sacral ESPB for their surgeries, with a contingency plan to switch to general anesthesia if sacral ESPB proved ineffective during surgery. Considering its anatomical characteristics [11], sacral multifidus plane block (SMPB) may be a more appropriate term than sacral ESPB [12].

2. Case presentation

2.1 Case 1

An 88-year-old woman (height, 158 cm; weight, 38 kg; body mass index, 15.2 kg/m^2) with valvular heart disease (moderate mitral stenosis and severe aortic stenosis (AS)) was scheduled for Delorme's operation for treatment of rectal prolapse. She had also been diagnosed with hypertension, two-vessel coronary disease, and heart failure with a preserved ejection

fraction, and was on the following medications: carvedilol, olmesartan/hydrochlorothiazide, spironolactone, rosuvastatin and clopidogrel. She was in a bed-ridden state because of her age and weakness. A large amount of pleural effusion was detected on preoperative chest x-ray examination; therefore, she was transferred to the department of cardiology for cardiopulmonary optimization. After 1 week of treatment, the pleural effusion had somewhat improved, and she returned to the department of surgery for the operation. The cardiologist indicated that the risk of surgery was moderate to high. Anticipating that further optimization might be unrealistic, and due to the pain and discomfort caused by rectal prolapse, she wanted to undergo surgery. Regional anesthesia was contraindicated because of the antiplatelet therapy (clopidogrel) and severe AS. Although her platelet count was within the normal limits at 204,000/mm^3, her coagulation profile revealed a prolonged prothrombin time (PT) of 1.35 international normalized ratio (INR) (normal 0.87–1.13), and an activated prothrombin time (aPTT) of 38.1 s (normal 27.7–44.2 s). General anesthesia seemed suitable for the operation, but it carried a high risk of cardiovascular complications. The patient was informed of the risks and benefits of the types of anesthesia available, including SMPB, and agreed to follow our plan to perform SMPB.

2.2 Case 2

A 69-year-old man (height, 160 cm; weight, 62.6 kg; body mass index, 24.5 kg/m^2) with heart failure, one-vessel coronary disease, and diabetes mellitus had undergone defibrillator implantation 3 years previously because of a history of sustained ventricular fibrillation and sudden cardiac arrest. He was on the following medications: bisoprolol, valsartan, digoxin, simvastatin, metformin and warfarin. He did not appear acutely ill, and consultation with the cardiologist indicated a mild risk of cardiopulmonary complications. However, the defibrillator needed to be turned off because of the use of electrocautery during surgery, which raised concerns about the risk of ventricular fibrillation during general anesthesia. Neuraxial block was contraindicated because of the anticoagulation therapy (warfarin). His coagulation profile showed a prolonged PT of 1.66 INR and aPTT of 37.2 s. The patient was informed of the risks and benefits of the types of anesthesia available, and he agreed to undergo SMPB for anesthesia, but wanted to be asleep during the entire procedure.

2.3 Sacral multifidus plane block

After the patient entered the operating room, standard monitoring, including noninvasive blood pressure, electrocardiography and peripheral pulse oximetry, was applied. Supplemental oxygen was given via a nasal cannula at a rate of 4 L/min. After the patient's baseline vital signs had been measured, the patient was placed in the jackknife position. Despite the hemodynamic advantages of the lithotomy position over the jackknife position, the surgeon preferred the latter for better exposure of the operative field and for surgical convenience. The patient tolerated the jackknife position well, without any changes in vital signs. The posterior superior iliac spine on both sides and coccyx were checked as landmarks (Fig. 1). After sterilization of the skin with 1% chlorohexidine, the L5 spinous process was visualized with ultrasound, and the linear probe was moved caudally until positioned on the sacrum. The probe was then rotated 90 degrees to check the median crest and moved laterally in a left or right direction to check the intermediate sacral crest. A 25-gauge needle was inserted in a caudocranial direction until it contacted the bone. Aspiration was performed to rule out intravascular injection, and 1 mL of 0.25% ropivacaine was administered to confirm that the multifidus muscle lifted upward as the local anesthetic spread (Fig. 2). After confirming the proper position of the needle, the remaining amount was administered. A total of 10 mL of 0.25% ropivacaine was administered at the S2 and S4 levels (two injections on each side for a total of four injections; *i.e.*, total of 40 mL). Surgery began 20 min later after confirming that the patient did not respond to pain stimulation to the perineum. The pinprick test with a blunt needle was used to assess the sensory block.

