Observational Study

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The analgesic benefit of rectus sheath block in robotic gynecologic surgery

A retrospective study

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Abstract

With the growing adoption of robotic techniques in gynecologic surgery, the advantages of minimally invasive procedures over traditional open surgery, such as reduced postoperative pain and quicker recovery, are clear. Yet, establishing an effective multimodal analgesic regimen remains a challenge. This retrospective study from a tertiary care center aimed to assess the analgesic efficacy of the rectus sheath block (RSB) on postoperative pain and opioid consumption after robotic gynecologic surgery. Between June 2022 and March 2023, 20 patients who underwent robotic gynecologic surgery were evaluated. Key parameters included postoperative visual analog scale scores, opioid consumption, and postoperative nausea/vomiting instances. Anesthesia protocols were standardized, with postsurgical pain management involving RSB and a patient-controlled analgesia device filled with morphine. Patients showed an average morphine intake of 8.2 ± 5.09 mg over the initial 24 hours postsurgery. During mobilization, average pain scores were consistently low, with no correlation identified between opioid consumption and age or body mass index. 40% of patients reported postoperative nausea on the first day, and no complications linked to the RSB were observed. The study underlines the potential of integrating RSB in a multimodal analgesic regimen after robotic gynecologic surgery. Its application may lead to reduced opioid consumption and more efficient postoperative pain management. Further randomized controlled trials are recommended to validate these findings.

Abbreviations: iv = intravenously, RSB = rectus sheath block.

Keywords: pain management, rectus sheath block, regional anesthesia, robotic gynecologic surgery, robotic surgery

1. Introduction

The use of robotic techniques in gynecologic surgery has increased dramatically in recent years.[1] Compared to traditional open surgery, minimally invasive techniques offer substantial benefits such as less postoperative pain, shorter hospital stay, and improved quality of recovery.[2] Despite these advances in surgical technique, an effective multimodal analgesia regimen has not been established.

The rectus sheath block (RSB) was originally introduced in 1899 for relaxation of anterior abdominal muscles during surgery.[3] However, with the advent of ultrasound-guided technique, the role of RSB has expanded into the realm of postoperative analgesia. RSB is an easily applicable abdominal wall block, in which local anesthetic is administered between the rectus muscle and its posterior sheath blocking effectively the anterior cutaneous branches of the lower thoracic spinal nerves (T7–T12).

RSB was shown to reduce pain in laparoscopic gynecologic surgery in the literature. In a systematic review and network meta-analysis by Cassai et al[4] the effect of RSB on various laparoscopic surgeries was investigated, and RSB was found to be effective in reducing postoperative pain.

In recent years, RSB has started to be used in robotic gynecologic surgery showing promising clinical outcomes. To the best of our knowledge, there is currently no published information on utilizing performing RSB as a component of a multimodal analgesic regimen after robotic gynecologic surgery. This study aims to show the effect of RSB on postoperative pain and postoperative cumulative opioid use after robotic gynecologic surgery.

2. Methods

Patients who underwent robotic gynecologic surgery at a university hospital between June 2022 and March 2023 were enrolled

Written informed consent from the patients were obtained.

The authors have no conflicts of interest to disclose.

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

The study received approval from the local ethical committee (protocol no: 2023.072.IRB1. 024).

The author declares that s(he) has no relevant or material financial interests that relate to the research describe in this paper.

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in the study. Demographic details, perioperative events, postoperative visual analog scale scores, and postoperative opioid consumption retrospectively were collated and evaluated from the database.

Anesthesia protocols for surgical procedures such as robotic and laparoscopic surgeries are standardized at the institute. Premedication involved administering midazolam (0.03–0.1 mg/kg) intravenously (iv). In the operating suite, standardized monitoring was enforced, which encompassed SPO_2, ECG, and noninvasive blood pressure metrics. General anesthesia induction and muscle relaxation for intubation were achieved using propofol (2–3 mg/kg), fentanyl (1–2 μg/kg), and rocuronium (0.6–1.2 mg/kg) iv. Maintenance of anesthesia was with 1 minimum alveolar concentration of desflurane and remifentanil infused at a rate of 0.5–2 μg/kg/min. Upon concluding the surgery, patients were administered tramadol (100 mg), paracetamol (1 g), ibuprofen (800 mg), dexamethasone (8 mg), and ondansetron (8 mg) iv.

For robotic gynecologic surgery, the port site placement is illustrated in Figure 1. An initial 8 mm robotic port was positioned at the umbilicus. Subsequently, 3 additional 8 mm ports were situated lateral to the primary umbilical port (2 on the right side and 1 on the left), spaced approximately 8 cm from each other. A 5 mm trocar for the aspiration device was embedded in the left upper abdominal wall adjacent to the 8 mm left robotic port.