2.4 Sedation during surgery

In Case 1, a bolus dose of dexmedetomidine (1 μg/kg over 10 min using a syringe pump) was administered after confirming that the patient did not respond to pain. In Case 2, a loading dose of 1 μg/kg over 10 min was given to the patient after he had been placed in the jackknife position due to the patient's preference. After a 10 min loading time, maintenance doses were administered at respective rates of 0.6 and 0.7 μg/kg/h. End-tidal carbon dioxide was monitored during sedation to confirm spontaneous respiration. Although hemodynamic stability was maintained throughout the entire surgery in Case 2, hypotension occurred with an approximately 50% decrease in baseline blood pressure after the loading dose was completed in Case 1. The maintenance dose was reduced to 0.5 μg/kg/h, and phenylephrine of 100 μg was administered twice to correct the blood pressure.

In both cases, surgery was completed successfully without adverse events such as movement, agitation, or laryngospasm. The total anesthesia time was 94 and 44 min in Cases 1 and 2, respectively, with operating times of 55 and 11 min. After awakening in the post-anesthesia care unit, both patients were asked to assess their current pain on a verbal rating scale: no pain, mild enough to not require analgesics, moderate enough to require analgesics, or severe enough that they felt like dying. They reported no pain, correlated with a numeric rating scale score (an 11-point scale where 0 is no pain and 10 is the worst imaginable pain) of 0 [13] and were discharged without any additional analgesics. During the ward follow-up on the day of surgery (8 and 6 h after discharge from the post-anesthesia care unit, respectively), both patients complained of mild pain, which did not require analgesics. Their vital signs were stable, and there was no evidence of bleeding, such as swelling or rash, at the injection site. The patients did not require any analgesics on the day of surgery. Case 1 was transferred to the department of cardiology for management of underlying medical disease on postoperative day 7 due to a persistent pleural effusion despite percutaneous drainage insertion, while Case 2 was discharged routinely on postoperative day 2. After one week treatment with diuretics and drainage, the percutaneous drainage catheter was removed, and Case 1 was discharged on

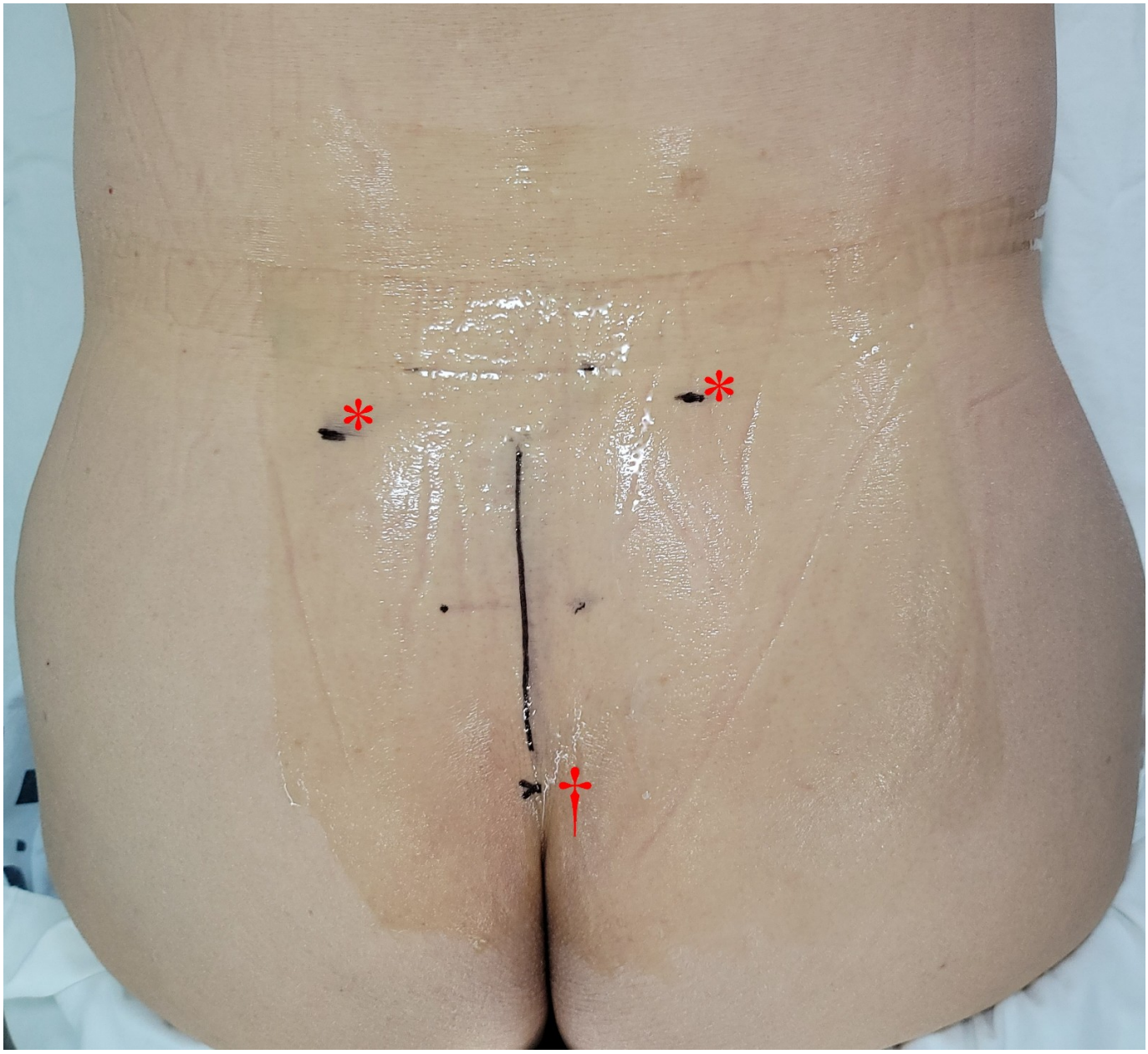

FIGURE 1. Sacral surface landmarks. *: posterior superior iliac spine on both sides; †: coccyx.

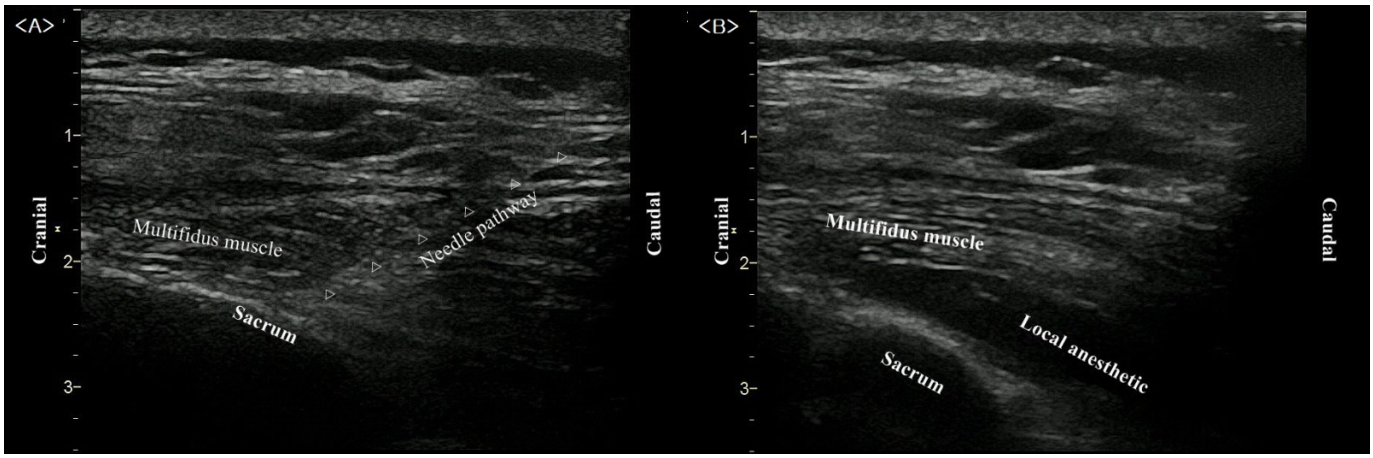

FIGURE 2. Ultrasound image of the sacral multifidus plane block. (A) Needle pathway toward the sacrum in a caudocranial direction. (B) Upward lifting of the multifidus muscle after injecting local anesthetics.

postoperative day 15. There were no anesthesia- or surgery-related adverse events.

3. Discussion

We successfully performed SMPB as the primary anesthetic technique for two patients with severe cardiovascular disease requiring anticoagulation. Because sedation was also used with SMPB during surgery, we cannot confirm the isolated anesthetic effect of SMPB in these patients. However, light sedation alone during perianal surgery can result in intense pain, leading to reflex body movements, tachypnea and laryngospasm [14]. The absence of these signs in our patients suggests that SMPB could be a suitable option for mitigating pain during perianal surgery.