After surgery, RSB was conducted employing a broadband (5–12 MHz) linear array ultrasound probe (GE logic P9, Gyeonggi- do, Republic of Korea) and a 20 G, 80 mm, insulated facet type needle (BBraun ultra-360, Melsungen, Germany). Bupivacaine (20 ml of 0.25%) was injected bilaterally (Fig. 2).

In the postoperative recovery unit, patients were equipped with morphine patient-controlled analgesia. It was set to dispense a 1 mg bolus dose with an 8-minute lockout interval. Paracetamol (1 g every 6 hours) and ibuprofen (800 mg every 12 hours) were systematically administered during ward care.

Pain management nurses monitored patients postoperatively. Cumulative morphine intake at 24 hours postsurgery was documented. Postoperative pain intensity was measured using visual analog scale, which ranges from 0 (no pain) to 10 (most severe pain), at 1, 3, 6, 12, and 24 hours after surgery. Events of nausea and vomiting within the initial 24 hours postsurgery were also recorded.

The study received approval from the local ethical committee (protocol no: 2023. 072. IRB1. 024). Participants provided written consent for study publication. This article aligns with the Enhancing the QUAlity and Transparency Of health Research publication guidelines.

Data processing was executed using SPSS (Version 20.0, 2011, IBM SPSS Statistics for Windows; IBM Corp. Armonk). Descriptive statistics comprised median, mean, standard deviation, and frequency and ratio values.

3. Results

Between June 2022 and March 2023, a total of 20 patients, ranging in age from 33 to 75 years, underwent robotic gynecologic surgery. These procedures were performed under general anesthesia, subsequently followed by RSB. The detailed demographics of the participants and surgery type are presented in Tables 1 and 2.

The average morphine consumption over the initial 24 hours postsurgery was determined to be 8.2 ± 5.09 mg. Table 3 provides a comprehensive overview of morphine utilization along with pain scores at specified intervals.

In the immediate postoperative period within the anesthesia care unit, 5 patients necessitated 50 mg of fentanyl as a rescue analgesic. Three patients did not request any supplemental analgesics during the 24-hour postoperative observation. Notably, 40% of the patients experienced postoperative nausea on the first day following the procedure.

The study found no complications directly related to the block. Additionally, there were no reported adverse incidents tied to the ultrasound-guided RSB, including systemic toxicity, inadvertent peritoneal puncture, or harm to any internal organs. All participants had an uncomplicated and smooth recovery in the postoperative phase.

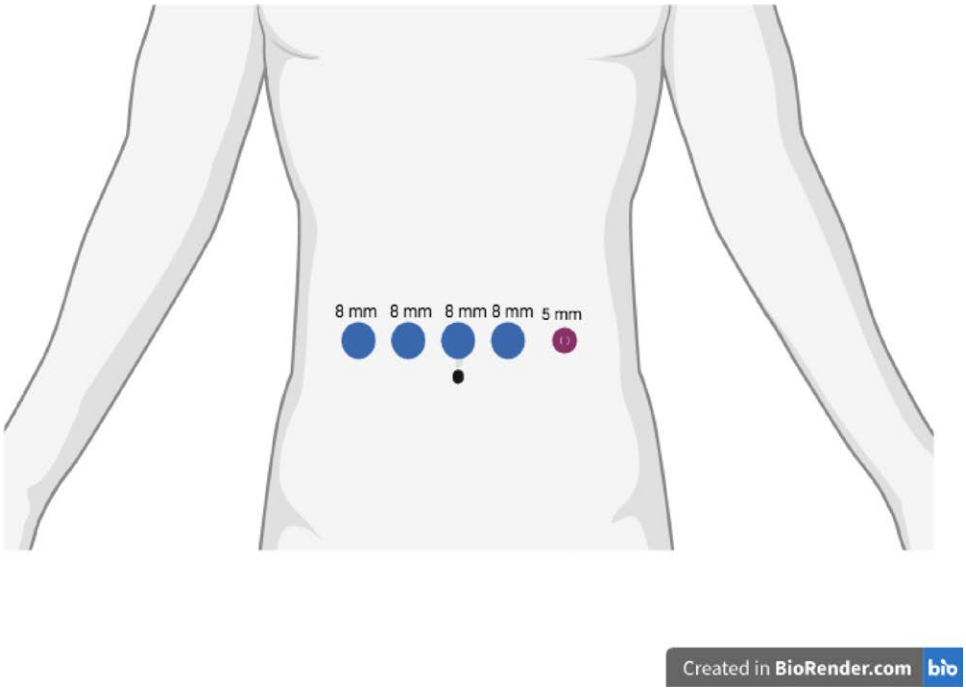


Figure 1. Port site placement for robotic gynecologic surgery. (Created with BioRender.com).