Although SMPB may cause bleeding in patients undergoing anticoagulation or antiplatelet therapy, we observed no bleeding in our patients. This may be attributed to the relatively superficial target point of SMPB, which allows adequate pressure to be applied at the injection site for hemostasis. Additionally, because no important structures such as vessels and nerves are present between the target point and the skin [15], SMPB can be safely performed under ultrasound guidance. Applying adequate pressure not only helps with hemostasis but also facilitates spread of the local anesthetics to other structure by providing high pressure [16]. Furthermore, by avoiding sympathetic blockade caused by neuraxial block, hemodynamic stability can be maintained in high-risk patients.

The mechanism of SMPB remains incompletely understood. Initially, SMPB was introduced as a technique for blocking only the dorsal branch of sacral nerves [5]. The currently known mechanism involves blockade of the dorsal branches of the sacral nerve, which pierce out through the multifidus muscle, and the diffusion of the drug through the sacral foramina, with subsequent spread to the sacral epidural space or the ventral branches of the sacral nerve. A cadaveric study by Diwan *et al.* [16] revealed consistent spread of dye to the multifidus muscle plane with relatively inconsistent spread in the sacral epidural space and along the intrapelvic ventral nerve roots. Although SMPB was not the only anesthetic technique in our patients, who were sedated with dexmedetomidine, which has analgesic effects, the patients did not complain of any pain from the start of surgery to discharge from the post-anesthesia care unit. Additionally, they did not require additional analgesics, indirectly supporting the possibility of blockade of the ventral and dorsal branches of the sacral nerve. However, further investigations are needed to confirm this.

We performed SMPB as a means of multimodal analgesia during abdominoperineal resection. While we recognized the potential for SMPB to serve as an effective anesthetic method, we could not be certain of its efficacy. Additionally, the patients wanted to be asleep during the procedure; therefore, we planned to administer sedatives along with SMPB. With a patient in the prone position, sedation can cause respiratory depression, which can be difficult for anesthesiologists to manage. Dexmedetomidine, known for being associated with a lower risk of respiratory depression, is commonly used at our center for sedation in patients in the prone position. Due to its inherent analgesic effects, we chose this as the sedative for our patients. Case 1 developed profound hypotension after administration of the loading dose of dexmedetomidine, which might have been attributed to the sympatholytic effect of dexmedetomidine [17]. From the time of ropivacaine administration until completion of the dexmedetomidine loading dose, no significant changes were observed in blood pressure or heart rate. Thus, we thought the hypotension was likely due to dexmedetomidine-induced vasodilation rather than SMPB. Low systemic vascular resistance due to vasodilation should be compensated by an increase in cardiac output to maintain blood pressure. However, the compensatory increase in cardiac output might have been limited in Case 1 because of severe AS leading to more profound hypotension. The correction of blood pressure following phenylephrine administration also supports our hypothesis.

Despite its promising results, our study had several limitations. First, although we observed the effectiveness of SMPB in mitigating pain during perianal surgery, the exact mechanism of this technique remains unclear. Further investigations, such as cadaveric or imaging studies, are therefore needed to better understanding how this technique could be used as a means of analgesia or anesthesia. Second, despite the patients' clinical differences, we used a fixed amount and concentration of local anesthetics. Proper doses and concentrations of local anesthetics are crucial to improve the quality of blockade. Third, the duration of SMPB was not determined precisely, including the onset of dull or sharp pain and the need for additional analgesics. Further investigations need to determine whether adjuvants, such as dexamethasone or epinephrine could prolong the duration of SMPB. Finally, patients with severe cardiovascular disease are often prescribed multiple medications. It is crucial to have a thorough understanding of these medication and to pay attentions to potential drug interactions.

4. Conclusions

SMPB was safely performed in two high-risk patients in this study, suggesting that it might be an effective anesthetic technique for perianal surgery by blocking the dorsal and ventral branches of the sacral nerves. However, further investigation is needed to confirm these results. With a better understanding of SMPB, this technique could become a viable anesthetic option not only for high-risk patients but also for general patients undergoing perianal surgery.

ABBREVIATIONS

AS, aortic stenosis; ESPB, erector spinae plane block; SMPB, sacral multifidus plane block.

AVAILABILITY OF DATA AND MATERIALS

The data presented in this study are available from the corresponding author on reasonable request.

AUTHOR CONTRIBUTIONS

YHC, SHK and JJ—designed the research study. YHC, BSK, JJ—performed the research. JY, SHK and JJ—analyzed the data. YHC, JY, BSK, SHK and JJ—wrote the manuscript. All authors read and approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Publication of these case reports was approved by the institutional review board of Soonchunhyang University Bucheon Hospital (IRB No. 2023-04-016), and written informed consent was obtained from both patients involved in the study.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

REFERENCES

[1] Halvorsen S, Mehilli J, Cassese S, Hall TS, Abdelhamid M, Barbato E, *et al*. 2022 ESC Guidelines on cardiovascular assessment and management of patients undergoing non-cardiac surgery developed by the task force for cardiovascular assessment and management of patients undergoing non-cardiac surgery of the European Society of Cardiology (ESC) Endorsed by the European Society of Anaesthesiology and Intensive Care (ESAIC). Italian Journal of Cardiology. 2023; 24: e1–e102. (In Italian)

[2] Yap E, Wei J, Webb C, Ng K, Behrends M. Neuraxial and general anesthesia for outpatient total joint arthroplasty result in similarly low rates of major perioperative complications: a multicentered cohort study. Regional Anesthesia & Pain Medicine. 2022; 47: 294–300.

[3] Sostaric M. Perioperative preparation of cardiac patients in regional anesthesia. Acta Clinica Croatica. 2022; 61: 84–89.

[4] Chin KJ, El-Boghdadly K. Mechanisms of action of the erector spinae plane (ESP) block: a narrative review. Canadian Journal of Anesthesia. 2021; 68: 387–408.

[5] Tulgar S, Senturk O, Thomas DT, Deveci U, Ozer Z. A new technique for sensory blockage of posterior branches of sacral nerves: ultrasound guided sacral erector spinae plane block. Journal of Clinical Anesthesia. 2019; 57: 129–130.

[6] Kukreja P, Deichmann P, Selph JP, Hebbard J, Kalagara H. Sacral erector spinae plane block for gender reassignment surgery. Cureus. 2020; 12: e7665.

[7] Sawyer K, Ceballos B, Kukreja P, Kalagara H. A novel sacral erector spinae block reduces opioid use after gender-affirming vaginoplasty. Journal of Sexual Medicine. 2022; 19: S91.

[8] Mermer A, Simsek G, Mermer HA, Tire Y, Kozanhan B. Effect of sacral erector spinae plane block on post-hemorrhoidectomy pain: a randomized controlled trial. Medicine. 2023; 102: e35168.

[9] Kaya C, Dost B, Tulgar S. Sacral erector spinae plane block provides surgical anesthesia in ambulatory anorectal surgery: two case reports. Cureus. 2021; 13: e12598.

[10] Unal M, Baydar H, Guler S, Sonmez A, Gumus M, Tulgar S. Sacral erector spinae plane block as the main anesthetic method for parasacral reconstructive surgeries: a single-center retrospective cohort feasibility study. Cureus. 2023; 15: e37347.

[11] Hamilton DL. The erector spinae plane block: time for clarity over anatomical nomenclature. Journal of Clinical Anesthesia. 2020; 62: 109699.

[12] Piraccini E, Taddei S. Sacral multifidus plane block: the correct name for sacral erector spinae plane block. Journal of Clinical Anesthesia. 2020; 63: 109754.

[13] Lee HJ, Cho Y, Joo H, Jeon JY, Jang YE, Kim JT. Comparative study of verbal rating scale and numerical rating scale to assess postoperative pain intensity in the post anesthesia care unit: a prospective observational cohort study. Medicine. 2021; 100: e24314.

[14] Rajabi M, Hosseinpour M, Jalalvand F, Afshar M, Moosavi G, Behdad S. Ischiorectal block with bupivacaine for post hemorrhoidectomy pain. The Korean Journal of Pain. 2012; 25: 89–93.

[15] Kilicaslan A, Goger E, Karakus F, Reisli R. Bilevel-bilateral sacral erector spinae plane block for chronic pain management: a case report and short literature review. Selcuk Medical Journal. 2020; 1: 65–69.

[16] Diwan S, Garud R, Sancheti P. Deciphering the mechanism of continuous sacral erector spinae block: a cadaveric study. Turkish Journal of Anaesthesiology and Reanimation. 2022; 50: 471–473.

[17] Weerink MAS, Struys MMRF, Hannivoort LN, Barends CRM, Absalom AR, Colin P. Clinical pharmacokinetics and pharmacodynamics of dexmedetomidine. Clinical Pharmacokinetics. 2017; 56: 893–913.

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