Figure 2. Ultrasound image of rectus sheath block. LA = local anesthetic, RS = rectus sheath.

Table 1

Demographic data of the patients.

	n = 20
Age (years); mean ± SD	56.85 ± 10.58
BMI (kg/m^2); mean ± SD	30.5 ± 5.51
ASA score (I/II)	1/19

ASA = American Society of Anesthesiologist, BMI = Body Mass Index, SD = standard deviation.

Table 2

Type of surgery.

Estimated blood loss, mL; mean ± SD	142.5 ± 89.27
Duration of surgery, min; mean ± SD	290 ± 59.18
Surgical procedure	4
Hysterectomy	7
Hysterectomy + BSO	7
Hysterectomy + BSO + LND	1
Myomectomy	1
Cytoreductive surgery	

BSO = bilateral salpingooferectomy, LND = lenf node dissection, SD = standard deviation.

Table 3

Postoperative VAS score for pain and morphine consumption.

	VAS at movement	Morphine consumption, mg
1 h	2.4 ± 1.83	3.7 ± 1.63
3 h	1.9 ± 1.59	5.4 ± 3.02
6 h	0.8 ± 1.54	6 ± 3.49
12 h	0.5 ± 1.26	6.7 ± 4.5
24 h	0	8.2 ± 5.09

VAS = visual analog scale.
Data are represented as Mean ± standard deviation

4. Discussion

This case series evaluates the analgesic potential of ultrasound-guided RSB in patients undergoing robotic gynecologic surgery. The robotic-assisted approach has revolutionized gynecologic procedures, providing enhanced surgical visualization and dexterity when compared with a traditional open or laparoscopic techniques.[5] These advancements were shown to result in rapid recovery and therefore earlier discharge from the hospital.[1]

However, despite the improvements in patient quality indicators associated with minimal invasive surgery, patients often experience severe postoperative pain requiring extra analgesic intervention. Some studies suggest that the use of larger trocars and subsequent closure of the deep fascial layer can exacerbate postoperative pain.[6] The periumbilical region, a standard incision site in robotic surgeries, emerges as a frequent epicenter of postoperative discomfort. This is possibly attributable to the larger assistant trocar site.

The RSB is a field block that encompasses multiple nerves, including T10 nerve branches and the T9 and T11 nerves, thereby providing comprehensive analgesia in the periumbilical region and midline incision.[7] There are many studies in the literature reporting that intraoperative and postoperative opioid consumption was significantly reduced in patients who received RSB compared with the control group.[8]

Metwally et al[9] compared the efficacy of intraperitoneal instillation of levobupivacaine versus ultrasound-guided RSB for postoperative pain relief following laparoscopic cholecystectomy. The study found that both methods resulted in excellent pain reduction, suggesting that RSB can be an effective option for pain management in laparoscopic surgery. Cassai et al,[4] through a systematic review, underscored the effectiveness of RSB up until the twelfth postoperative hour but observed its diminishing returns by the twenty-fourth hour. In addition, a randomized controlled trial by Hamill et al[10] specifically studied the effect of RSB on pain after laparoscopic appendicectomy for acute appendicitis. The study found that RSB significantly reduced early postoperative pain in children undergoing laparoscopic appendicectomy. These studies provide evidence that RSB can be an effective method for reducing pain in minimally invasive gynecologic surgery.

This study demonstrated that the rectus block can be safely placed in a population consisting of obese patients. Mean body mass index in this study was 30.5 (range 22–38.8 kg/m^2). There were 10 patients with a body mass index greater than 30 kg/m^2, and there were no complications regarding the block placement.

It is pivotal, however, to understand the pain spectrum addressed by RSB. Predominantly, RSB mitigates somatic pain

and is less efficacious against visceral pain.[11] Given the dual nature of pain postrobotic gynecologic surgery, encompassing both somatic and visceral components, this distinction is crucial. With robotic surgery often culminating in organ removal, it is plausible that the visceral pain contributors are minimized.[12] Thus, effective management of somatic pain could be instrumental in significantly alleviating overall postoperative discomfort.

5. Conclusion

While the optimal analgesic strategy of postrobotic surgery remains a topic of active research, our findings advocate for the integration of RSB within a multimodal analgesic regimen. Such an approach can potentially curtail opioid consumption and ensure effective pain management. These observations warrant further exploration, ideally through randomized controlled trials, to bolster our understanding and derive more robust conclusions.

Author contributions

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Visualization: Mete Manici, Ilayda Kalyoncu.
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Writing – review & editing: Mete Manici, Doğan Vatansever, Yavuz Gurkan.
Data curation: Ilayda Kalyoncu.
Formal analysis: Ilayda Kalyoncu.
Software: Ilayda Kalyoncu.
Validation: Ilayda Kalyoncu.
Methodology: Doğan Vatansever.

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